

# Pro Tools TDM Installation Guide

**Version 5.1.1 for Windows 2000**

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## chapter 1

# Pro Tools TDM System Requirements

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## Pro Tools TDM Systems

Pro Tools 5.1 for Windows 2000 Pro supports the following TDM (Time Division Multiplexing) systems.

### Pro Tools MIX-Series (Pro Tools 24 MIX, MIXplus and MIX3)

A core system includes:

- MIX Core card
- MIX Farm card (MIXplus contains one card and MIX3 contains two cards)
- Pro Tools software
- Digidesign audio interface (sold separately)

A core system provides:

- Up to 64 tracks of recording and playback of 24-bit and 16-bit audio files
- TDM digital mixing and DSP plug-in environment
- Non-linear, random-access editing and mix automation
- MIDI recording, playback and editing


### Pro Tools 24

A core system includes:

- d24 Audio card
- DSP Farm card
- Pro Tools software
- Digidesign audio interface (sold separately)

A core system provides:

- Up to 32 tracks of recording and playback of 24-bit and 16-bit audio files
- TDM digital mixing and DSP plug-in environment
- Non-linear, random-access editing and mix automation
- MIDI recording, playback and editing

 Pro Tools 24 requires a MIX Farm card to support up to 64 tracks.

## Audio Interfaces

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

### 888/24 I/O

- ♦ Analog: XLR (balanced or unbalanced) connectors, +4 dBu or -10 dBV
- ♦ Digital: XLR (AES/EBU) or RCA (S/PDIF) connectors

## 882/20 I/O

- ◆ Analog: 1/4" TRS (balanced or unbalanced) connectors, +4 dBu or -10 dBV
- ◆ Digital: RCA (S/PDIF) connectors

## 1622 I/O

- ◆ Analog: 1/4" TRS (balanced or unbalanced) connectors. Inputs are variable from +4 dBu to -10 dBV; outputs are selectable between +4 dBu or -10 dBV
- ◆ Digital: RCA (S/PDIF) connectors

## Digidesign ADAT Bridge I/O

- ◆ Analog: 1/4" TRS (balanced) connectors, +4 dBu or -10 dBV
- ◆ Digital: XLR (AES/EBU) or RCA (S/PDIF) connectors
- ◆ Optical: Two pairs of EIAJ fiber optic connectors

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## System Requirements

The CPU, hard disk, monitoring and MIDI requirements for Pro Tools differ depending on your system configuration. The requirements for each configuration are listed below.

### 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 latest compatibility information on the Digidesign Web site:


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

## Computer Requirements

- ◆ A Digidesign-qualified, uniprocessor Pentium II or Pentium III-based (highly recommended) computer:
  - 256 MB RAM (required for 64-voice performance).
  - 1 unused PCI slot for Pro Tools 24 MIX systems.
  - 2 unused adjacent PCI slots for Pro Tools 24 or Pro Tools 24 MIXplus systems.
  - 3 unused adjacent PCI slots for Pro Tools 24 MIX3 systems.
  - For expanded systems, the expansion chassis card takes the place of the Pro Tools card in the PCI slot and the Pro Tools card is placed in the chassis.
  - VIA Apollo Pro133 (for Pentium III), *or*, Intel 440BX (for Pentium II or III).
  - Phoenix or Award BIOS.
  - A CD-ROM drive.
  - An AGP display card is strongly recommended.
  - Windows 2000 Professional Edition with Service Pack 1 or higher.
- ◆ A 17-inch or larger color monitor. Black and white monitors are not supported.
- ◆ Additional RAM is highly recommended if you plan to use other audio or MIDI applications concurrently with Pro Tools.

## Hard Drive Requirements


For audio recording and storage, all Pro Tools TDM systems require one or more Digidesign-qualified SCSI drives attached to a qualified PCI SCSI HBA card or qualified built-in SCSI HBA connector on the motherboard.

 *FAT32 drives are highly recommended for both system and storage drives.*

**Pro Tools MIX-series systems** For best 64-track, 24-bit performance, use 4 hard drives, with audio files distributed among them.

**Pro Tools 24 systems** For best 32-track, 24-bit performance, use 2 hard drives, with audio files distributed among them.

IDE drives are not supported for use as studio drives on Windows-based Pro Tools systems. If you intend to use an IDE drive, your session must be limited to 16 bits. 24-bit sessions are not compatible with IDE drives.

 It is recommended that you remove IDE drives and drivers from any Pro Tools system. SCSI boot drives provide better Pro Tools performance. However, if you are using an Expansion Chassis, IDE drives and drivers must be removed from your system. For more information, see the *Pro Tools Expanded System Installation Guide*.

For audio recording and storage, all Pro Tools TDM systems require one or more Digidesign-qualified drives.

To provide full 64-track, 24-bit, 48 kHz performance, a TDM system must include at least two Digidesign-qualified SCSI hard drives attached to a qualified SCSI HBA (host bus adapter) card.

For 64-track sessions that have substantial edit densities (such as one edit every third of a second across 64 voices) or large amounts of cross-fades, up to four SCSI drives may be required, allocated with 16 tracks per drive and two drives per SCSI channel.

Refer to the Digidesign Web site for compatible hard drives and SCSI HBA cards:

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

## MIDI Requirements

Both USB and serial MIDI interfaces work effectively with Pro Tools. Serial MIDI interfaces offer the tightest possible MIDI timing.

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## Digidesign Registration

Make sure to complete and return the registration card included with Pro Tools TDM system. Registered users are entitled to one year of free technical support, and will receive periodic software updates and upgrade notices.

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## About the Pro Tools Guides


PDF versions of the Pro Tools guides are installed automatically with Pro Tools, and can be easily accessed from the Help menu in Pro Tools. To read the guide online, or print it, you must install *Acrobat Reader* (included on the Pro Tools Installer CD).


## Conventions Used in This Guide


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

Convention	Action
File > Save Session	Choose Save Session from the File menu
Control+N	While pressing the Control key, press the N key
Shift-click	While pressing the Shift key, 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.*

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

## Choose and Select

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

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

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



## chapter 2

# Connecting SCSI Drives

Pro Tools sessions and audio files are stored on SCSI hard drives. SCSI hard drives are the recommended recording media for Pro Tools TDM systems.

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

SCSI hard drives offer several advantages over ATA/IDE drives. First, SCSI drives can be external and therefore provide portable audio storage that is easily moved between systems. Second, SCSI drives offer better performance when recording to large numbers of tracks. Furthermore, 24-bit sessions cannot be guaranteed to record or playback from ATA/IDE drives.

For 64-track sessions that have substantial edit densities (such as one edit every third of a second across 64 voices) or large amounts of cross-fades, up to four SCSI drives may be required, allocated with 16 tracks per drive and two drives per SCSI channel.

SCSI drives must provide a data transfer rate of at least 9 MB per second of sustained throughput.

**▲** *Pro Tools 24 requires a MIX Farm card (or the discontinued Pro Tools 24 Expansion Kit) to support up to 64 tracks.*

Refer to the Digidesign Web site for compatible hard drives and HBA cards:

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

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

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## SCSI Requirements

### High-Performance SCSI Drives and SCSI Host Bus Adapters

To provide full 64-track, 24-bit, 48 kHz performance, a Pro Tools TDM system must include at least two Digidesign-qualified SCSI hard drives attached to a qualified SCSI HBA host bus adapter (HBA) card.

## SCSI Cables

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

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

SCSI type and transfer rate	maximum cable length	maximum # 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
Ultra2 SCSI Low Voltage Dif- ferential (LVD) 80 MB/sec	12 meters	16

## Disk Space for Audio Tracks

Audio tracks recorded at 24-bit resolution at a CD-fidelity sampling rate of 44.1 kHz require about 7.5 MB of hard drive space per minute. The same tracks recorded at 16-bit resolution require about 5 MB per minute. Stereo tracks require about twice as much hard drive space.

### Using these guidelines:

- 64 mono tracks of 24-bit audio takes up about 480 MB of hard drive space per minute.
- 64 mono tracks of 16-bit audio takes up about 320 MB of hard drive space per minute.
- 32 mono tracks of 24-bit audio takes up about 240 MB of hard drive space per minute.
- 32 mono tracks of 16-bit audio takes up about 160 MB per minute.

### A 9-gigabyte drive holds:

- 18 minutes of 64 tracks, 24-bit audio
- 28 minutes of 64 tracks, 16-bit audio
- 37 minutes of 32 tracks, 24-bit audio
- 56 minutes of 32 tracks, 16-bit audio

## 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 SCSI drives. See the *Pro Tools Reference Guide* for details.

## Separate Video and Audio Files

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

## Dual-Channel SCSI HBA Cards

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

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## 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 depending on your system's SCSI requirements.
- 3 Secure the cable's connectors to the hard drive and computer. Loose cables can cause data loss.
- 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 connected is properly terminated. See "SCSI Termination" on page 7.
- 6 Attach power cables to the hard drives.

## SCSI Termination

If your computer's SCSI chain is not properly terminated, your system will not function correctly. Terminate only the last device on the chain, using the termination type recommended by the hard drive manufacturer.

Use either an external terminator plug or enable the device's internal terminators. If you are using a terminator plug, it is recommended that you purchase and use an *active* terminator.

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

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## Initializing and Maintaining SCSI Drives

SCSI hard drives used for audio recording on TDM systems must be formatted for the FAT32, FAT16 or NTFS files system. Under Windows 2000, FAT32 and NTFS drive partition sizes are almost limitless. FAT16 partitions have a limit of 4096 MB.

TDM Windows systems require that you use Microsoft Windows Disk Administration software for drive formatting and partitioning. Use only one disk utility for all drives in a system.



*Pro Tools for Windows 2000 allows you to connect Macintosh-formatted hard drives and play sessions created on Pro Tools for Macintosh when using MacOpener from DataViz. A demo version of MacOpener is included on your Pro Tools CD-ROM.*

### To format a new drive:

- 1 Turn on your hard drives, computer, and any other peripherals.
- 2 Use Microsoft's Disk Management software, located in the Administrative Tools control panel under Computer Management > Storage.

Refer to your Windows 2000 manual or help for information on how to use the Disk Management software.

## Formatting Drives

There are two different types of formatting: high-level formatting and low-level formatting.

### Low-Level (Physical) Formatting

Low-level formatting means completely erasing the hard drive and rewriting each sector address on the drive. In low-level formatting, the sector and track addresses, error-correction codes, and other details are written on the platters of the hard drive in the form of a magnetic pattern. A low-level format permanently erases all data on the drive.

#### When is Low-Level Formatting Necessary?

Virtually all hard drives come pre-formatted from the manufacturer. Low-level formatting is generally unnecessary except in rare circumstances. They are:

- ◆ If you want to change the Sector Size of the drive. This is not recommended by Digidesign. Digidesign systems only recognize 512-byte sectors.
- ◆ If you want to perform permanent deletion of data.
- ◆ If a drive is being changed from one platform to another. For example if you are switching from a Macintosh to a Windows-based system, the drive must be high-level re-formatted for the new operating system.

If you choose low-level formatting, keep in mind that it can take up to three hours or more (depending on the size of the drive). Avoid power interruptions and computer bus resets during the format operation or permanent damage to the drive could occur. In addition, leave the drive powered on for at least 30 minutes prior to formatting so that the drive has time to make any necessary thermal adjustments or recalibrations.

## High-Level Formatting

High-level formatting a drive replaces the drive's directory, volume partition map and drivers. Information about the drive is created and drivers that communicate this information to the host CPU are installed. The drive itself is not erased, nor is verification performed.

#### When is High-Level Formatting Necessary?

It is generally necessary to high-level format a hard drive in one of the following cases:

- ◆ If a new drive is being prepared for use on a computer for the first time and the drive is not already high-level formatted.
- ◆ If you suspect that the directories containing the drive's information have become corrupted.

## Partitioning Drives


Partitioning divides a physical drive into multiple, unique volumes, almost as if you were creating virtual hard drives. Partitioning is usually performed when the drive is high-level formatted.

**⚠** *Windows 2000 allows drives formatted with the NTFS or FAT32 file systems to be seen as whole volumes. FAT16 formatted drives have a partition size limit of 4096 MB. 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.

In addition, smaller partitions perform faster than larger partitions. However, this comes at the expense of contiguous storage space. When you partition a drive, 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 adversely affects drive performance.*

## Avoiding File Fragmentation

For maximum recording and playback efficiency, write data to your hard drive in a contiguous fashion. This minimizes 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.

 *To avoid fragmentation, format drives with higher cluster sizes (such as 32K or 64K.)*

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 are far enough apart that playback is still very seek-intensive. Also, the remaining free space on the disk is 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.

## 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, consider optimizing it.

If you use your system for intensive editing, or if you frequently delete audio or fade files from your hard drive, 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.

## Back Up Data Before Optimizing

Since your files are rewritten by the optimization process, always make a backup copy of the data on your hard drive before you optimize it. Additionally, use a hard drive utility to find and repair any problems before optimizing data. If there is any damage to your hard drive's directories prior to optimizing, serious data loss may result.

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## Using Macintosh Drives on Windows Systems

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

To mount HFS or HFS+ drives on a Windows system, you must use the MacOpener™ software utility by DataViz. A demo version of MacOpener is included with Pro Tools Windows.



*For details on sharing sessions between Macintosh and Windows systems, see the Pro Tools Reference Guide.*

### Installing the MacOpener Utility

The MacOpener installer was placed on your hard drive when you installed Pro Tools, in the following location:

*Program Files\Digidesign\Pro Tools\Pro Tools Utilities\MacOpener 2000 Demo*

#### To Install MacOpener:

- 1 Locate the macopener2000.exe file in the above location and double-click it to launch the installer.
- 2 Follow the on-screen instructions to install MacOpener.
- 3 When installation is complete, restart your computer.

### Enabling the MacOpener Driver

When you are finished installing MacOpener, the MacOpener driver must be enabled to mount HFS and HFS+ drives.

#### To enable the settings on the MacOpener Driver:

- 1 Choose Start > Programs > MacOpener 5.0 > MacOpener Driver Preferences.
- 2 Under Driver Settings, select Enable MacOpener Driver.
- 3 Under Extension Mapping, select Do not add the PC extension to the Mac file name.

### Mounting HFS Drives

If the MacOpener utility is installed and enabled, no additional steps are required to mount HFS drives. They appear as normal system drives after you connect them and restart your computer.

### Formatting and Maintaining HFS and HFS+ Drives

Although you can use MacOpener to format HFS and HFS+ drives from a Windows machine, it is not recommended for use with Pro Tools. We recommend that you connect the drives to a Macintosh computer (if possible) and use the ExpressPro-Tools software from ATTO (included on the Mac Pro Tools CD-ROM).

### Windows Disk Utility Software on HFS Drives

Do *not* use a Windows disk utility software (such as Norton Utilities for Windows) on HFS drives. These utilities do not recognize HFS-formatted drives and try to reformat them. This causes format errors on the HFS drive, resulting in data loss.

If you need to perform disk maintenance on an HFS-formatted drive, connect the drive to a Macintosh computer and use a Macintosh utility.


## chapter 3

# Installing Pro Tools Hardware

**⚠ WARNING:** *There have been changes in the installation process since the last release of Pro Tools. To avoid problems, please read and follow the installation instructions carefully.*

## Pro Tools TDM Cards

Pro Tools TDM cards differ depending on the system configuration. Card components for each configuration are listed below.

 *If you are installing an expanded system in your computer, or using an Expansion Chassis to add additional cards to your system, refer to the Expanded Systems Guide included with your Pro Tools system.*

## Pro Tools MIX-Series Hardware

Pro Tools MIX-series hardware comes in three configurations:

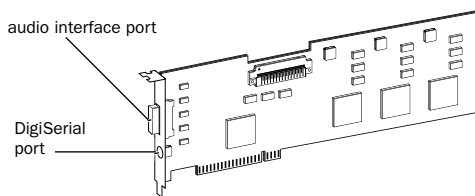
**Pro Tools 24 MIX** Includes a single MIX Core card and a 5-node TDM ribbon cable for connecting to other optional TDM-equipped cards.

**Pro Tools 24 MIXplus** Includes a MIX Core card, a MIX Farm card, and a 5-node TDM ribbon cable for connecting the MIX Core to the MIX Farm and other optional TDM-equipped cards.

**Pro Tools MIX3** Includes a MIX Core card, two MIX Farm cards, and a 5-node TDM ribbon cable for connecting the MIX Core to the MIX Farm cards and other optional TDM-equipped cards.

## The MIX Core Card

The MIX Core card provides 24-bit, 64-track, 16-channel I/O, direct-to-disk recording and playback to your Pro Tool MIX-series system, as well as DSP power for its mixing and processing capabilities.

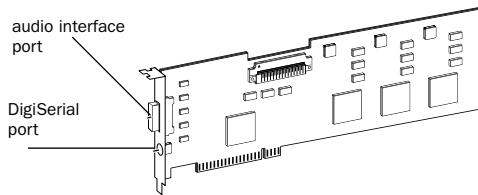


*MIX Core card*

This card includes a connector for attaching a single 888/24 I/O, 882/20 I/O, or 1622 I/O Audio Interface. If you purchase the optional 16-channel peripheral cable adapter, you can attach two 8-channel audio interfaces. The DigiSerial port is for connecting a Digidesign Universal Slave Driver, or a 9-pin device for use with the Pro Tools MachineControl option.

## The MIX Farm Card

The MIX Farm card provides more DSP power for mixing, processing, and DSP software such as the DigiRack plug-ins included with Pro Tools. It also provides a connector for attaching a single 888/24 I/O, 882/20 I/O, or 1622 I/O Audio Interface. If you purchase the optional 16-channel peripheral cable adapter, you can attach two 8-channel audio interfaces. The DigiSerial port is for connecting a Digidesign Universal Slave Driver, or a 9-pin device for use with the Pro Tools MachineControl option.



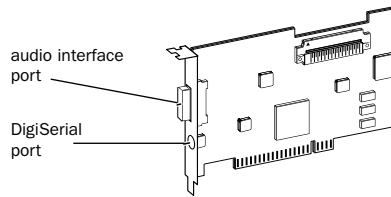
*MIX Farm card*

## Pro Tools 24 Hardware

Pro Tools 24 system hardware consists of a d24 audio card, a DSP Farm card, and a 5-node TDM ribbon cable for connecting them.

## The d24 Audio Card

The d24 audio card provides 24-bit, 32-track, 16-channel I/O, direct-to-disk recording and playback capabilities to your Pro Tools 24 system. It also provides a connector for attaching a single 888/24 I/O, 882/20 I/O, or 1622 I/O Audio Interface. If you purchase the optional 16-channel peripheral cable adapter, you can attach two 8-channel audio interfaces.



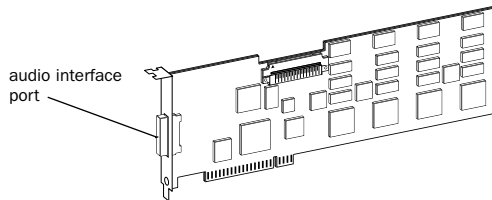
*d24 card*

The DigiSerial port is for connecting an optional Digidesign Universal Slave Driver, or a 9-pin device for use with the Pro Tools MachineControl option.



## The DSP Farm

The DSP Farm provides the power for the Pro Tools 24 system's mixing and processing capabilities. It powers DSP software such as the DigIRack plug-ins included with Pro Tools. It also provides a connector for attaching an 8-channel audio interface.

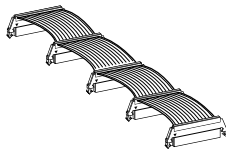


**DSP Farm card**

**⚠** *The 1622 I/O Audio Interface is not supported by the DSP Farm. It must be connected to a MIX Core, MIX Farm, or d24 card. Only one 1622 I/O can be connected to any of these cards. The optional 16-channel peripheral cable adapter is not supported by the 1622 I/O.*

## The TDM Ribbon Cable

The TDM ribbon cable is used to connect multiple cards in your Pro Tools system so they can share data along the TDM bus.



**TDM Ribbon Cable**

A 5-node cable comes with your system. If you plan to use your system with an expansion chassis, you can order a TDM cable with more nodes from your Digidesign dealer.

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## Installing Pro Tools Cards

Before you begin to physically install your Pro Tools cards, we recommended temporarily disable the warning option, "Display a message before installing an unsigned file." This expedites and automates much of the installation process. If you do not temporarily disable the warning, warning messages (that you are installing an unsigned driver) appear after each DSP chip during the detecting Pro Tools phase of installation.

### To temporarily disable the warning option:

- 1 Turn on your computer.
- 2 Right-click the My Computer icon located on your Windows desktop.
- 3 Choose Properties.
- 4 Select the Hardware Tab.
- 5 In the Device Manager section of the dialog box that appears, select the Driver Signing button.
- 6 In Driver Signing Options, select "Ignore – Install All Files Regardless Of File Signature."
- 7 Click OK twice.
- 8 Turn your computer off.
- 9 Proceed with physically installing your Pro Tools cards.


### 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 Open the computer case. For additional details on installing a card in your computer, refer to its User's Guide.

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

- 3 Remove the metal access port cover behind the expansion slot you want to use by removing the screw (if present) and sliding the cover out from the access port.
- 4 If installing a SCSI HBA card, install it in the lowest or highest PCI slot in your computer.
- 5 Install the primary MIX Core or d24 card (clock master with primary audio interface) in the next available slot.
- 6 Install the remaining TDM cards in slots adjacent to the MIX card or d24 card.

Pro Tools cards must be installed in a specific order that is dependent on the slot numbering of the model of computer you are using.

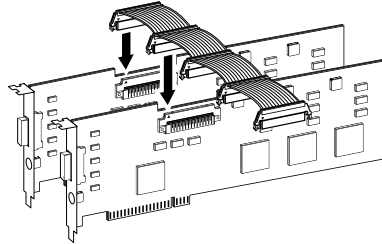
 See Appendix A, "Slot Order" for more details on determining slot order.

Group similar cards together (put all MIX Farm cards next to each other, for example).

- 7 If installing a SCSI HBA card, install it in the highest numbered remaining slot.


### Connect all TDM cards with the TDM ribbon cable:

- 1 Connect the first node of the cable to the first TDM card. Make sure the TDM cable is facing the right direction—align the white triangles on the cable plug with the triangle on the card.



### Attaching the TDM ribbon cable to MIX Core and MIX Farm cards


- 2 Push down gently but firmly until the node is fully connected to the card. When the plug is properly seated, the two tabs on the side of the cable's TDM connector click shut. To detach the ribbon cable, squeeze the tabs on the TDM connector inward.
- 3 Attach the remaining nodes on the TDM cable to subsequent cards.

 *It is OK to have ribbon connectors that go unused. They should reside after the last TDM card.*

- 4 Secure the cards in place with the slot access port screws you removed earlier and close your computer.

## Connecting Audio Interfaces

Pro Tools provides you with a choice of the 888/24 I/O, 882/20 I/O, 1622 I/O, or ADAT Bridge I/O interfaces. These devices supply the inputs and outputs for your system.

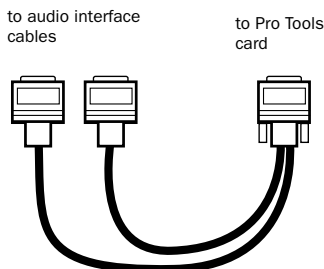
 For instructions on connecting an ADAT Bridge I/O, see the *ADAT Bridge I/O Installation Guide*.

### Connect the Pro Tools audio interfaces:

- 1 Connect the primary audio interface to the primary Mix Core or d24 card with the provided interface cable. The primary audio interface functions as the clock master.
- 2 Connect additional audio interfaces to subsequent Digidesign audio cards.

If you are connecting both 888/24 and 882/20 or 1622 I/O Audio Interfaces to your system, for best system performance, connect the 888/24 to your core Pro Tools card, followed by any additional 888/24 interfaces to the next highest-priority cards. Then connect the 882/20 or 1622 I/O interfaces to subsequent cards.

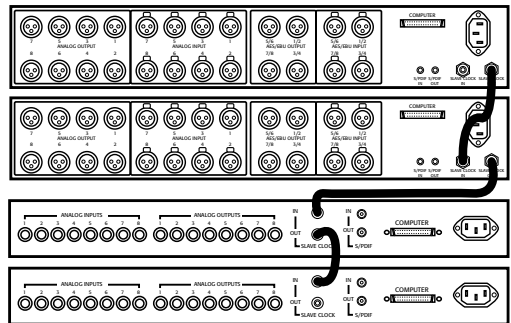
You can use Digidesign's 16-channel peripheral cable adapter (optional) to connect two 8-channel audio interfaces to a single MIX Core, MIX I/O, d24, or MIX Farm card.



*Optional 16-channel peripheral cable adapter*

**▲** The 1622 I/O Audio Interface is not supported by the DSP Farm. It must be connected to a MIX Core, MIX Farm, or d24 card. Only one 1622 I/O can be connected to any of these cards. The optional 16-channel peripheral cable adapter is not supported by the 1622 I/O.

- 3 If using multiple audio interfaces, connect the Slave Clock Out of the primary interface to the Slave Clock In of the second interface with the provided BNC cable. Connect the Slave Clock Out of the second interface to the Slave Clock In of the next audio interface (and so forth).



*Connecting multiple audio interfaces together*

---

## Detecting Pro Tools Cards

### To detect Pro Tools Cards:

- 1 Start or restart your computer.
- 2 Start up Windows 2000, logging in with Administrator privileges.
- 3 The Found New Hardware Wizard dialog pops up automatically. Click Next. If Digidesign DSP devices are found and installed automatically, skip to step 13.
- 4 Select the "Search For A Suitable Driver For My Device (Recommended)" option in the Install Hardware Device Drivers dialog. Click Next.
- 5 In the Locate Driver Files dialog, check (only) the CD-ROM option under Optimal Search Locations. Click Next.
- 6 In the Locate File window, select the Drivers folder (on your Pro Tools CD-ROM). Click Open.
- 7 Open "dalwdm.inf" or "dalwdm."
- 8 Click OK in the Found New Hardware Wizard dialog.
- 9 Click Next to install the multimedia controller in the Driver Files Search Results dialog.
- 10 Click Yes in the Digital Signature Not Found dialog, if present.
- 11 Click Finish in the Completing Found New Hardware dialog (indicating that a DSP is found).
- 12 Repeat step 10 for each DSP chip found. There are 6 DSP chips on MIX cards, 4 DSP chips on DSP Farm cards, and 1 on d24 cards.
- 13 Re-enable the warning option, "Display a message before installing an unsigned file." See "Installing Pro Tools Cards" on page 13.
- 14 You are now ready to install Pro Tools Software.

If you do not follow the steps above or if you cancel any of the steps, your computer may not recognize your Pro Tools cards and you may receive the error message, "Cannot Create DAE Deck." To resolve this error message, see "Cannot Create DAE Deck Or Error Number 4" on page 46.


## chapter 4

# Connecting Your Studio

Pro Tools can be connected to a mixer, amplification system, digital recorders, and SMPTE synchronization devices.

Instructions are based on the following audio - interfaces:

- 888/24 I/O
- 882/20 I/O
- 1622 I/O

 *If you have an ADAT Bridge I/O interface, refer to the ADAT Bridge I/O User's Guide for details on connecting it to your studio.*

At the end of the chapter is general information on connecting Pro Tools to digital equipment, effects units, MIDI gear, and SMPTE synchronization devices.

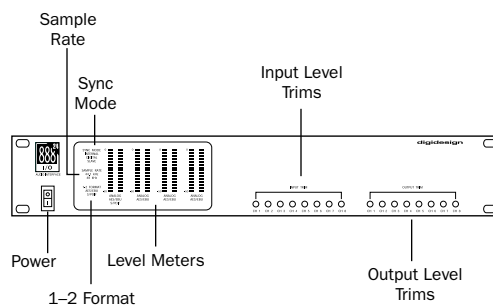
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## The 888/24 I/O Interface

This section explains each of the connectors and indicators on the front and back panels of the 888/24 I/O interface, how they are used, and offers suggestions for connecting the 888/24 I/O to your studio.

### 888/24 I/O Front Panel

The 888/24 I/O has the following front panel indicators, moving from left to right:



#### Front panel of the 888/24 I/O

##### Power

This switch applies power to the 888/24. The “I” position is on. The “O” position is off.

## Sync Mode


The Sync Mode LEDs indicate which sample rate clock reference is currently used by the analog-to-digital converters (ADCs) and the digital-to-analog converters (DACs).

**Internal** This is the 888/24 I/O standard setting. In this mode, the 888/24 I/O sample rate is generated by its internal crystal oscillator (whose frequency is determined by the Sample Rate setting in the Session Setup window). Activate internal mode whenever the 888/24 I/O is not synchronized to an external clock source.

**Digital** This setting indicates that an AES/EBU or S/PDIF word clock signal is currently the source for the 888/24 I/O sample rate. This is the setting to use for inputting material from DAT recorders or other digital devices.

To use the 888/24 I/O digital inputs and outputs as effects sends and returns to digital effects devices, set the 888/24 I/O to Internal mode. Set the digital effects device to accept an external digital clock (from the 888/24 I/O) so it synchronizes itself to Pro Tools.


The 888/24 I/O can only synchronize to and receive word clock lock on channels 1–2 of its digital inputs. To synchronize your system to an external digital clock source, it must be connected to digital inputs 1–2 of the 888/24 I/O. In an expanded Pro Tools system, the system clock is carried by the audio interface connected to the first Pro Tools card in your system. This audio interface acts as the master interface in your system. All other audio interfaces are slaved to it.

 *Because some digital audio devices do not output proper clock when they are not playing back, leaving the 888/24 I/O in Digital mode may cause Pro Tools audio playback quality to suffer, or play back at the wrong pitch. If you are using digital I/O, reset the Sync Mode from Digital to Internal after inputting material.*

**Slave** This LED is lit when the 888/24 I/O sample rate is synchronized to another Digidesign audio interface or synchronization peripheral. In this mode, the sample rate of the slave interface is derived from the frequency of the incoming master clock signal present at the Slave Clock In (256x) port.

The 888/24 I/O automatically switches to this mode when a Slave Clock Out signal from another Digidesign interface, Universal Slave Driver, Video Slave Driver, or SMPTE Slave Driver is connected to the 888/24 I/O Slave Clock In port.

In expanded Pro Tools systems, the Super Clock output of the master audio interface locks all other interfaces together with sample accuracy, keeping all signals phase-synchronous.

 *When slaving to a Digidesign Universal Slave Driver, Video Slave Driver, or SMPTE Slave Driver, set the clock source to Internal. The audio interface automatically switches to Slave mode when it detects the 256x input clock*

## Sample Rate and 1–2 Format Indicators


These LEDs indicate the sample rate of the 888/24 I/O internal crystal oscillator and the digital format (AES/EBU or S/PDIF) of the audio input signal to channels 1 and 2.

The choice of digital format for these two channels is made in the Session Setup window or Hardware Setup dialog. Digital input pairs 3–4, 5–6, and 7–8 of the 888/24 I/O are always AES/EBU. Sample Rate is set in the Session Setup window or Hardware Setup dialog in Pro Tools.

The 888/24 I/O provides the following sample rates:

**48 kHz** This is a standard sampling rate of many professional audio devices. It is recommended for use with devices that cannot receive digital transfers at 44.1 kHz.

**44.1 kHz** This is the compact disc standard sampling rate and the Pro Tools default sample rate. To avoid the need for sample rate conversion, use this rate when you are recording material that will ultimately be published on a compact disc.

 *When you are using an external digital source such as a DAT recorder, the front panel of the 888/24 I/O indicates only the internal oscillator sample rate, not that of the external digital source.*

## Level Meters

The 888/24 I/O level meters monitor the channel outputs of Pro Tools. Input levels are monitored on-screen in the Pro Tools software.

The 888/24 I/O is factory calibrated so that a meter reading of  $-18$  dB corresponds to the 888/24 I/O nominal operating level (which can be set to either  $+4$  dBu or  $-10$  dBV). If you sent the output to an analog device with a VU meter, this would correspond to “0 VU” on the VU meter.

The red LED indicators on the audio interface indicate both full-code (highest level before clipping) and clipping of Pro Tools output signals. The on-screen meters in Pro Tools software indicate clipping when at least three consecutive full-code samples follow each other.


## Input Level Trims

The 888/24 I/O analog inputs are factory calibrated at a  $-18$  dB nominal level, referenced to a full code signal. This means that at the nominal reference input level (either  $+4$  dBu or  $-10$  dBV), you have 18 dB of headroom before clipping. The input level trim pots allow adjustment of the 888/24 I/O input levels to match the operating level of your external equipment. Adjustments can be made with a Phillips screwdriver.

## Output Level Trims

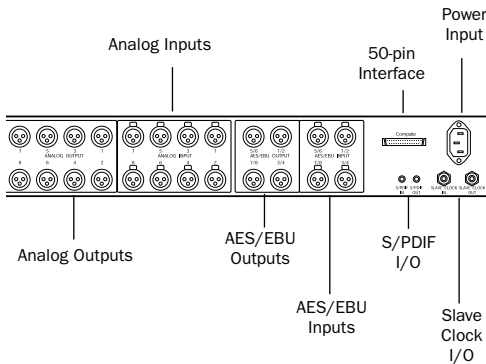
The 888/24 I/O analog outputs are factory calibrated at a  $-18$  dB nominal level, referenced to a full code signal. This means that at the nominal reference output level (either  $+4$  dBu or  $-10$  dBV), you have 18 dB of headroom before clipping. The output level trim pots allow adjustment of the 888/24 I/O output levels to match the operating level of your external equipment. Adjustments can be made with a Phillips screwdriver.

To calibrate the input and output levels of the 888/24 I/O to match your mixing console or other devices in your studio, use Calibration Mode and the Signal Generator TDM Plug-In in Pro Tools.

 *Instructions for calibrating the 888/24 I/O appear in Chapter 7, “Calibrating the 888/24 I/O.”*

## 888/24 I/O Back Panel

The 888/24 I/O has the following back panel connectors, moving from left to right:



*Back panel of the 888/24 I/O*

### Analog Audio Outputs

These are balanced male XLR connectors for analog audio output connections. All eight output channels are continuously active. The 888/24 I/O analog outputs feature 24-bit digital-to-analog converters.

### Analog Audio Inputs

These are balanced female XLR connectors for analog audio input connections. The 888/24 I/O analog inputs feature 24-bit analog-to-digital converters. Because input channels

1–8 of the 888/24 I/O are software selectable in pairs between analog or digital format, analog input to a channel pair is disabled when digital input format is chosen for that channel.

The 888/24 I/O analog audio connectors are balanced XLRs with pin 2 wired hot, (or “+”); pin 3 cold, (or “-”); and pin 1 ground.

### AES/EBU Digital Outputs 1–8

The 888/24 I/O AES/EBU output jacks are balanced, 3-conductor, XLR connectors which output a 24-bit digital data stream. Output is continuously active on both the AES/EBU and S/PDIF jacks even when the 888/24 I/O input selector is set to analog.

### AES/EBU Digital Inputs 1–8

The AES/EBU digital format is used in many professional digital audio devices, including some DAT recorders. The AES/EBU inputs on the 888/24 interface are balanced, 3-conductor XLR connectors which accept a full 24-bit digital data stream.

For AES/EBU connections, we strongly recommend using 110-ohm cables with a length that does not exceed 30 meters.

Input channels 1–8 of the 888/24 I/O are software selectable in pairs between analog or digital format. Digital input to a channel pair is disabled when analog input format is chosen for that channel in the Hardware Setup dialog. Input to AES/EBU input channels 1–2 is disabled when S/PDIF digital format is chosen for these inputs in the Pro Tools Session Setup window.



## **50-pin Interface Connector**

This 50-pin Computer connector is used to connect the 888/24 I/O to a MIX card, d24 audio card, Disk I/O card, or a DSP Farm card. The necessary cable is supplied with your audio interface. If you plan to connect two 888/24 audio interfaces to a single MIX card or d24 card, a 16-channel peripheral cable adapter is necessary. (This cable is available from your Digidesign dealer.)

## **S/PDIF Digital Input/Output**

The Sony Philips Digital Interface Format (S/PDIF) is used in many professional and consumer CD players and DAT recorders. The 888/24 I/O S/PDIF in/out jacks are unbalanced 2-conductor phono (RCA) jacks which utilize a full 24-bit digital data stream. To avoid RF interference, use 75-ohm coaxial cable for S/PDIF transfers and do not exceed a cable length of 10 meters.

Because input channels 1–2 of the 888/24 I/O are software selectable between analog or digital format, input to these two digital channels is disabled when analog input is chosen or when AES/EBU digital format is chosen in the Pro Tools Session Setup window. Output is continuously active on both the AES/EBU and S/PDIF output jacks, regardless of which digital input format is selected for channels 1–2.

## **Slave Clock In/Out**

The Slave Clock Out jack is a standard BNC type connector that outputs a 256 times sample rate Super Clock signal for slaving and synchronizing multiple Digidesign interfaces and synchronization peripherals together.

When the 888/24 I/O Sync Mode is set to Internal, connecting a valid Slave Clock Out signal to this port causes the 888/24 I/O to automatically switch to Slave mode. When the 888/24 I/O is the master interface or the first interface in a chain, Digital mode overrides the Slave Clock input, and an incoming Slave Clock Out signal will not switch the 888/24 I/O to Slave mode.

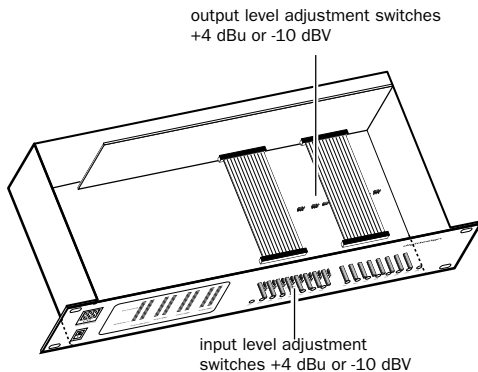
Because crucial timing data is passed over these ports, use high-quality, 75-ohm RG-59 cables for making connections, and keep total cable length to less than 3 meters between interfaces.

## **Power Input**

This connector accepts a standard AC power cable. The interface automatically selects power (100 V to 240 V) and automatically works with a standard modular cable to connect to AC power receptacles in any country.

## Changing Operating Levels of Individual 888/24 I/O Channels

The 888/24 I/O is factory set to +4 dBu operating levels for input and output. However, the 888/24 I/O allows you to individually switch any of its analog inputs or outputs to either a +4 dBu or -10 dBV operating level by moving internal jumpers on its circuit board.



*Input and output level switches inside the 888/24 I/O*

### To change the operating level of an input channel:

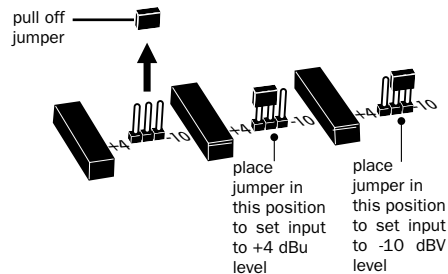
- 1 Turn off your computer and the 888/24 I/O.
- 2 With a Phillips screwdriver, remove the screws from the top of the 888/24 I/O.
- 3 Using the 1/16-inch hex wrench included with the 888/24 I/O, carefully remove the front four panel screws as noted on the bag containing the hex wrench.
- 4 Lift the top off of the 888/24 I/O.

5 Inside the 888/24 I/O chassis, next to each of the channel input trims, there is a jumper switch with a removable cap. Locate the jumper switch for the channel you want to modify. Gently lift the cap off the 3-pronged connector. Place it in the position corresponding to the operating level that you desire. For +4 dBu levels, place it over the rear two prongs. For -10 dBV levels, place it over the front two prongs.

6 When you have made the desired changes, replace the top of the 888/24 I/O.

7 Replace the four front panel screws using the hex wrench.

8 Replace the top screws with a Phillips screwdriver.



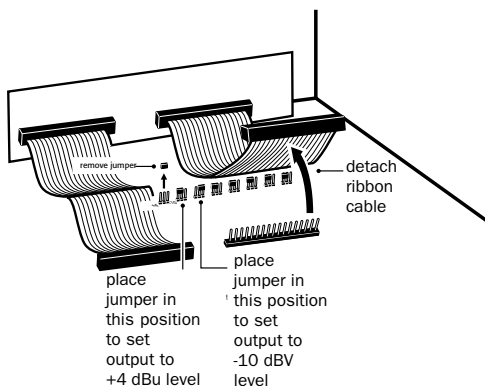
### Setting the input level jumper switches

### To change the operating level of an output channel:

- 1 Turn off your computer and the 888/24 I/O.
- 2 Using the 1/16-inch hex wrench included with the 888/24 I/O, carefully remove the front four panel screws as noted on the bag containing the hex wrench.
- 3 With a Phillips screwdriver, remove the screws from the top of the 888/24 I/O and lift the top off of the 888/24 I/O.

4 To find the channel output switches, detach the front part of the ribbon cable at the right side of the chassis. To do this, grip both sides of the black connector and gently pull up.

5 With the ribbon cable out of the way you'll see eight 3-pronged jumper switches, each with a removable cap. Locate the switch for the channel you want to modify.



#### Setting the output level jumper switches

6 Gently lift the cap off of the jumper switch. Place it in the position corresponding to the operating level that you desire. For +4 dBu levels, place it over the left two prongs. For -10 dBV levels, place it over the right two prongs.

7 When you have made the desired changes, reconnect the ribbon cable and put the top back on the 888/24 I/O.

8 Replace the four front panel screws using the hex wrench.

9 Replace the top screws with a Phillips screwdriver.

---

## Making Signal Connections to the 888/24 I/O

Depending on how you plan to use the 888/24 I/O, the way you connect it to your studio will vary.

### Choosing Between +4 dBu and -10 dBV Operation Modes

The 888/24 I/O can be set to operate at +4 dBu or -10 dBV input and output levels (see “Changing Operating Levels of Individual 888/24 I/O Channels” on page 22). It is important that you determine which line level mode is appropriate for your studio. In +4 dBu operating mode, the 888/24 I/O is a 24-bit digital audio device capable of producing audio signals at or near +26 dBu. Check the owner’s manual for your mixer, power amplifier or effects processor to see if it can handle this load. If it cannot, consider setting the 888/24 I/O to operate at -10 dBV line levels.

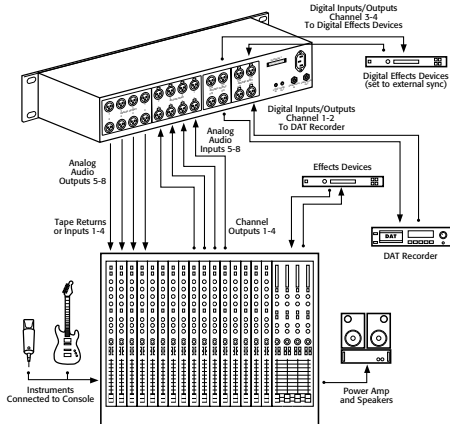
Consider the following when connecting a mixer:

- ◆ If your mixer cannot handle more than 1.5 V (RMS) inputs at +4 dBu, then set the 888/24 I/O to run at -10 dBV line level.
- ◆ If your mixer can handle up to 8.5 V (RMS) inputs, or has pads or attenuators on its inputs, then you can use the +4 dBu setting on the 888/24 I/O.

Most manuals contain device input specifications, including whether or not there are pads or attenuators. Consult the manufacturer of your mixer or power amplifier for further information.

## Setting Up Your Studio

The following diagram illustrates a typical studio setup, with the 888/24 I/O connected to a mixing console, effects and other equipment.



### Typical studio configuration

The 888/24 I/O analog audio connectors are balanced XLRs with pin 2 wired hot (or “+”), pin 3 cold (or “-”), and pin 1 ground.

If you are connecting a balanced system, connect pin 1 and shield at the input only (not at the output). This prevents ground loops between the shield and pin 1 conductor.

If you are connecting an unbalanced signal to the 888/24 I/O inputs or outputs, connect only pin 2 to the “+” signal, and pins 1 and 3 to ground at all inputs only.

## Using 888/24 I/O As Standalone Audio Converter


The 888/24 I/O can be used apart from Pro Tools as a standalone 8-channel, 24-bit, analog-to-digital or digital-to-analog converter.

### Before you use the 888/24 I/O in standalone mode:

- 1 Turn off the 888/24 I/O.
- 2 Do not turn on your computer while the 888/24 I/O is in standalone mode. If you do, the 888/24 I/O stops functioning in standalone mode.

### To use the 888/24 I/O as a standalone A/D converter:


- 1 Turn off any digital devices that send a word clock signal to the 888/24 I/O channel 1–2 digital input ports.
- 2 Turn on the 888/24 I/O. The 888/24 I/O searches briefly for a word clock signal on channels 1–2 of its digital input ports.
- 3 If the 888/24 I/O does not detect word clock, it functions as a standalone A/D converter using its internal clock. In this mode, use analog inputs 1–8 and AES/EBU outputs 1–8.

 The default sample rate of the 888/24 I/O in standalone A/D mode is 44.1 kHz. To change this default setting to 48 kHz, you must open the 888/24 I/O and manually reset it by moving an internal jumper switch. Instructions for doing this are provided in the 888/24 I/O Installation Guide.

### To use the 888/24 I/O as a standalone D/A converter:

- 1 Make sure that a digital device providing a word clock signal is connected to AES/EBU inputs 1–2 of the 888/24 I/O and turned on.
- 2 Turn on the 888/24 I/O. The 888/24 I/O searches for a valid word clock or a word clock signal on channels 1–2 of its digital input ports.
- 3 When a valid word clock lock is recognized, the 888/24 I/O enters Digital mode and function as a standalone D/A converter using AES/EBU inputs 1–8 and analog outputs 1–8.

The 888/24 I/O D/A sample rate is determined by the sample rate it detects on channels 1–2 of its AES/EBU inputs.

 The 888/24 I/O defaults to listening to a digital word clock signal on channels 1–2 of its AES/EBU digital input ports. To use a S/PDIF device as your source of word clock, you must reset this default by opening the 888/24 I/O and moving an internal jumper switch. Instructions for doing this are provided in the 888/24 I/O Installation Guide. That guide also provides instructions for changing other standalone mode default parameters such as sample rate and DAC muting.

### To return the 888/24 I/O to Pro Tools-based operation:

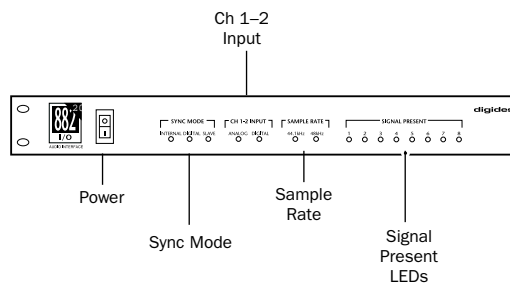
- Turn on your computer.
  - or –
- If your computer is on, launch Pro Tools.

## The 882/20 I/O Interface

This section explains all of the connectors and indicators on the front and back panels of the 882/20 I/O interface, how they are used, and offers suggestions for connecting the 882/20 I/O to your studio.

### 882/20 I/O Interface Front Panel

The 882/20 I/O has the following front panel indicators, moving from left to right:



Front panel of the Digidesign 882/20 I/O

#### Power

This switch applies power to the 882/20. The “I” position is on. The “O” position is off.

#### Sync Mode


The Sync Mode LEDs indicate which sample rate clock reference is currently used by the analog-to-digital converters (ADCs) and the digital-to-analog converters (DACs).

**Internal** This is the 882/20 I/O standard setting. In this mode, the 882/20 I/O sample rate is generated by its internal crystal oscillator (whose frequency is determined by the Sample Rate setting in the Session Setup window). Activate internal mode whenever the 882/20 I/O is not synchronized to an external clock source.

**Digital** This setting indicates that a S/PDIF word clock signal is the source for the 882/20 I/O sample rate. This is the setting you would use for inputting material from DAT machines or other S/PDIF digital devices.


To use the 882/20 I/O digital input and output as an effects send and return to a digital effects device, set the 882/20 I/O to Internal mode. Set the digital effects device to accept an external digital clock (from the 882/20 I/O) so it synchronizes with Pro Tools.

In an expanded system, the system clock is carried by the audio interface connected to the first Pro Tools card in your system. This audio interface acts as the master interface in your system, and all other audio interfaces slave to it. Only the master interface allows you to set the Sync Mode. Slaved interfaces do not allow this parameter selection.

 *Because some digital audio devices do not output proper clock when they are not playing back, leaving the 882/20 I/O in Digital mode may cause Pro Tools audio playback quality to suffer, or to play back at the wrong pitch. If you are using digital I/O, reset the Sync Mode from Digital to Internal after inputting material.*

**Slave** This LED is lit when the 882/20 I/O sample rate is synchronized to another Digidesign audio interface or synchronization peripheral. In this mode, the sample rate of the slave interface is derived from the frequency of the incoming master clock signal present at the Slave Clock In (256x) port. The 882/20 I/O automatically switches to this mode when a Slave Clock Out signal from another Digidesign interface, Universal Slave Driver, Video Slave Driver, or SMPTE Slave Driver is connected to its Slave Clock In port.

In expanded Pro Tools systems, the Super Clock output of the master audio interface locks all other interfaces together with sample accuracy, keeping all signals phase-synchronous.

 *When slaving to a Digidesign Universal Slave Driver, Video Slave Driver, or SMPTE Slave Driver, set the clock source to Internal. The audio interface automatically switches to Slave mode when it detects the 256x input clock.*

## Ch 1–2 Input

This LED indicates the format (analog or digital) of the audio input signal to channels 1 and 2. In Pro Tools, you choose analog or digital input for these two channels in the Session Setup window. Input channels 3 through 8 of the 882/20 I/O are always analog.

## Sample Rate

These LEDs display the current sample rate of the 882/20 I/O internal crystal oscillator, which can be either 44.1 kHz or 48 kHz. In Pro Tools, this is set in the Session Setup window.

The 882/20 I/O provides the following sample rates:

**48 kHz** This is a standard sampling rate of many professional audio devices. It is recommended for use with devices that cannot receive digital transfers at 44.1 kHz.

**44.1 kHz** This is the compact disc standard sampling rate and the Pro Tools default sample rate. To avoid the need for sample rate conversion, use this rate when you are recording material that will ultimately be published on a compact disc.

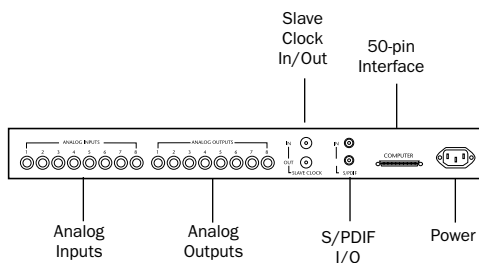
**⚠** *When you are using an external digital source such as a DAT recorder, the front panel of the 882/20 I/O indicates only the internal oscillator sample rate, not that of the external digital source.*

### Signal Present LEDs

These LEDs indicate whether signal is present (above the level of  $-30$  dB) at a given channel's output. These LEDs indicate the presence of channel output signals, not input signals. Input signals are monitored on-screen in the Pro Tools software. The LEDs do not indicate clipping. Clipping is indicated by the on-screen meters in Pro Tools software.

### 882/20 I/O Back Panel

The 882/20 I/O has the following back panel connectors, moving from left to right:



**Back panel of the Digidesign 882/20 I/O**

### Analog Audio Inputs

These are balanced, 1/4-inch TRS jacks for analog audio input connections. The 882/20 I/O analog inputs feature 20-bit analog-to-digital converters.

Input operating levels are switchable between  $+4$  dBu and  $-10$  dBV operation. Unbalanced connections are supported through the use of standard 1/4-inch TRS mono phone plugs.

Because input channels 1–2 of the 882/20 I/O are software selectable between analog or S/PDIF digital format, input to these two analog channels is disabled when S/PDIF digital input format is chosen in the Pro Tools Hardware Setup dialog.

The 882/20 I/O analog inputs are factory calibrated at a  $-14$  dB nominal level, referenced to a full code signal. This means that at the nominal reference input level (either  $+4$  dBu or  $-10$  dBV), you have 14 dB of headroom before clipping.

### Analog Audio Outputs

These are balanced, 1/4-inch TRS jacks for analog audio output connections. The 882/20 I/O analog outputs feature 20-bit digital-to-analog converters.

All eight output channels are continuously active. Output operating levels are switchable between  $+4$  dBu and  $-10$  dBV operation. Unbalanced connections are supported through the use of standard 1/4-inch TRS mono phone plugs.

The 882/20 I/O analog outputs are factory calibrated at a  $-14$  dB nominal level, referenced to a full code signal. This means that at the nominal reference output level (either  $+4$  dBu or  $-10$  dBV), you have 14 dB of headroom before clipping.

## Slave Clock In/Out

The Slave Clock Out jack is a standard BNC type connector that outputs a 256x audio sample rate master Super Clock signal for slaving and synchronizing multiple Digidesign interfaces and synchronization peripherals together.

The Slave Clock In jack is a standard BNC type connector designed to receive a Slave Clock Out signal from another Digidesign interface, a Universal Slave Driver™, Video Slave Driver™, or SMPTE Slave Driver™ for synchronizing multiple Digidesign interfaces and synchronization peripherals together.

When the 882/20 I/O Sync Mode is set to Internal, connecting a valid Slave Clock Out signal to this port causes the 882/20 I/O to automatically switch to Slave mode. When the 882/20 I/O is the master interface or the first interface in a chain, Digital mode overrides the Slave Clock input, and an incoming Slave Clock Out signal will not switch the 882/20 to Slave mode.

Because crucial timing data is passed over these ports, use high-quality, 75-ohm RG-59 cables for making connections, and keep total cable length to less than 3 meters between interfaces.

## S/PDIF Digital Input/Output

The Sony Philips Digital Interface Format (S/PDIF) is used in many professional and consumer CD players and DAT recorders. The 882/20 I/O S/PDIF jacks are unbalanced, 2-conductor, phono (RCA) jacks. Because input channels 1–2 of the 882/20 I/O are software selectable between analog or digital format, input to these two digital channels is disabled when analog input is chosen in the Hardware Setup dialog in Pro Tools. Output is continuously active on the S/PDIF output jack, even if the 882/20 I/O input selector is set to Analog in the

Hardware Setup dialog. To avoid RF interference, use 75-ohm coaxial cable for S/PDIF transfers and do not exceed a cable length of 10 meters.

## 50-pin Interface Connector

This 50-pin connector is used to connect the 882/20 I/O to a MIX card, d24, Disk I/O, or DSP Farm card. The necessary cable is supplied with your audio interface. If you plan to connect two 882/20 I/O interfaces to a MIX card or d24 card, a 16-channel peripheral cable adapter is necessary. (This cable is available from your Digidesign dealer.)

## Power Input

This connector accepts a standard AC power cable. The interface automatically selects power (100 V to 240 V), and automatically works with a standard modular cable to connect to AC power receptacles in any country.



## Making Signal Connections to the 882/20 I/O

Depending on how you plan to use the 882/20 I/O, the way you connect it to your studio will vary.

### Choosing Between +4 dBu and -10 dBV Operation Modes

The 882/20 I/O can be set to operate at +4 dBu or -10 dBV input and output levels. It is important that you determine which line level mode is appropriate for your studio. In +4 dBu operating mode, the 882/20 I/O is a 20-bit digital audio device capable of producing audio signals at or near +18 dBu. Check the owner's manual for your mixer, power amplifier or effects processor to see if it can handle this load. If it cannot, consider setting the 882/20 I/O to operate at -10 dBV line levels.

Consider the following when connecting a mixer:

- ◆ If your mixer cannot handle more than 1.5 V (RMS) inputs at +4 dBu, set the 882/20 I/O to operate at -10 dBV line level.
- ◆ If your mixer can handle up to 8.5 V (RMS) inputs, or has pads or attenuators on its inputs, then you can use the +4 dBu setting on the 882/20 I/O.

Most manuals contain device input specifications, including whether or not there are pads or attenuators. Consult the manufacturer of your mixer or power amplifier for further information.

## Setting Up Your Studio

The following diagrams provide general suggestions for connecting studio gear to your system. Figure 1 illustrates a studio setup with the 882/20 I/O connected to a mixing console, with effects and other gear routed into the console as well.

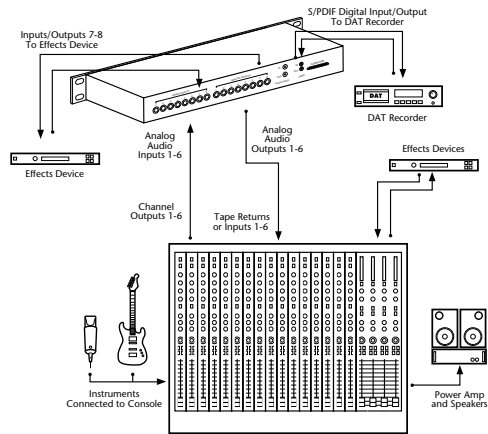


Figure 1. Typical studio configuration with mixer connections

Figure 2 diagram shows a setup without a mixer, where effects and monitoring gear are connected directly to the 882/20 I/O.

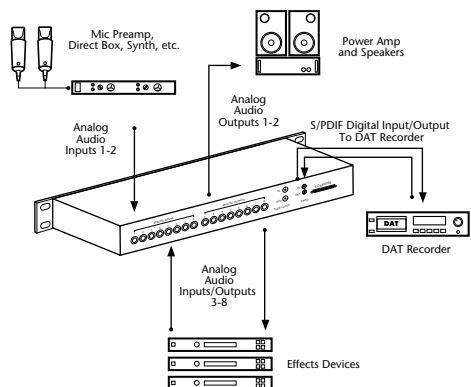


Figure 2. Typical studio configuration without a mixer

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## Using 882/20 I/O As Standalone Audio Converter

The 882/20 I/O can be used apart from Pro Tools as a standalone 2-channel, 20-bit, analog-to-digital or digital-to-analog converter.

**⚠** *The 882/20 I/O always operates at -10 dBV when in standalone mode.*

### Before you use the 882/20 I/O in standalone mode:

- 1 Turn off the 882/20 I/O.
- 2 Do not turn on your computer while the 882/20 I/O is in standalone mode. If you do, the 882/20 I/O stops functioning in standalone mode.

### To use the 882/20 I/O as a standalone A/D converter:

- 1 Turn off any digital devices that send a word clock signal to the 882/20 I/O S/PDIF digital input.
- 2 Turn on the 882/20 I/O. The 882/20 I/O searches briefly for a word clock signal on channels 1–2 of its digital input ports.
- 3 If the 882/20 I/O does not detect word clock, it functions as a standalone A/D converter using its internal clock. Use analog inputs 1–2 and the S/PDIF output in this mode.

**⚠** *In standalone mode, the 882/20 only operates at a 44.1 kHz sample rate. If you want to convert analog signals into 48 kHz digital audio, you must launch Pro Tools (or any other software which supports the 882/20 I/O) to change the default sample rate.*

### To use the 882/20 I/O as a standalone D/A converter:

- 1 Make sure that a digital device providing a word clock signal is connected to the S/PDIF input of the 882/20 I/O and that the device is powered on.
- 2 Turn on the 882/20 I/O. The 882/20 I/O searches for a valid word clock on its S/PDIF input.
- 3 When a valid word clock lock is recognized, the 882/20 I/O enters Digital mode and functions as a standalone D/A converter using the S/PDIF input and analog outputs 1–2.

The 882/20 I/O sample rate is determined by the sample rate that it detects on its S/PDIF input.

### To return the 882/20 I/O to Pro Tools-based operation:

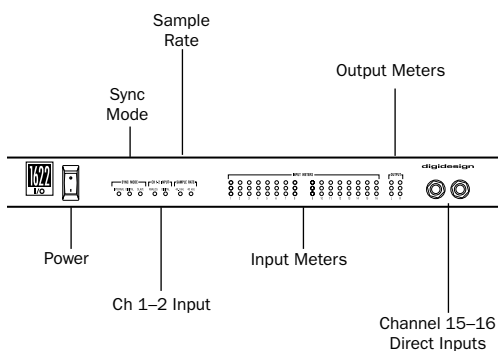
- Turn on your computer.
  - or –
- If your computer is on, launch Pro Tools.

## The 1622 I/O Interface

This section explains the connectors and indicators on the front and back panels of the 1622 I/O interface, how they are used, and offers suggestions for connecting the 1622 I/O to your studio.

### 1622 I/O Front Panel

The 1622 I/O has the following front panel indicators, moving from left to right:



Front panel of the Digidesign 1622 I/O

#### Power

This switch applies power to the 1622 I/O. The “I” position is on. The “O” position is off.

#### Sync Mode

The Sync Mode LEDs indicate which sample rate clock reference is currently used by the analog-to-digital converters (ADCs) and the digital-to-analog converters (DACs).

**Internal** This is the 1622 I/O standard setting. In this mode, the 1622 I/O sample rate is generated by its internal crystal oscillator (whose frequency is determined by the Sample Rate setting in the Session Setup window). Activate internal mode whenever the 1622 I/O is not synchronized to an external clock source.

**Digital** This setting indicates that a S/PDIF word clock signal is the source for the 1622 I/O sample rate. This is the setting to use for inputting material from DAT machines or other S/PDIF digital devices.

To use the 1622 I/O digital input and output as an effects send and return to a digital effects device, set the 1622 I/O to Internal mode. Set the digital effects device to accept an external digital clock (from the 1622 I/O) so it synchronizes with Pro Tools.

In expanded Pro Tools systems, the Super Clock output of the master audio interface locks all other interfaces together with sample accuracy, keeping all signals phase-synchronous.

**⚠** *Because some digital audio devices do not output proper clock when they are not playing back, leaving the 1622 I/O in Digital mode may cause Pro Tools audio playback quality to suffer, or to play back at the wrong pitch. If you are using digital I/O, reset the Sync Mode from Digital to Internal after inputting material.*

**Slave** This LED is lit when the 1622 I/O is synchronized to another Digidesign audio interface or synchronization peripheral. In this mode, the sample rate of the slave interface is derived from the frequency of the incoming master clock signal present at the Slave Clock In (256x) port. If the Sync Mode is set to Internal, connecting a

Slave Clock Out signal from another Digidesign interface or synchronization peripheral to the 1622 I/O Slave Clock In port automatically switches it to Slave mode.

In expanded Pro Tools systems, the Super Clock output of the master audio interface locks all other interfaces together with sample accuracy, keeping all signals phase-synchronous.



*When slaving to a Digidesign Universal Slave Driver, Video Slave Driver, or SMPTE Slave Driver, set the clock source to Internal. The audio interface automatically switches to Slave mode when it detects the 256x input clock.*

## Ch 1–2 Input

This LED indicates the format (analog or digital) of the audio input signal to channels 1–2. In Pro Tools, you choose analog or digital input for these two channels in the Session Setup window or the Hardware Setup dialog. Input channels 3 through 16 of the 1622 I/O are always analog.

## Sample Rate

These LEDs display the current sample rate of the 1622 I/O internal crystal oscillator, which can be either 44.1 kHz or 48 kHz. In Pro Tools, this is set in the Session Setup window or in the Hardware Setup dialog.

### The 1622 I/O provides the following sample rates:

**48 kHz** This is a standard sampling rate of many professional audio devices. It is recommended for use with devices that cannot receive digital transfers at 44.1 kHz.

**44.1 kHz** This is the compact disc standard sampling rate and the Pro Tools default sample rate. To avoid the need for sample rate conversion, use this rate when you are recording material that will ultimately be published on a compact disc.



*When you are using an external digital source such as a DAT recorder, the front panel of the 1622 I/O indicates only the internal oscillator sample rate, not that of the external digital source.*

## Input Meters

These LEDs indicate whether signal is present at a given channel's input. Segment 1 (green) indicates –20.0 dB. Segment 2 (yellow) indicates –3.0 dB. Segment 3 (red) indicates –0.1 dB.

## Output Meters

These LEDs indicate whether signal is present at one of the two outputs. Segment 1 (green) indicates –20.0 dB. Segment 2 (yellow) indicates –3.0 dB. Segment 3 (red) indicates –0.1 dB.

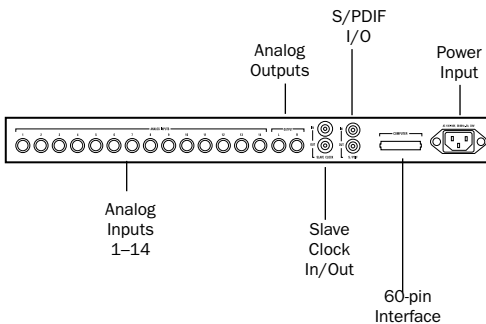
## Channel 15–16 Direct Inputs

These are balanced, 1/4-inch TRS jacks for convenient front panel audio input connections.

Inputs can be individually calibrated from +4 dBu to –10 dBV line levels and higher in 2 dB gain steps, using the Other Options dialog (choose Setups > Hardware and click Other Options). This allows the 1622 I/O to accommodate any standard line-level input, including synthesizers, samplers and effects devices. Unbalanced connections are supported through the use of standard 1/4-inch TRS mono phone plugs.

## 1622 I/O Back Panel

The 1622 I/O has the following back panel connectors, moving from left to right:



*Back panel of the Digidesign 1622 I/O*

### Analog Audio Inputs 1–14

These are balanced, 1/4-inch TRS jacks for analog audio input connections.

Inputs can be individually calibrated from +4 dBu to –10 dBV line levels and higher in 2 dB gain steps, using the Other Options dialog (choose *Setups > Hardware* and click *Other Options*). This allows the 1622 I/O to accommodate any standard, line-level input, including synthesizers, samplers and effects devices. Unbalanced connections are supported through the use of standard 1/4-inch TRS mono phone plugs.

The 1622 I/O analog inputs are factory calibrated at a –14 dB nominal level, referenced to a full code signal. This means you can have up to 14 dB of headroom before clipping, depending on the input levels you set in the Other Options dialog.

Because input channels 1–2 of the 1622 I/O are software selectable between analog or S/PDIF digital format, input to these two analog channels is disabled when S/PDIF digital input format is chosen in the Pro Tools Hardware Setup dialog.

### Analog Audio Outputs L-R

These are balanced, 1/4-inch TRS jacks for analog audio output connections. They carry Pro Tools main output channels 1–2. The analog outputs feature 24-bit digital-to-analog converters. Both output channels are continuously active. Output operating levels are switchable between +4 dBu and –10 dBV operation.

Unbalanced connections are supported through the use of standard 1/4-inch TRS mono phone plugs.

The 1622 I/O analog outputs are factory calibrated at a –14 dB nominal level, referenced to a full code signal. This means that at the nominal reference output level (either +4 dBu or –10 dBV), you have 14 dB of headroom before clipping.

### Slave Clock In/Out

The Slave Clock Out jack is a standard BNC type connector that outputs a 256x audio sample rate master Super Clock signal for slaving and synchronizing multiple audio interfaces and synchronization peripherals together.

When the 1622 I/O Sync Mode is set to Internal, connecting a valid Slave Clock signal to the Slave Clock In port causes the 1622 I/O to automatically switch to Slave mode. When the 1622 I/O is the master interface or the first interface in a chain, Digital mode overrides the Slave Clock input, and an incoming Slave Clock Out input will not switch the 1622 I/O to Slave mode.

Because crucial timing data is passed over these ports, use high-quality, 75-ohm RG-59 cables for making connections, and keep total cable length to less than 3 meters between interfaces.

## **S/PDIF Digital Input/Output**

The Sony Philips Digital Interface Format (S/PDIF) is used in many professional and consumer CD players and DAT recorders. The 1622 I/O S/PDIF jacks are 24-bit capable, unbalanced, 2-conductor, phono (RCA) jacks.

Because input channels 1–2 of the 1622 I/O are software selectable between analog or digital format, input to these two digital channels is disabled when analog input is chosen in the Hardware Setup dialog in Pro Tools.

Output is continuously active on the S/PDIF output jack, even if the 1622 I/O input selector is set to analog in the Hardware Setup dialog. To avoid RF interference, use 75-ohm coaxial cable for S/PDIF transfers and do not exceed a cable length of 10 meters.

## **60-pin Interface Connector**

This 60-pin connector is used to connect the 1622 I/O to a MIX or d24 card. The appropriate interface cable is supplied with the 1622 I/O.

## **Power Input**

This connector accepts a standard AC power cable. The 1622 I/O automatically selects power (100 V to 240 V), and automatically works with a standard modular cable to connect to AC power receptacles in any country.

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## **Making Signal Connections to the 1622 I/O Interface**

Depending on how you plan to use the 1622 I/O, the way you connect it to your studio will vary.

## **Adjusting 1622 I/O Gain Levels**

The 1622 I/O input levels are adjustable through the Pro Tools software to accommodate a variety of equipment output levels. For optimum fidelity and signal-to-noise performance, adjust these inputs according to the devices that you connect to them.

When you have set up, configured, and launched Pro Tools, refer to the instructions below for adjusting input gain levels for the 1622 I/O.



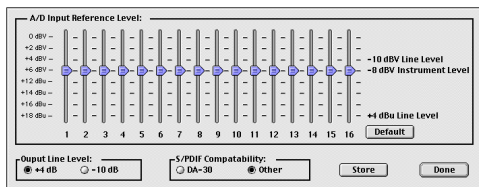
*For best signal-to-noise performance, set the 1622 I/O input gain to +4 dBu when recording devices that provide this output level.*

### **To adjust input level gain on the 1622 I/O:**

- 1** Connect the instrument or device to the 1622 I/O.
- 2** In Pro Tools, choose Setups > Hardware.
- 3** Click Other Options.
- 4** Set the input trim slider to match the output level of the connected instrument. (Refer to the manufacturer's documentation for details.) If you do not know the output level of the device, use the default input trim level, then fine tune the input level gain using the procedure below.
- 5** Select the desired output gain level, +4 dBu or –10 dBV, and click Done.

### To fine tune the input level gain:

- 1 Create an Auxiliary Input track. This can be either mono or stereo depending on the device you are monitoring.
- 2 Set the track input to the 1622 I/O input channel you just set in the Other Options dialog.
- 3 Play the instrument at maximum volume, sending a steady signal to the 1622 I/O. (You will not be able to hear the input signal while adjusting your levels in this dialog, but you can see the levels on the input meters of the 1622 I/O.)
- 4 Note where the instrument output signal registers on the on-screen meters in Pro Tools.
- 5 In the Other Options dialog, adjust the channel input trim slider to increase or decrease gain until you are able to achieve maximum signal level without clipping.



### Adjusting Input Sliders in the Other Options dialog

- 6 Repeat as necessary for other instruments/inputs.
- 7 Click Store, then Done.
- 8 Click OK when you have finished.

💡 *Input trim level, output line level, and sample rate settings are stored in non-volatile memory so that the 1622 I/O retains them when used in standalone mode.*

## Setting Up Your Studio

The diagrams below provide suggestions for connecting studio gear to your system. Figure 3 illustrates a studio setup with the 1622 I/O connected to a mixing console, with effects and other gear routed into the console as well.

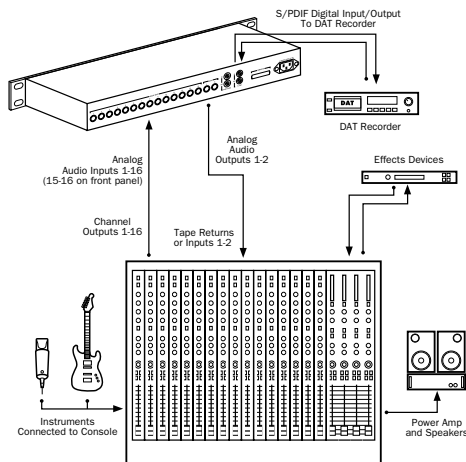


Figure 3. Typical studio configuration with a mixer

Figure 4 illustrates a setup without a mixer, where effects processors and monitoring gear are connected directly to the 1622 I/O.

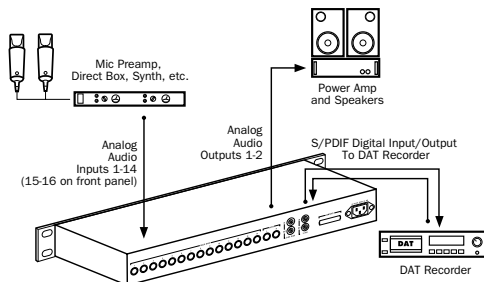


Figure 4. Typical studio configuration without a mixer

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## Using 1622 I/O As Standalone Audio Converter

The 1622 I/O can be used apart from Pro Tools as a standalone 2-channel, 20-bit analog-to-digital, or 24-bit digital-to-analog converter.

Input and output levels are determined by the settings last saved by clicking the Store button in the Other Options dialog (choose Setups > Hardware and click Other Options).

**⚠** *If no input level settings are stored, input levels default to +4 dBu and output levels default to -10 dBV.*

There are no panning controls in standalone mode. Odd-numbered channels are hard-panned left and even-numbered channels hard-panned right. Mono instruments play out of output L or R, but not both. Stereo instruments play out of both outputs L and R. Output gain must be controlled directly from connected instruments.

### Before you use the 1622 I/O in standalone mode:

- 1 Turn off the 1622 I/O.
- 2 Do not turn on your computer while the 1622 I/O is in standalone mode. If you do, the 1622 I/O stops operating in standalone mode.

### To use the 1622 I/O as a standalone A/D converter:

- 1 Turn off any digital devices that send a word clock signal to the 1622 I/O S/PDIF digital input.
- 2 Turn on the 1622 I/O. The 1622 I/O searches briefly for a word clock signal on channels 1–2 of its digital input ports.
- 3 If the 1622 I/O does not detect word clock, it functions as a standalone A/D converter using its internal clock. Use analog inputs 1–16 and the S/PDIF output in this mode.

### To use the 1622 I/O as a standalone 24-bit D/A converter:

- 1 Make sure that a digital device providing a word clock signal is connected to the S/PDIF input of the 1622 I/O and that the device is powered on.
- 2 Turn on the 1622 I/O. The 1622 I/O searches for a valid word clock on its S/PDIF input port.
- 3 When a valid word clock lock is recognized, the 1622 I/O enters Digital mode and function as a standalone D/A converter using the S/PDIF input and analog outputs 1–2.

### To return the 1622 I/O to Pro Tools-based operation:

- Turn on your computer.
  - or –
- If your computer is on, launch Pro Tools.



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## Connecting Equipment with Digital Audio Ins and Outs

Because the 888/24 I/O, 882/20 I/O, 1622 I/O, and ADAT Bridge I/O feature digital inputs and outputs, Pro Tools allows you to digitally record to or from a digital device such as a DAT recorder. The 888/24 I/O and ADAT Bridge I/O provide both AES/EBU and S/PDIF digital audio input and output. The 882/20 I/O and 1622 I/O provide S/PDIF digital audio input and output.

If you plan to use a DAT player, CD recorder, or other digital input and output device with your Pro Tools system, be sure the external device supports either the AES/EBU or S/PDIF format. Connect your interface's AES/EBU inputs and outputs to only another AES/EBU device. Connect S/PDIF inputs and outputs only to another S/PDIF device.

### To connect your Pro Tools system to a DAT recorder:

- 1 Connect the digital output of the audio interface to the digital input of the DAT deck. Audio channels 1 and 2 will be sent out of these outputs.
- 2 Connect the digital output of the DAT to the digital input of the audio interface. The DAT recorder is routed to Pro Tools inputs 1 and 2.

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## Connecting Effects Units

The 888/24 I/O, 882/20 I/O, 1622 I/O, and ADAT Bridge I/O audio interfaces allow you to connect effects units to your system by using any analog (or digital) inputs/outputs as Auxiliary Inputs/Outputs for effects sends and returns. When 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 fader* in Pro Tools.

Five 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 32-internal busses in the Pro Tools TDM Mixer. Outputs can be returned to mono or stereo Auxiliary Inputs for automated mixing or processing.

When you are using an effect in this send-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 is 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 & returns to a digital effects device, set your interface to Internal mode (unless it is already synchronized to an external clock source such as a DAT deck). Then, set your digital effects devices to accept an external digital clock so that they synchronize themselves to Pro Tools. In the Pro Tools Hardware Setup dialog, set the input of the channel pair to which you have connected the digital effects device to Digital, and set the Sync Mode to Internal.

---

## Connecting MIDI Devices

By adding a Windows 2000-compatible MIDI interface to your system, you can take advantage of all the MIDI features of Pro Tools, including recording and editing tracks, syncing to MIDI Time Code or MIDI beat clock (this requires an appropriate MIDI interface) and the use of MIDI Controllers.

 *For information on configuring a MIDI control surface for use with Pro Tools, see the Pro Tools MIDI Control Surfaces Guide.*

### 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 and/or controller software required by the MIDI interface. (When your MIDI interface hardware and software is installed, confirm that it is working properly. To do so, use the procedure provided with the interface's documentation.)
- 3** Connect the MIDI OUT of your MIDI device or controller to the MIDI IN of your MIDI interface.
- 4** Connect the MIDI IN of your MIDI device or controller to the MIDI OUT of your MIDI interface.

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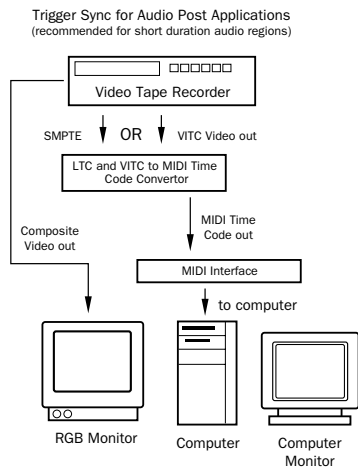
## Connecting SMPTE Synchronization Devices

If you intend to synchronize Pro Tools to external devices with SMPTE using MIDI Time Code, your system must be connected properly. This section provides setup suggestions for synchronizing Pro Tools to audio or video tape. For details on SMPTE and synchronization, see the *Pro Tools Reference Guide*.

### Pro Tools and Synchronization

Pro Tools supports a type of SMPTE synchronization known as SMPTE Trigger through the use of SMPTE-to-MIDI Time Code converters. This type of synchronization allows Pro Tools to chase and start (or stop) playback and recording while slaved to other systems. With SMPTE Trigger alone, when playback or recording starts, there is no further synchronization, and Pro Tools plays back at a rate determined by the internal clock of the audio interface or selected external clock source.

For fairly short pieces of audio program material, SMPTE Trigger is acceptable, especially if the sync master has a fairly stable transport or is resolved to house sync or a black burst generator. In this case, the master transport and Pro Tools will probably not drift very far apart in such a short period of time.



#### Synchronization setup using SMPTE Trigger alone

On the other hand, if the audio piece is several minutes long, or if the sync master has an unstable transport (as in the case of a low quality recording deck striped with SMPTE, for example), SMPTE Trigger alone is probably not an acceptable solution, since the two systems may drift apart noticeably over the duration of the source material.

A better alternative is to use Digidesign's Universal Slave Driver.

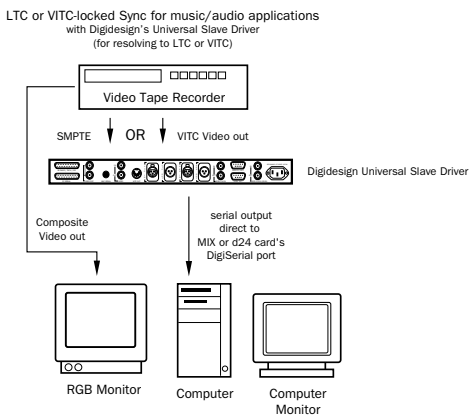
## The Digidesign Universal Slave Driver

The Universal Slave Driver (USD) is a multi-purpose synchronization peripheral that provides virtually all of the functions and connections needed to achieve synchronization to a variety of devices.

The USD allows synchronization of Pro Tools to Linear Time Code (LTC), external video black burst, or word clock signal. It supports all major industry-standard clocks and formats and can also act as a standalone MIDI Time Code (MTC) or VITC reader/generator.

In addition, the Universal Slave Driver offers 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 on Digidesign's USD, please refer to the Universal Slave Driver User's Guide that came with your USD.



**Synchronization setup using a USD**

## chapter 5

# Installing Pro Tools Software

**A** *WARNING: There have been changes in the installation process since the last release of Pro Tools. To avoid problems, please read and follow the installation instructions carefully.*

The complete Pro Tools software installation process includes:

- Un-installing any previously installed versions of Pro Tools.
- Upgrading to Windows 2000 (if necessary).
- Preparing your computer for Pro Tools.
- Installing Pro Tools software.

The first time you launch Pro Tools after software installation, will be prompted to enter your Pro Tools serial number and configure hardware. Instructions for this begin in “Launching Pro Tools For the First Time” on page 49.

Before you begin installing Pro Tools software, Pro Tools hardware should already be installed. For more information on installing Hardware, see Chapter 3, “Installing Pro Tools Hardware.”

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## Upgrading to Windows 2000

IBM IntelliStation E Pro Model 6846 users who downgraded from Windows 2000 to Windows NT (to be compatible with Pro Tools 5.0.1) will need to recover Windows 2000.

### To recover Windows 2000:

- 1** Start or restart your computer.
- 2** Press F11 during the message, “To start the IBM product recovery program, press F11.” This message appears briefly, so you will need to be quick. If you miss it, allow the E Pro to boot into Windows and restart again.
- 3** Select Full Recovery of Windows 2000 in the “IBM Product Recovery Program”.
- 4** Follow the on-screen instructions. You will warned that recovery process will erase everything on that drive. The recovery process takes about 40 minutes.
- 5** You now have Windows 2000. Proceed to the Pro Tools installation process.

---

## Configuring Your Computer

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

**⚠** *Before you make any changes to your computer's system settings, make a backup copy of your Registry (that is where many of these essential settings are stored). By doing so, you will be able to restore your system's original settings in case of trouble. See your Windows 2000 User's Guide for details.*

*If your computer does not provide the BIOS configuration options included in this section, or if you do not feel comfortable changing system parameters or deleting drivers, consult with a Windows 2000 system administrator, or your computer dealer or manufacturer for assistance.*

### **There are five parts to configuring your computer:**

- 1 Configuring your BIOS.
- 2 Configuring your SCSI BIOS.
- 3 Installing the SCSI drivers.
- 4 Setting Display Performance.
- 5 Setting Application Response.

### **Configuring Your 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 more details.

Different BIOS manufacturers often use different names to describe the same system function. Some manufacturers do not provide a particular configuration option at all. Consequently, the names and options that appear in your computer's BIOS may differ from those described in this manual.

### **To modify your computer's BIOS:**


- 1 Start or restart your computer.
- 2 During power up, enter BIOS Setup by pressing the appropriate key on your computer keyboard. On most computers, this is F1, F2 or the Delete key. Refer to the documentation that came with your computer.
- 3 When you are in BIOS Setup, disable Plug & Play OS, if present. (Most likely in M Pro)
- 4 Disable PCI Parity, if present. (Most likely in M Pro)
- 5 Enable SCSI support, if your computer is equipped with built-in SCSI hardware. 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 using a SCSI host adapter card instead, you do not need to set this setting.
- 6 Disable Power Management, if present.
- 7 Enable PCI Dynamic Bursting, if present.
- 8 Enable PCI Master 0 WS Write, if present.
- 9 Disable PCI Delay Transaction, if present.
- 10 Disable PCI#2 Access #1 Retry, if present.
- 11 Save settings.
- 12 Exit BIOS setup and restart your computer.

## Configuring Your SCSI BIOS

In addition to configuring your BIOS, you must also modify the settings of your built-in SCSI hardware or SCSI adapter card. This allows SCSI hard drives to work properly with Pro Tools. This procedure varies on different computers. Consult your computer's User Guide.


### To modify your computer's SCSI BIOS:

- 1 Start your computer. If your computer is already on, restart it.
- 2 During power up, when the text message regarding the SCSI BIOS appears, press the key combination listed on the screen to enter the SCSI BIOS. The SCSI BIOS setup utility appears.
- 3 Consult your SCSI host bus adapter's User Guide to set the following parameters:
  - Maximum Sync Transfer Rate parameter to 20 MB/sec for each SCSI ID and SCSI channel connected to your audio drives.
  - If you are using an ATTO HBA, change the PCI Burst Size to 32 Bytes.
  - If you are using an Adaptec HBA, enable the Host Adapter BIOS option.
- 4 Save these settings.
- 5 Exit SCSI BIOS setup and restart your computer.

 *If you are using the ATTO EPCI-DC card that came in Digidesign's SCSI64 Kit, these parameters are already set correctly for use with Pro Tools.*

## Installing the ATTO or Adaptec SCSI Drivers

Pro Tools requires the use of SCSI host adapters and SCSI drives. For Pro Tools to run at maximum efficiency with these devices, install the Digidesign approved SCSI driver (ATTO or Adaptec, depending on the card you are using).

 *Check Digidesign's Compatibility Documents for a list of Digidesign approved computers and supported SCSI driver versions:*

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

### The full name of the ATTO driver is:

- ATTO ExpressPCI

### The full name of the Adaptec drivers for the IBM M Pro is:

- Adaptec  
AHA290/291/294x/394x/4944/AIC78xx

If you need to install the ATTO or Adaptec driver, consult the driver manufacturer's documentation.

## Setting Display Performance

Configure your computer's video display for optimal performance with Pro Tools. You can avoid disk performance issues by changing two video display parameters on your system.

### To change video display parameters:

- 1 Right-click on the desktop.
- 2 Go to Properties.
- 3 Select the Settings tab.
- 4 Go to Advanced.
- 5 Select the Troubleshooting tab.
- 6 Disable all accelerations by manually moving the slider to None (from its default setting of Full).
- 7 Click OK.
- 8 Select the Effects tab.
- 9 Deselect the Show Windows Contents While Dragging box.
- 10 Click OK.

Specific settings vary, depending on the type of video card in your computer. For a complete list of compatible video cards and their settings, refer to the latest compatibility information on the Digidesign web site:

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

## Setting Application Response

The final step in configuring your computer is setting your system's Application Response parameter.


### To configure Application Response:

- 1 From the Start Menu, choose Settings > Control Panel.
- 2 Double-click on System.
- 3 Click the Advanced tab.
- 4 Click Performance Options.
- 5 Under Application Response select Background Services.
- 6 Click OK, twice.



---

## Installing Pro Tools Software

 *To install Pro Tools, you must log on to Windows 2000 as Administrator. If you do not have Administrator privileges or do not know how to set them up, see your Windows 2000 User's Guide.*

### To install Pro Tools software:

- 1 If you are using virus-protection software, turn it off or remove it and restart your computer. Avoid running virus-protection software while using Pro Tools since it adversely affects system performance.
- 2 Place the Pro Tools Installer CD for Windows 2000 in your CD-ROM drive. Locate and double-click the blue icon named "Setup."
- 3 Click Next.
- 4 Click OK to accept the License Agreement.
- 5 Select the hard drive on which to install Pro Tools from the Install pop-up menu. For maximum reliability, install Pro Tools on your startup drive.
- 6 Click Next.
- 7 We recommend you choose the Typical Install option. However, if you Custom Install, the next window will ask you to choose the options you want to install. To install any of these items, select them from the following list:

**Program Files** This component contains the Pro Tools executable and all support DLLs.

**Plug-Ins** This component contains the core plug-ins. These files are required by Pro Tools.

**Controllers** This component contains the Pro Tools Control Surface Personalities.

**Documentation** This component contains Pro Tools documentation and release notes.

**System Files** This component contains Digidesign System Files. These files are required by Pro Tools.

**Pro Tools Utilities** This component contains the DigiTest utility and calibration test tones.

**Acrobat Reader** This component contains the Acrobat 4.0 Reader installer.

**Codecs** This component contains the Pro Tools Audio Codecs: MP3, RealAudio, and Windows Media.


**MacOpener Demo 8** This component contains the MacOpener Demo installer.

**USD Setup 9** This component contains the Universal Slave Driver Setup application.

**Answerbase** This component contains standalone Pro Tools multi-lingual information databases. Note: these files require approximately 37 MB of disk space.

**10** Click Next.

**11** Select a "work environment." This is an initial set of Pro Tools Preferences. These Preference "sets" have been pre-configured to include some of the more popular settings for post production, audio, and audio with MIDI. Click Next.

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

**12** For Pro Tools MIX-series systems, you are prompted to install the Surround Mixer plug-in. This plug-in is required for mixing, mastering, and monitoring in surround. Select Standard Pro Tools if your monitoring is configured for Film Format. Select ProControl for DTS Format if your monitoring is configured for DTS. Select Stereo if your monitoring is configured for Stereo. Then click Next.

**13** When installation is complete, click Finish to restart your computer.

## Using MIDI

Pro Tools in Windows 2000 uses your Multimedia Setup to which MIDI devices are available, and what their properties are. Refer to your device's installation and usage documentation to properly configure the device.

---

## Cannot Create DAE Deck Or Error Number 4

Your computer may not recognize your Pro Tools cards if you did not follow all of the steps above, or if you upgrade from Windows NT to Windows 2000.

If you receive error message number 4 or "Cannot Create DAE Deck," when you launch Pro Tools, complete the instructions below.

### To correct a "Cannot Create DAE Deck" error:

- 1** Turn your computer off.
- 2** Confirm that all your Pro Tools cards are seated correctly and cables are tightly fastened.
- 3** Start your computer and launch Pro Tools. If the error does not re-appear, you do not need to continue with these steps.

**4** With your computer on, right-click the My Computer icon (located on your Widows desktop).

**5** Choose Properties > Hardware > Device Manager.

**6** Expand the Sound, Video and Game Controllers list.

**7** In Multimedia Devices, you should see an "!" icon next to all of the Pro Tools DSP chips that are not properly installed.

**8** Select one of these "!" icons and press Delete. Click OK in the Confirm Device Remove dialog.

**9** Repeat step 8 for each of these "!" icons, until they are all removed. Then, click OK.

**10** You are ready to install your Pro Tools cards. See "Detecting Pro Tools Cards" on page 16.


## chapter 6

# Checking Your TDM System and Launching Pro Tools

Before you launch Pro Tools, run the DigiTest diagnostics application located in the Digidesign Utilities folder (see “Running DigiTest” on page 48). DigiTest finds your cards and confirms that they are correctly installed and working.

When DigiTest has completed and you have rebooted your computer, launch Pro Tools for the first time. Pro Tools provides dialogs to validate your software and configure your TDM cards and audio interfaces (see “Launching Pro Tools For the First Time” on page 49).

When you have completed initial configuration, you can install and play the demo session included on the Pro Tools Installer CD (see “Installing the Demo Session” on page 51).

 *If you haven't already installed Pro Tools software, do so now. See Chapter 5, “Installing Pro Tools Software” for instructions.*

---

## Starting Up Your System


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


### Start your Pro Tools System in this order:

- 1** Turn on your external hard drives. Wait approximately ten seconds for them to come up to speed.
- 2** Lower the volume of all output devices, then turn on your Pro Tools audio interfaces. Wait at least ten seconds for them to initialize.
- 3** Turn on your computer. Or, if it is already on, restart it.

## Running DigiTest

Run the DigiTest diagnostics application to identify TDM cards and verify that they are correctly installed and working.

 *DigiTest is included on the Pro Tools Installer CD and installed with Pro Tools. DigiTest resides in the Digidesign Utilities folder.*

 *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 Turn off Pro Tools.
- 2 Go to Start > Programs > Digidesign > Pro Tools > DigiTest.

- 3 Test cards.
  - To test only one Digidesign card in your system, click the button that corresponds to this card.
  - To test all Digidesign cards at once, press the “Test All Cards” button.

4 When prompted, recycle power on all Pro Tools peripherals and disconnect all cables from Audiomedia and SampleCell. Press Continue.

5 Check the “Test I/O Box.”

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

6 Exit DigiTest by clicking on the “close” box on the top right hand corner of the application window.

7 Reboot your computer.

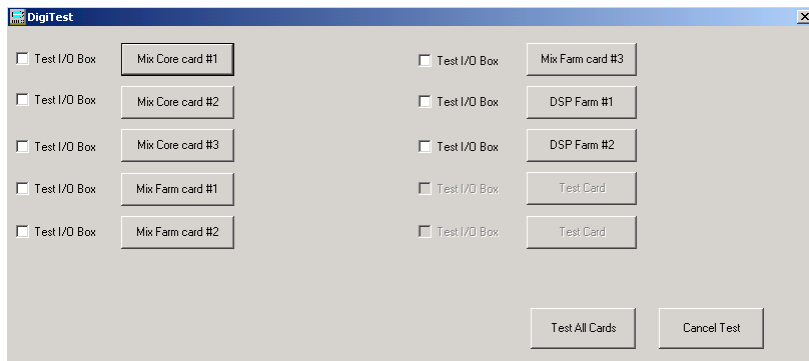


Figure 5. DigiTest

## Errors and Undetected Cards


Complete the steps below if:

- There is a problem with a component in your system and an error message has been displayed to the right of the corresponding card's button in DigiTest.
  - or –
- A supported card is installed but not automatically detected during DigiTest.

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

- 1 Close DigiTest.
- 2 Power down your system.
- 3 Reinstall the cards (see “Installing Pro Tools Cards” on page 13).
- 4 Check the card seating.
- 5 Check the ribbon cable connection.
- 6 Power up.
- 7 Begin DigiTest again.

For descriptions of all error codes, refer to Appendix B, “DigiTest Error Codes.” For test details, click the Info button to the right of the reported error, then click Failures in the pop-up window and change Failures to Detailed.

 *If a card continues to fail DigiTest, contact Digidesign.*

---

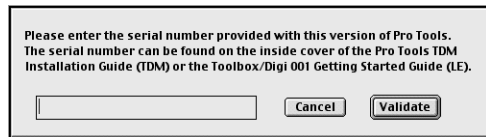
## Launching Pro Tools For the First Time

### Validate Pro Tools Software

When launching Pro Tools the first time, you are prompted to enter a serial number to validate your software.

#### To validate Pro Tools software:

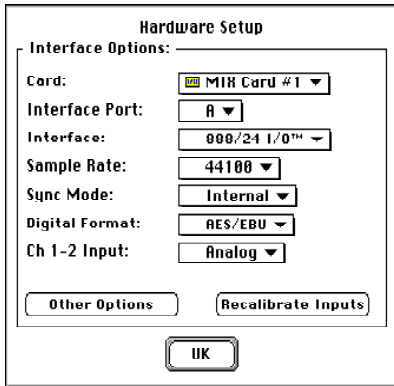
- 1 Double-click the Pro Tools application in the Pro Tools folder inside the Digidesign folder.
- 2 Enter the serial number in the dialog when prompted, making sure to observe any spaces, then click Validate.



*Serial number entry for Pro Tools*

## Configuring Pro Tools TDM Cards and Audio Interfaces

The first time you run Pro Tools, the Hardware Setup dialog automatically opens after you validate Pro Tools software. The Hardware Setup dialog prompts you to configure the parameters for each Pro Tools card and audio interface in your system.



*Hardware Setup dialog*

If you have a system with multiple TDM cards and audio interfaces, you must configure each by selecting the appropriate items from the pop-up menus in this dialog.

You must select the card, identify the interface connected to it, then set the parameters for that interface—repeating this for each card and interface in your system.

**⚠** *Some parameters explained below do not apply to all Pro Tools configurations.*

### To configure Pro Tools hardware:

**1** If the Hardware Setup dialog isn't on-screen, choose **Setup > Hardware** in Pro Tools.

**2** From the Card pop-up, select the Digidesign card type.

**3** From the Interface Port pop-up, select the port to which your audio interface is connected (port A or port B).

Choose port A if only one audio interface is connected to the card. If two audio interfaces are connected to your card, follow the steps below for each port and interface.

**4** From the Interface pop-up, choose the audio interface connected to the card you selected in the previous step.

**5** From the Sample Rate pop-up, select the desired sample rate for the current card and interface (the sample rate of the demo session is 44100 Hz).

**6** From the Sync Mode pop-up, select the appropriate sync mode on the currently selected interface (Internal or Digital). In most cases you will use Internal. Digital is used primarily for inputting data from DAT or other digital sources.

**7** From the Digital Format pop-up, select the desired digital format of Channels 1–2 of the currently selected interface (AES/EBU or S/PDIF).

**8** From the Ch 1–2 Input pop-up, select the input format of Channels 1–2 of the currently selected interface (Analog or Digital).

**9** From the H/W Buffer pop-up, select the audio buffer size, in samples, for host processing tasks such as Real-Time AudioSuite (RTAS) plug-in processing.

**Select a minimum of 128 samples. Select larger buffer sizes for slower computers.**

**10** From the CPU Usage Limit pop-up, select the maximum percentage of CPU resources to allocate to host processing tasks.

**Select a minimum percentage of 65%. Select higher CPU usage percentages for slower computers.**

**11** Click Recalibrate Inputs to recalibrate the analog-to-digital converters of the audio interface and remove any DC offset that has built up in them. (For an explanation of DC offset, see the *DigiRack Plug-Ins Guide*).

**12** Click Other Options for additional configuration options specific to the audio interface. These include:

- Setting the input format (analog or digital) of each pair of input channels on an 888/24 I/O.
- Configuring the level sensitivity and peak hold settings for the output level meters on the front panel of the 888/24 I/O.
- Selecting S/PDIF compatibility with Tascam DA30 DAT recorders.

**▲** *To record to or from a Tascam® DA30 DAT recorder, you must set S/PDIF compatibility to "Tascam." To record to or from a non-Tascam DA30 DAT recorder, set S/PDIF compatibility to "Other."*

- Enabling or disabling DAC Muting (mutes the 888/24 I/O digital-to-analog converters when its output level falls below a certain threshold, to reduce noise).
- Setting the input and output levels of a 1622 I/O.

**13** Configure the Other Options parameters as desired and click Done.

**14** Click OK to close the Hardware Setup dialog.

**15** Choose File > Quit to close Pro Tools.

---

## Installing the Demo Session

Install the demo session included on the Pro Tools Installer CD.

### To install the demo session:

**1** Insert the Pro Tools Installer CD in your CD-ROM drive.

**2** Double-click the file "Install Pro Tools Demo Session."

**3** Select "Pro Tools SoundCheck TDM." Pro Tools SoundCheck TDM is the session used for testing your system.

**4** Choose a drive on which to install the demo session.

**5** Click Install. When installation is complete, click OK to return to the Finder.

Note that you can also install "Be There," for a demonstration of Pro Tools capabilities. However, since Be There is not used for testing purposes, installing it is optional. Be There is tailored to fit the size and configuration of your Pro Tools system.

---

## Opening the Demo Session

To hear Pro Tools in actions, open the demo session and begin playback.

### To open the demo session:

- 1 Locate and open the demo session folder.
- 2 Double-click the file, “Pro Tools SoundCheck TDM.”



*If this is the first time you are launching Pro Tools, a dialog appears prompting you to use the Hardware dialog to configure your system. Click OK. See “Configuring Pro Tools TDM Cards and Audio Interfaces” on page 50.*

### To play the demo session:

- 1 Adjust the volume control on your monitoring system so that it is set relatively low. You can adjust levels as the demo begins to play.
- 2 Press the Spacebar on your keyboard to begin playback. To stop playback, press the Spacebar again.

Welcome to Pro Tools!



*If you weren't able to play the demo session, see the Pro Tools Reference Guide for troubleshooting tips.*



## chapter 7

# Calibrating the 888/24 I/O

Before you use the 888/24 I/O Audio Interface, calibrate its input and output levels to the level of your mixing console.

The 888/24 I/O is factory-calibrated so that its input operating level is set to +4 dB nominal with 18 dB headroom nominal at full code, unity gain, making calibration unnecessary for most professional applications.

If you do need to recalibrate your interface or other components of your studio, you can use the alignment procedure described in this chapter.

---

### About Calibration

Calibrating levels on a digital recording device is different from calibrating levels on an analog recording device. Unlike analog devices, most digital devices do not have a standard “0 VU” level setting that corresponds to nominal input and output levels. Instead, with an interface such as the 888/24 I/O, the meters are calibrated in *decibels below peak* (digital clipping) level.

### Headroom

The concept of headroom is slightly different for analog and digital devices.

**Analog** Most analog devices allow for a certain amount of headroom above 0 VU. If you send a signal above 0 VU to an analog recorder, you still have a margin of headroom, and if tape saturation occurs, it does so fairly gracefully, giving the audio a compressed sound that some find desirable.

**Digital** Digital devices, on the other hand, do not allow for signals that exceed the dynamic range of the input. When a signal exceeds the maximum input level for a digital device, clipping occurs, causing digital distortion, which is harsh and usually undesirable.

### The AES Standard For Headroom

The AES (Audio Engineering Society) standard for headroom is currently –18 dB for nominal level in a digital audio system. The exact value you use is determined by the amount of headroom available in the rest of your system. For example, if your mixing console has 15 dB of headroom above nominal level, then you may want to calibrate the 888/24 I/O to have 15 dB of headroom.

## The Calibration Process

**Analog** To calibrate the input level of an analog device to a mixing console's output level, you would typically send a 1 kHz tone at 0 VU from the console to the analog deck and align the recording deck's meters to read 0 VU.

**Digital** With a digital recording device such as the 888/24 I/O, in order to allow for headroom, you must align a 0 VU tone from the console to a value less than zero on the 888/24 I/O, by exactly the amount of headroom that you want.

For example, to have 12 dB of headroom above 0 VU with the 888/24 I/O, you must align the incoming 0 VU 1kHz tone to a level of -12 dB. For 18 dB of headroom, you would align it to -18 dB. (Since it is assumed that you are using the 888/24 I/O with a +4 dBu console, a 0 VU signal level coming out of the console is actually equivalent to a nominal +4 dBu level signal.)

---

## Calibrating the 888/24 I/O

To calibrate the 888/24 I/O, put Pro Tools in a special operating mode called *Calibration mode*, then use the Signal Generator plug-in to generate a test tone for alignment.

The Pro Tools Installer includes several pre-configured calibration session templates that cover most common calibration setups. You can use these in addition to the calibration procedure given below.

**⚠** *Turn down your monitoring system before beginning calibration! The Signal Generator plug-in emits a continuous signal when inserted on a track.*

### To calibrate the 888/24 I/O:

- 1 Launch Pro Tools by opening the Digidesign folder, then the Pro Tools folder, and double-clicking Pro Tools.
- 2 In Pro Tools, create a new session by choosing File > New Session.
- 3 Choose Setups > Preferences and click Operations.
- 4 Enter the desired Calibration Reference Level value in dB. A level of -18 dB is typical. (It isn't necessary to type a minus sign here.)
- 5 Click Done.
- 6 Create a new mono audio track by choosing File > New Track.
- 7 Insert the Signal Generator TDM plug-in on the track.
- 8 Set Signal Generator's output level. This should be the same value you entered as the Calibration Reference Level.
- 9 Set Signal Generator's frequency to 1000 Hz.
- 10 Set Signal Generator's signal waveform to Sine.
- 11 Route the track's output to Bus 1.
- 12 Create a mono Auxiliary Input track for each 888/24 I/O output you want to calibrate. Set the output assignment for each of these Auxiliary Inputs to its respective 888/24 I/O output.
- 13 Set the input of each Auxiliary Input track to Bus 1.

**14** Create an additional mono Auxiliary Input track for each 888/24 I/O input you want to calibrate. Set the input assignment for each of these Auxiliary Inputs to its respective 888/24 I/O input. Then set the output of each of these Auxiliary Inputs to an unused bus pair (for example Bus 31–32) so that feedback doesn't occur when monitoring main outputs 1–2.

**15** Connect an external VU meter to each of the 888/24 I/O outputs in turn. (One at a time as you calibrate).

**16** Set all Pro Tools track faders to their default of 0 dB by Shift-Option-clicking each fader in the session.

**17** Adjust the 888/24 I/O output level trim pots with a Phillips screwdriver to align the outputs to read "0 VU" on the external VU meter.

**18** Connect each output of the 888/24 I/O directly to its input. Connect channel 1 output to channel 1 input, and so on for each channel.

**19** In Pro Tools, select Operations > Calibration Mode.

The names of all uncalibrated tracks begin to flash. In addition, the track volume indicator of each Auxiliary Input track receiving an external input signal now displays the reference level coming from the calibrated output.

**20** Adjust the 888/24 I/O input level trim pots with a Phillips screwdriver to align the inputs to match the reference level. When the level is properly matched, the track name stops flashing.

The Automatch indicator arrows on each track show the direction of adjustment required for alignment:

- ◆ When the incoming level is higher than the reference level, the down arrow appears lit (blue). In this case, trim the 888/24 I/O input level down.
- ◆ When the incoming level is lower than the reference level the up arrow appears lit (red). In this case, trim the 888/24 I/O input level up.

When you have properly aligned the incoming peak signal levels to match the calibration reference level, both Automatch indicator arrows lights: the up arrow red and the down arrow blue.

**21** When you have finished, deselect Operations > Calibration Mode.

## **Calibrating a System with Both 888/24 I/O and 882/20 I/O Audio Interfaces**

The 888/24 I/O is factory preset with 18 dB of headroom in its +4 dB line level operating mode. The 882/20 I/O, however, is fixed at 14 dB of headroom and its inputs are not adjustable.

When setting up an 882/20 I/O (particularly in systems using a combination of the 882/20 I/O and 888/24 I/O), make sure that you use a headroom setting of –14 dB for your system. This helps ensure that recorded audio files have the same relative levels regardless of which interface they are recorded with.



## appendix a


# Slot Order


---


### Card Order Guidelines For Each Pro Tools System

The following are card installation guidelines for each Pro Tools TDM system. Install your cards in the following order, starting with the lowest numeric slot.

The guidelines below may include optional cards not present in your system.

 *All Pro Tools TDM cards must be grouped in successive order, in order for the ribbon cable to connect them properly.*

 *SCSI host bus adapter (HBA) cards can be placed in either the first or last slot.*

 *Most computers have AGP slots (in a fixed location) for their display card. This is strongly recommended. However, if the display card for your computer monitor is a PCI card, place it in the second to last slot.*

#### Pro Tools MIX-Series (Pro Tools 24 MIX, MIXplus and MIX3):

- 1 MIX Core cards
- 2 MIX Farm cards
- 3 MIX I/O cards

#### Card order for Pro Tools 24:

- 1 Pro Tools d24 audio cards
- 2 DSP Farm cards

#### Card order for mixed systems:

- 1 MIX Core card
- 2 MIX Farm card
- 3 MIX I/O cards
- 4 DSP Farm cards

At this time, d24 cards are not supported on mixed Pro Tools TDM for Windows 2000 configurations.

#### Systems Using an Expansion Chassis

If you are using an expansion chassis, refer to the *Pro Tools Expanded Systems Guide*, and any recent addendum, included with your Pro Tools system for instructions on connecting an expansion chassis to your computer.



## appendix b

# DigiTest Error Codes

*DigiTest Error Codes*

Code	Description
Err3	Cards from different Pro Tools systems are incorrectly mixed. See "Card Order Guidelines For Each Pro Tools System" on page 57.
Err4	Cards marked with this error are installed in the wrong order. See "Card Order Guidelines For Each Pro Tools System" on page 57.
Err5	Too many cards of this type are installed in the system. Refer to the Digidesign Web site for compatibility information: <a href="http://www.digidesign.com/compato/">www.digidesign.com/compato/</a>
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 "Card Order Guidelines For Each Pro Tools System" on page 57, as well as related installation guides.
Err1010	Too many MIX Core cards installed. The maximum number of MIX Core cards allowed is 7.
Err1011	Too many MIX Farm cards installed. The maximum number of MIX Farm cards allowed is 7.

*DigiTest Error Codes*

Code	Description
Err1012	Too many total MIX cards installed. The maximum number of total MIX cards allowed is 7.
Err1020	Too many d24 Core cards installed. The maximum number of d24 Core cards allowed is 2.
Err1021	Too many MIX I/O cards installed. The maximum number of MIX I/O cards allowed is 2.
Err1022	Too many total d24 cards installed. The maximum number of total d24 cards allowed is 2.
Err1220	SCSI Accelerator card is installed in the wrong slot. See "Card Order Guidelines For Each Pro Tools System" on page 57 for correct location of the card.
Err1221	Expansion Chassis Host Interface card is installed in the wrong slot. See "Card Order Guidelines For Each Pro Tools System" on page 57 for correct location of the card.
Err1301	A Core card is not installed. At least one Cord card is needed.
Err1310	A DSP Farm card is not installed. At least one DSP Farm card is needed.





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