96 I/O Guide

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Communications & Safety Regulation Information

Compliance Statement
The model 96 I/O complies with the following standards regulating interference and EMC:

- FCC Part 15 Class A
- EN55103 – 1, environment E4
- EN55103 – 2, environment E4
- AS/NZS 3548 Class A

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

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

Safety Statement
This equipment has been tested to comply with USA and Canadian safety certification in accordance with the specifications of UL Standards; UL1419 and Canadian CSA standard; CSA C22.2 No.1-M90. Digidesign Inc., has been authorized to apply the appropriate UL & CUL mark on its compliant equipment.

Important Safety Instructions
When using electric or electronic equipment, basic precautions should always be followed, including the following:

- Read all instructions before using this equipment.
- To avoid the risk of shock, keep this equipment away from rain water, and other moisture. Do not use this equipment if it is wet.
- The equipment should only be connected to the correct rating power supply as indicated on the product.
- Do not attempt to service the equipment. There are no user-serviceable parts inside. Please refer all servicing to authorized Digidesign personnel.
- Any attempt to service the equipment will expose you to a risk of electric shock, and will void the manufacturer’s warranty.
- The product should be connected only to the correct power supply as indicated on the product.

Warning!

- HD audio interfaces need room at their sides to maintain proper air flow and cooling.
- Do not install these units into a rack or other enclosure that doesn’t leave room on either side for the unit fans.
- Do not block the sides of the units (where fans are), or disconnect the fan.
- If the units are racked up in a case, remove all lids, doors, or covers before operating the units.
- Failure to do so can result in the units overheating very quickly, which can permanently damage them.

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chapter 1

Introduction to the 96 I/O

The Digidesign 96 I/O is a 16-channel digital audio interface, featuring 24-bit analog-to-digital (A/D) and digital-to-analog (D/A) converters. The 96 I/O supports sampling rates of up to 96 kHz for superior dynamic range and low noise floor.

96 I/O Features

- 16 discrete channels of input and output, with 4-segment LED Meters on each channel. Input and Output channels can include:
  - Eight channels of 24-bit D/A and A/D converters for superior analog input and output at sampling rates of 44.1 kHz, 48 kHz, 88.2 kHz, and 96 kHz.
  - S/PDIF, AES/EBU, and Optical (ADAT) digital inputs and outputs.
- Word Clock input and output for synchronizing 96 I/O with external Word Clock or 256x (Slave Clock) devices.
- Simultaneous use of up to six 96 I/O units is supported, for a maximum of 96 channels of I/O at 48 kHz.
- Legacy port for Digidesign MIX-series Audio Interfaces.
- Interface with digital mixing consoles and other peripherals equipped with ADAT Lightpipe connections (using the ADAT Optical standard at up to 24-bit resolution).

What's Included

- 96 I/O with power cable
- This guide
- DigiLink cable (1.5ft. [0.46m])
- BNC cable (1.5ft. [0.46m])

System Requirements

The Digidesign 96 I/O requires:

- A Pro Tools HD system on a qualified Macintosh OS or Windows CPU.
- Pro Tools software, version 5.3 or higher.
- A monitoring system (mixer, amplifier, speakers, or headphones).

About This Guide

This guide provides a basic overview of the 96 I/O's features and functionality.

Complete instructions for connecting and configuring your Pro Tools|HD System are located in the *Getting Started with HD Guide*.

For additional information about using Pro Tools software to route your interface inputs and outputs to Pro Tools inputs and outputs, refer to the *Pro Tools Reference Guide*.

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	Hold down the Control key and press the *N* key
Option-click	Hold down the Option key and click the mouse button

The following symbols are used to highlight important information:

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

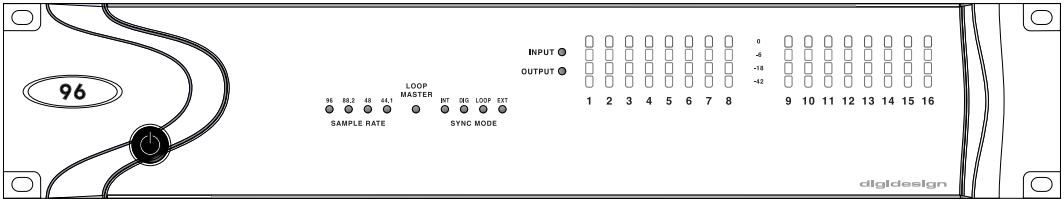
Important Notices include information that could affect your session data or the performance of your system.

Cross References point to related sections in this and other Digidesign Guides.

chapter 2

96 I/O Overview

96 I/O Front Panel



96 I/O Front Panel

The 96 I/O has the following front panel features:

Power Switch and LED Ring

This button turns the 96 I/O on and off.

The LED ring around the power button will light green to indicate that the unit has powered up successfully and is connected to an active HD system. If the LED ring is orange, the unit has power, but the computer it is connected to is shut down.

Sample Rate

These LEDs display the current sample rate of the 96 I/O internal crystal oscillator, which can be 44.1 kHz, 48 kHz, 88.2 kHz, and 96 kHz. The sample rate can be set when you create a new session, or in the Hardware Setup or Playback Engine dialogs if no session is open.

Loop Master LED

The LOOP MASTER LED indicates which HD audio interface is the master Pro Tools peripheral. Loop Master defaults to the first HD I/O connected to the HD Core card. Loop Master will always be lit with a single interface, regardless of the synchronization mode.

Sync Mode LEDs

The SYNC MODE LEDs indicate different clock source modes. Synchronization mode LEDs reflect the Clock Source choice in Pro Tools.

Only one HD I/O can be Loop Master at a time. When you change the clock source to an external clock on a particular HD I/O, that HD I/O will automatically become the Loop Master and all other HD I/Os in the chain will be switched to Loop Slave mode. The Loop Master LED will be continuously lit on the current Loop Master peripheral only, and unlit on all other peripherals.

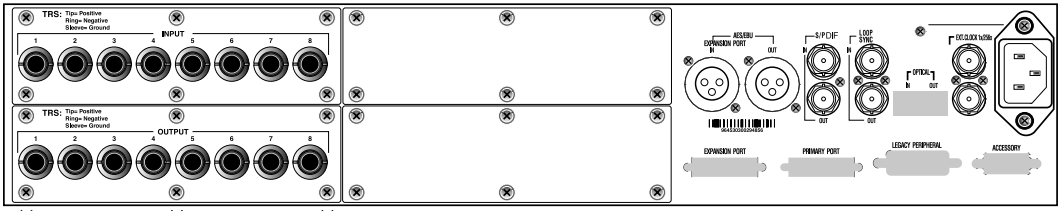
For more information, see "Synchronization Mode and Clock Source" on page 19.

Meters

These four-segment LEDs indicate signal level for each of 16 channels. Two additional LEDs, located to the left of the meters, indicate whether the 96 I/O is displaying input or output levels; the meters indicate output levels by default, and can be switched from within the Hardware Setup dialog in Pro Tools.

These meters are calibrated at –42 dB, –18 dB, –6 dB, and 0 dB, respectively. Note that 0 dB is not to be confused with clipping; please use the on-screen meters in Pro Tools to determine whether a signal is clipping. See the *Getting Started with HD Guide*.

96 I/O Back Panel



96 I/O Rear Panel

The 96 I/O has the following back panel connectors:

Analog Audio Inputs

These are balanced, 1/4-inch TRS jacks for analog audio input connections. The eight analog inputs feature 24-bit A/D converters.

The TRS inputs are wired as follows:

- Tip = positive
- Ring = negative
- Sleeve = ground

These connectors also support unbalanced connections.

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

Analog Audio Outputs

These are balanced/unbalanced, 1/4-inch TRS jacks for analog audio output connections. The 96 I/O analog outputs feature 24-bit D/A converters.

All eight output channels are continuously active. Output operating levels are switchable between +4 dBu and –10 dBV operation from within the Hardware Setup window in Pro Tools. Unbalanced connections are supported with the use of standard 1/4-inch mono phone plugs.

AES/EBU Digital In and Out

These are balanced, three-conductor XLR connectors that accept and output a stereo, 24-bit AES/EBU digital data stream. These two ports support up to 96 kHz sample rates.

S/PDIF Digital In and Out

These are unbalanced, two-conductor RCA jacks that accept and output a stereo S/PDIF digital data stream. S/PDIF supports up to 24-bit audio, at sample rates up to 96 kHz. To avoid RF interference during S/PDIF transfers, use 75-ohm coaxial cable.

Loop Sync In and Out

Loop Sync is a dedicated clock loop for synchronizing multiple HD-series interfaces together. Loop Sync uses a word clock signal based on sampling rates of either 44.1 kHz or 48 kHz. As sample rates increase in the system, Loop Sync continues to operate at a base rate of 44.1 kHz or 48 kHz, depending upon the higher rate.

The Loop Sync In and Out ports are standard BNC connectors that output a 1x Loop Sync clock signal. Loop Sync should only be used to chain multiple HD-series peripherals together.

Optical (ADAT) In and Out

These are Optical ports which accept up to eight channels of Optical (ADAT) input and output, or two channels (stereo) optical S/PDIF input and output. Optical (ADAT) mode supports sample rates up to 48 kHz. In TOS-Link mode, supports two-channel Optical input and output at sample rates up to 96 kHz.

About Lightpipe-Compatible Devices

Lightpipe is an industry standard, eight-channel optical digital audio connection created by Alesis. Lightpipe is found on many devices, including Optical (ADAT) decks, modular digital multitracks (MDMs), sound cards, A/D or D/A converters, and digital consoles.

EXT. CLOCK In and Out

The External Clock I/O ports are standard BNC connectors that receive and output a word clock signal. These ports can be used to synchronize the 96 I/O to any device that requires (or provides) word clock.

The External Clock In port is configured by your choice for Clock Source in the Hardware Setup dialog. The External Clock Out is configured using the External Clock Out selector in the Hardware Setup dialog.

Because crucial timing data is passed through the Loop Sync and Word Clock ports, you should use high-quality, 75-ohm RG-59 cables for making connections.

AC Power

This connector accepts a standard AC power cable. The 96 I/O is auto power-selecting (100V to 240V) and will automatically work with a standard modular cable to connect to AC power receptacles in any country.

Primary DigiLink

The Primary port is where the DigiLink cable connects from your HD Core or Process card to the 96 I/O. The Primary DigiLink port sends and receives all 32 I/O channels to and from the HD Core or Process card. As the 96 I/O is a 16-channel only device, channels 17–32 are passed through to the Expansion port or the Legacy port.

Expansion DigiLink

The Expansion port is where the DigiLink cable connects an additional HD I/O to your base, or primary, HD I/O. This port passes channels 17–32 to the secondary, or expansion, I/O.

Legacy Port

This port is used to connect MIX-series Digidesign audio interfaces to 96 I/O. You can connect two eight-channel interfaces (such as the 888|24 or 882|20) or a single sixteen-channel interface (1622 I/O, 24-bit ADAT Bridge I/O, or the original ADAT Bridge I/O) for expanded input and output options, using their original cables.

When the Legacy port has been activated from within Pro Tools, your MIX-series I/O will appear as channels 17–32 in the Pro Tools mixer.

To connect HD or legacy audio interfaces, refer to the *Getting Started with HD Guide*.

Legacy and Expansion Peripheral Port Limitations

Because both the Legacy port and the Expansion port use channels 17–32, you can only use one at a time.

To select the Legacy or Expansion ports, refer to the *Pro Tools Reference Guide*.

The Legacy port is not available in any session in which the sample rate is set for higher than 48 kHz.

Accessory Port

This port is not supported at this time.

DigiLink Connections

DigiLink cables make the vital connection between your HD Core or HD Process card and your HD I/Os. DigiLink cables are also used to interconnect multiple HD I/Os together to expand total system I/O.

DigiLink Length Specifications

There are five different lengths of DigiLink cables:

- The 18″ (0.46m) cable is included with each HD I/O, designed for daisy-chaining multiple HD audio interfaces.
- The 12′ (3.6m) cable included with each HD Core, designed for connecting the Core card to an HD I/O.
- 25′ (7.62m) cable is the same length as Pro-Control and Control|24 breakout cables.
- 50′ (15.25m) cable (sold separately).
- 100′ (30.5m) maximum cable length (sold separately).

chapter 3

Installation Overview

Complete instructions for connecting and configuring your Pro Tools|HD System are located in the *Getting Started with HD Guide*. If you are connecting the 96 I/O to a new Pro Tools|HD System, please refer to that guide now.

If you are adding the 96 I/O to an existing Pro Tools|HD system, you can probably use just the instructions here in this chapter of your *96 I/O Guide*. Additional information can always be found in the *Getting Started with HD Guide*, and the *Expanded Systems Guide*.

Connecting the 96 I/O to an Existing HD System

If you are adding this interface to an existing Pro Tools|HD system, please follow these guidelines:

⚠ *Turn off your computer, hardware interfaces, monitoring system, hard drives, and peripherals. Making connections while power is on can damage your system.*

DigiLink Cable Connections

The DigiLink cable provided with the 96 I/O is 18′ long.

Each HD Core system includes a 12′ DigiLink cable. Digidesign assumes most often I/Os will be rack mounted together. For this reason each HD I/O includes an 18′ DigiLink cable for linking additional I/O units.

If you need a 12′ or longer DigiLink cable to connect to the HD Process card, you must purchase DigiLink cables separately.

Guidelines for DigiLink Connections

For additional details on the ordering of audio interfaces in an expanded system, see the *Expanded Systems Guide*.

To connect the 96 I/O to an existing HD System:

■ If the existing system contains a single HD I/O, you can connect your 96 I/O directly to the first HD Process card or through the Expansion port of your existing HD I/O. Connect the DigiLink cable from the Primary port of the new 96 I/O to either the Expansion port on the existing HD I/O or the DigiLink port on the HD Process card.

Loop Sync Connections with BNC Cable

To connect Loop Sync between two interfaces:

■ Connect the BNC cable from the Loop Sync Out of the original HD I/O to the Loop Sync in of the new 96 I/O. Connect the Loop Sync Out from the new 96 I/O to the Loop Sync In of the original HD I/O.

To connect the 96 I/O into a Loop Sync chain:

■ Connect the new 96 I/O Loop Sync In and Out ports to properly place the new interface in the Loop Sync chain. See the *Getting Started with HD Guide* for more information.

Checking Installation

This section explains how to quickly check that your installation was successful.

To check installation using DigiTest:

1 Start up your computer (see "Powering Up Your System" on page 10).

2 Launch DigiTest.

3 Ensure that any and all HD cards and HD I/Os are identified properly. If not, see the *Getting Started with HD Guide*.

4 When finished, quit DigiTest and restart.

To check or reconfigure I/O:

1 Launch Pro Tools and choose Setup > Hardware Setup.

2 Use the Identify button to verify that your newly-added 96 I/O has been properly identified. Select each HD I/O in the Peripherals list, and click on the Identify radio box in the lower left corner of the Hardware Setup dialog to illuminate all of the LEDs on the front panel. This will clearly demonstrate which HD I/O you have selected in the Peripherals list.

3 If you encounter any difficulties, delete the DigiSetup file (located in the System Folder/Preferences), power down the computer completely, and turn off all interfaces. Then turn the power back on all interfaces and boot the computer. See "Powering Up Your System" on page 10 for more information.

Powering Up Your System

In order for Pro Tools to communicate properly with audio interfaces and other peripherals, it is important that you start up and shut down your system in the following order:

Power up your system in this order:

1 Turn on your Pro Tools hard drives.

2 Turn on synchronization or other MIDI peripherals or interfaces.

3 Turn on your 96 I/O and any other Pro Tools audio interfaces. On power up, the status LEDs will flash. Wait at least fifteen seconds for the 96 I/O to initialize, and the status LEDs to stop blinking and stay lit on any and all audio interfaces. If properly connected, the ring around the power switch will be orange while the computer is powered down.

4 Turn on your computer. When the computer boots, all power LED rings on HD I/O should switch to green. This signifies that the HD I/Os are properly connected to HD cards or other HD I/Os in your system.

MIX-series audio interfaces will not be available until they have been made active in the Hardware Setup dialog. See the *Getting Started with HD* Guide for info.

Power down your system in this order:

1 Quit Pro Tools.

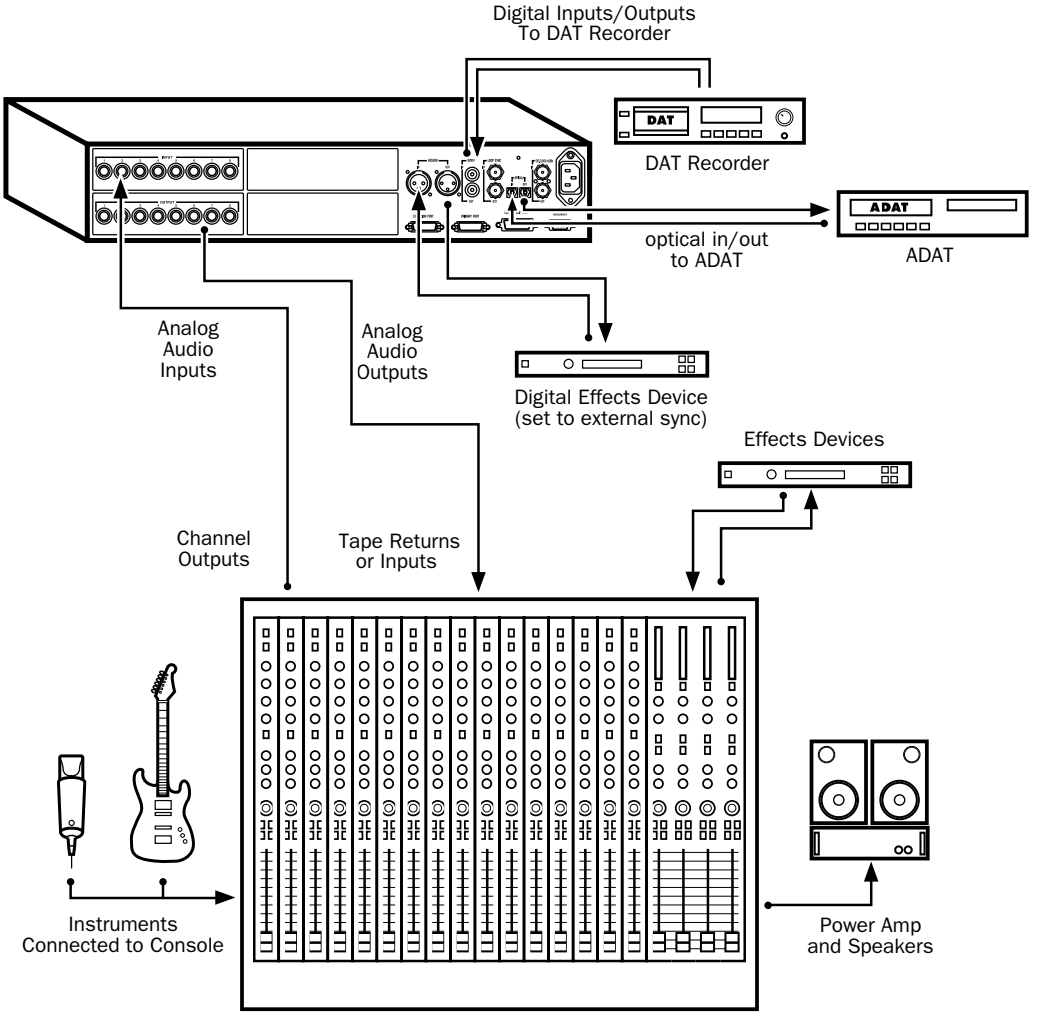
2 Shut down the computer.

3 Power off your audio interfaces.

4 Turn off any synchronization, MIDI, or other peripherals or interfaces.

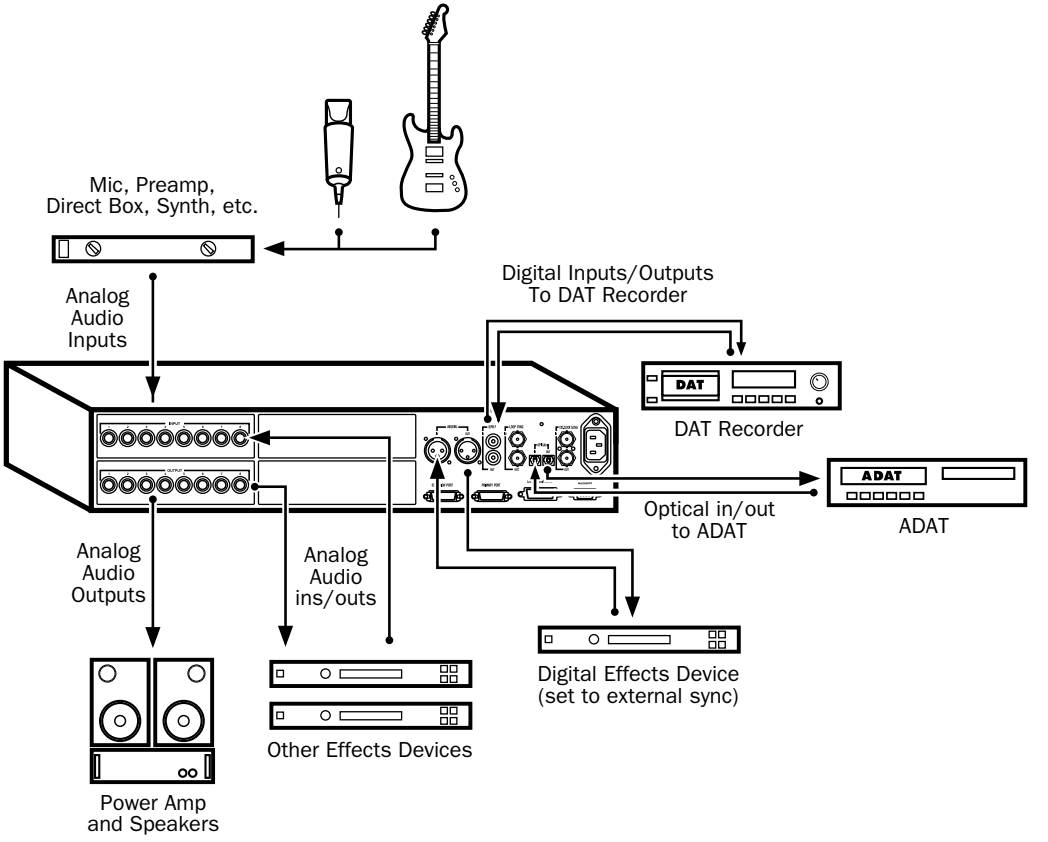
5 Turn off your drives.

Example Studio Setup with a Mixing Console



Example Studio Setup with a Mixing Console

Example Studio Setup without a Mixing Console



Example Studio Setup without a Mixing Console

Making Signal Connections to the 96 I/O

Depending on how you plan to use the 96 I/O, the way you connect it to your studio will vary.

Setting Up Your Studio

The previous diagrams provide general suggestions for connecting studio gear to your system.

The first illustrates a studio setup with the 96 I/O connected to a mixing console, with effects and other gear routed into the console as well.

The second diagram shows a setup without a mixer, where effects and monitoring gear are connected directly to the 96 I/O.

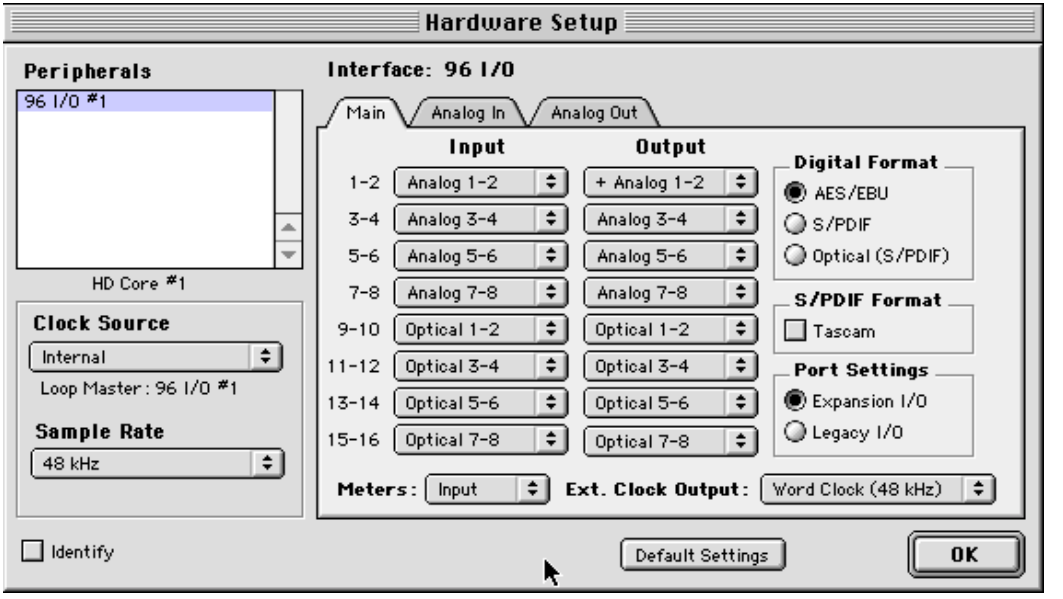
Hardware Setup

The Hardware Setup dialog shows you a list of all audio interfaces in the system as well as I/O routing and clock selections for your HD I/Os. The Hardware Setup also allows you to set special options unique to the 96 I/O.

Hardware Setup automatically configures itself to default settings for each HD-series card and peripheral it detects. The Hardware Setup dialog also lets you change default settings, and configure expansion audio interfaces (including Legacy peripherals).

Configuring Hardware Setup (Audio Interfaces)

The Main tab of the Hardware Setup dialog is where you define what physical ports are routed to Pro Tools input and output channels. Think of this window as a patchbay that allows you to route any of the physical inputs or outputs to Pro Tools mixer inputs and outputs.



Hardware Setup dialog with Main tab selected

The Main tab also provides controls for session Sample Rate, synchronization settings, and to define whether Expansion port or Legacy port peripherals are active. Sample Rate can only be changed when there is no session open.

Additional tabs are available to configure other parameters on each audio interface (such as setting operating levels).

You must select an HD I/O from the Peripherals column in order to change settings on a specific interface in expanded I/O system.

To configure audio interfaces:

1 In Pro Tools, choose Setups > Hardware.

2 From the Peripherals list, select your 96 I/O or any audio interface you would like to adjust. If you only have a single 96 I/O in your system, it will already be selected by default.

3 Make sure Main tab is chosen.

SHIFT *When the Hardware Setup dialog is open, the Left and Right arrows scroll through the tabs; the Up and Down arrows scroll through the Peripherals list.*

4 From the Digital Format radio buttons, select the desired format for the digital I/O of your choice. Choices include: AES/EBU, S/PDIF, and Optical (S/PDIF). Selecting Optical (S/PDIF) resets the physical Optical I/O port to two channels of S/PDIF I/O. When Optical (S/PDIF) is not selected, this port defaults to eight channels of Optical (ADAT) I/O.

5 From the Clock Source pop-up menu, select the appropriate clock source for the system. In most non-synchronized cases, you will use Internal. See "Synchronization Mode and Clock Source" on page 19 for more information about non-internal clock settings.

6 From the Ext. Clock Output, select the appropriate clock source to feed to devices attached to your I/O. Slave Clock is automatically selected when a Legacy peripheral has been declared. See "Clock Source and Loop Master" on page 19.

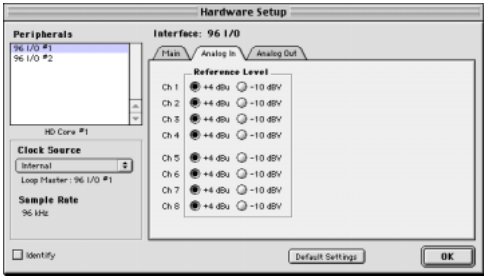
7 For S/PDIF compatibility with Tascam DA30 DAT recorders, click on the Tascam button, under S/PDIF Format.

8 From the Input and Output channel pop-up menus, select the physical ports (such as Analog 1–2, Optical 5–6, and so on), that will be routed to the Pro Tools input and output channels (Ch 1–2, 3–4, and so on). You can select default settings at any time by pressing the Default button on the bottom edge of the Hardware Setup dialog.

Certain functions and paths will be greyed-out as a result of other selections. For example, Optical channels 1–8 will become unavailable when a sampling rate greater than 48 kHz is selected.

Analog Input Settings

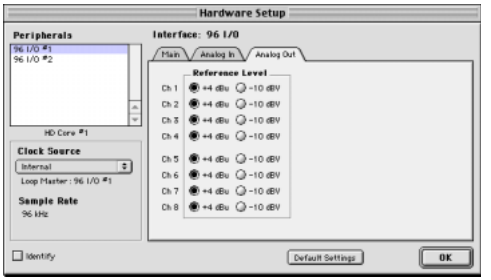
9 Click on the Analog In tab to select the Reference Input Level (+4 dBu or –10 dBV) on each channel. See "Setting Operating Levels" on page 18



Hardware Setup dialog with Analog In tab selected

Analog Output Settings

10 Click on the Analog Out tab to select the Reference Level Output (+4 dBu or –10 dBV) on each channel. See "Setting Operating Levels" on page 18



Hardware Setup dialog with Analog Out tab selected

To configure additional interfaces:

1 Repeat the above steps for additional HD-series I/O in the Peripherals list. To configure the Main tab of a secondary HD peripheral attached to a primary HD I/O, you must first choose the I/O in the Peripherals list.

2 From the Peripherals list, choose the 96 I/O (which must be your primary I/O). Once a peripheral is selected, the Main page displays options and controls for that peripheral. The HD card and/or the expansion interface connected to the this primary I/O will appear below it in the Peripherals list.

3 In the Main page, enable Expansion I/O.

4 From the Peripherals list, select your secondary I/O (in this case, the 96 I/O). The HD card and/or the expansion interface connected to the this secondary I/O will appear below it in the Peripherals list.

5 Configure the Main page and other settings/options for the secondary peripheral.

Legacy I/O Setup

Repeat the above steps for any Legacy I/Os (such as 888|24 I/O) connected to the first I/O, then second, and so on. Before you can configure a Legacy I/O, however, it must first be connected and initialized in Hardware Setup.

To connect and initialize Legacy I/Os:

1 Make sure the entire HD system is powered down before connecting your Legacy I/O.

2 Connect the slave clock cable that came with your MIX-series peripheral to the Ext. Clock Output of the HD I/O and the Slave Clock In port on the back of your MIX-series peripheral.

3 Connect your Legacy I/O with its MIX-series cable to the Legacy port on the HD peripheral.

4 Power up your system and launch Pro Tools.

5 Before you turn on and configure your Legacy I/O, turn down the volume on your monitoring system. Very loud digital noise may be emitted before the Legacy I/O is initialized.

6 Turn on your Legacy I/O.

7 Wait for the Legacy I/O to initialize. While the Legacy I/O is initializing, some of its LEDs will flash.

To configure Legacy I/Os:

1 Power up the rest of your gear (see "Powering Up Your System" on page 10) and launch Pro-Tools.

2 Choose Setup > Hardware Setup.

3 From the Peripherals list, select the primary I/O.

4 From the Main tab, select the Legacy I/O button in the Port Settings.

5 In the Peripherals list, select the first line, labeled "> <No Interface>," directly below your I/O in the Peripherals list. A pop-up menu will appear with a list of interfaces to choose from.

6 From the Interface pop-up menu, select your Legacy I/O.

7 After the Hardware Setup dialog updates, choose your I/O in the Peripherals list.

The I/O is automatically selected in the Peripherals list, and is labelled HD Core #1, Port A. Configure the peripheral's options as available in Hardware Setup, then close the Hardware Setup dialog.

Configuring I/O Setup

I/O Setup provides tools to label and map Pro Tools input, output, insert, and bus signal paths.

In addition, the I/O Setup dialog, like the Main tab of Hardware Setup, provides controls for routing the physical ports on your I/O peripheral to Pro Tools input and output channels.

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

Multiple Outputs

Multiple outputs from your 96 I/O can be assigned from a single Pro Tools mixer output. This type of mirroring is useful when laying back material in multiple formats.

For example, if you look at the default settings for the Hardware Setup dialog, you will see on the Main tab that there is a "+" sign in front of the Output assignment for channels 1 and 2.

Click the Default button on the lower edge of the Hardware Setup dialog if you want to reset your assignments to the factory defaults.

This basic configuration routes Pro Tools channels 1 and 2 to Analog Outputs 1 and 2, and the "+" symbol means that there are multiple outputs for channels 1 and 2.

Select the pop-up menu for channels 1 and 2 in the Output column of the Main tab, you will see that the Digital (AES/EBU, S/PDIF) outputs are also checked, which means that those ports are outputting Pro Tools channels 1 and 2 as well. In fact, the Digital (AES/EBU, S/PDIF) outputs always mirror each other.

This allows you, for example, to quickly make a single output assignment in an Pro Tools session (such as A 1-2), which is then mirrored to the analog outputs for your monitor system, DAT Deck, and/or a S/PDIF device, with no extra load on your Pro Tools system.

You can multi-assign any available 96 I/O outputs in the Hardware Setup dialog.

To route Pro Tools channels to multiple 96 I/O outputs:

1 In the Hardware Setup dialog, click the pop-up for the Pro Tools output pair you wish to multi-assign (for example, 1–2, 3–4, 15–16). By default, all pairs are assigned to a 96 I/O output pair, except for Analog Outputs 1–2 which are by default mirrored to the two-channel Digital pairs.

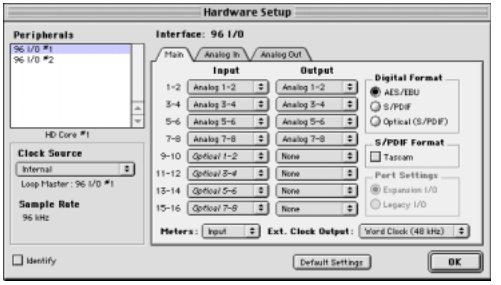
2 Select one of the outputs to which you want to route the output from Pro Tools.

3 While pressing Ctrl, select each additional output destination.

Selecting multiple output formats does not affect time slot count. The multiplexing of audio is done in the peripheral rather than in software or the computer.

Setting Operating Levels

There are specific windows within the Hardware Setup dialog in which to make I/O settings specific to your 96 I/O. These include setting input and output operating levels.



Hardware Setup dialog with 96 I/O as the Primary audio interface

Choosing +4 dBu or –10 dBV Operating Levels

It is important that you determine which line level is appropriate for your studio. In +4 dBu operating mode, the 96 I/O is a 24-bit digital audio device capable of producing audio signals up to + 18 dBu across +4 dBu input/output. The default headroom value is 14 dB. This translates to a maximum output of + 18 dBu.

Check the owner's manual for your mixer, power amplifier or effects processor to see if it can handle this load. If the other devices in your studio cannot handle this load, consider lowering the headroom value of Pro Tools.

About Input Operating Levels

As with Output levels, check the owner's manual for your mixer, power amplifier or effects processor to see if it operates more comfortably at line level, in which case consider setting the 96 I/O to operate at –10 dBV line levels.

Consider the following when connecting a mixer:

- If your mixer cannot handle more than 1.5V (RMS) inputs at +4 dBu, then you should set the 96 I/O to operate at –10 dBV line level.
- If your mixer can handle up to 6.15V (RMS) inputs, or has pads or attenuators on its inputs, then you can use the +4 dBu setting on the 96 I/O.
- 96 I/O is calibrated for 14 dB headroom at the +4 dBu setting.

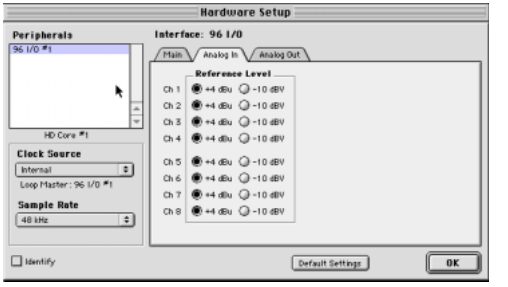
Most manuals contain device input specifications, including whether or not there are pads or attenuators. Consult the manufacturer's documentation for your mixer or power amplifier for further information.

Selecting Analog Input Operating Levels

If you want to switch the input levels of the 96 I/O from +4 dBu to –10 dBV, you can access these parameters, on a channel-by-channel basis, in the Hardware Setup dialog.

To Set Input Operating Levels:

1. Launch Pro Tools.
2. Choose Setups > Hardware Setup in Pro Tools.



Selecting +4 dBu or –10 dBV levels in the Hardware Setup Dialog

3 Click on the Analog In tab to access the radio buttons with which to select your input operating levels for each channel.

4 Click OK to leave the Hardware Setup dialog.

Synchronization Mode and Clock Source

The 96 I/O lets you resolve your Pro Tools|HD system to most digital clock references in use in today's complex, multi-unit production environments.

The Hardware Setup dialog lets you specify among digital input sources and select a clock source.

Choices for Clock Source vary depending on Sample Rate and the Digital Format that is enabled (AES/EBU, S/PDIF, or Optical S/PDIF).

Pro Tools|HD and the 96 I/O give you multiple clock reference choices at all sample rates and digital format settings.

To choose a clock source:

1 Launch Pro Tools.

2 Choose Setups > Hardware Setup.

3 Select a Digital Format from the port choices: AES/EBU, S/PDIF, or Optical (ADAT).

4 Click the Clock Source pop-up menu and select a synchronization mode. If the desired clock is not listed, check your Digital Format setting to be sure you have enabled the appropriate digital port and format. Choices for Clock Source also vary depending on Sample Rate.

5 Click OK to close the Hardware Setup dialog when you have finished.

Your choice depends on which device in your setup you want to make the master clock device.

6 96 I/O can only be the clock source when it is the master audio interface. If you choose a clock source on another HD I/O other than the Loop Master, Pro Tools will automatically designate the new interface as the Loop MASTER peripheral, switch to it for the chosen Clock Source, and set all other HD I/Os to Loop Slave mode.

Clock Source and Loop Master

In the Hardware Setup dialog, you can set the clock source to be available from any HD I/O. Choosing to use a Clock Source will, in expanded I/O systems, automatically make that I/O the Loop Master. The LOOP MASTER LED will light on the front of the Loop Master I/O.

Because any HD I/O can be the Loop Master, you can use any of the digital ports on any HD I/O as your system clock source.

Digital Format

The Digital Format section enables you to choose which port the 96 I/O will use for digital audio input and/or word clock input. For example, to record digitally from an optical S/PDIF device connected to the Optical In port, enable the Optical (S/PDIF) option for Digital Format. Only one digital input port can be used at a time, although the AES/EBU and S/PDIF *outputs* are mirrored at all times.

Clock Source

The Clock Source selector lets you choose among available digital clock choices to determines which HD-series interface, and which specific digital port on that interface, is providing clock to Pro Tools. Choices will include 1x Word at the session sample rate or base rate (for clocking to house video reference or other Word

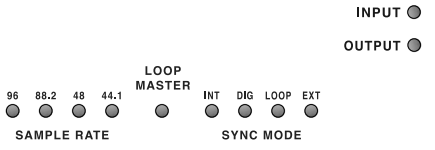
clock signals connected to the External Clock In port), and other choices as appropriate for the currently enabled Digital Format and sample rate.

Pro Tools will remember your configuration until you change it. If you want to change your Pro Tools hardware configuration in the future, you can access these parameters again in the Hardware Setup dialog.

You will be able to select the sample rate each time you create a new session.

SYNC MODE Indicators

The SYNC MODE LEDs indicate the current clock source.



Front panel synchronization mode setting LEDs

INT (Internal) This is the 96 I/O standard clock setting. In this mode, the 96 I/O sample clock is generated by its internal crystal oscillator, as determined by the session Sample Rate.

DIG (Digital) This setting indicates that an external AES/EBU, Optical (ADAT), or S/PDIF device is providing system clock. If you wish to use an AES/EBU or S/PDIF device as Clock Source, you will have to select the corresponding Digital Input format. If no valid clock source is detected, 96 I/O will switch to INT, the DIG LED will flash, and an error message will appear on-screen in Pro Tools.

To record from an AES/EBU source, select AES/EBU for Digital Format, and make sure it's not selected in Clock Source.

To connect digitally with other digital devices that are functioning as more than an input device (such as when sending and returning signals to and from an external digital signal processing device) be sure to set the external digital device to external clock. This will allow the external digital device to clock off the digital output port you are using on the 96 I/O.

The 96 I/O can function in this way while in Internal clock mode, and can use a third device as Clock Source.

You will not be able to use the Optical (ADAT) port as an eight-channel synchronization source if the radio button for Optical S/PDIF is selected. Likewise, you must first select the radio button for Optical S/PDIF in the Digital Format section if you want to use the Optical (ADAT) port to synchronize to receive Optical S/PDIF (also known as TOS-Link, it supports sampling rates up to 96 kHz).

If at least two channels are not assigned from the selected digital port in the Main page of the Hardware Setup dialog, or if no valid clock source is detected at this port, 96 I/O will switch to INT and the DIG LED will flash.

LOOP (Loop Master) This LOOP LED indicates that the 96 I/O is slaving to another HD I/O through Loop Sync. You do not set LOOP mode anywhere in the software. This is done automatically when you choose another I/O as LOOP MASTER by selecting its Clock Source.

Loop Sync is used when multiple HD I/O's are installed in a system. Loop Sync is a separate word clock signal used to keep all HD I/Os synchronized with each another. Only one peripheral at a time in the entire system can serve as LOOP MASTER, and by default this will be the HD I/O connected to the HD Core card.

You can select any connected HD I/O to be the Loop Master by choosing a clock source on that particular HD I/O. Once you set this, all other peripherals in the chain will automatically be set for Loop Slave and light the LOOP LED.

Because you can select any HD I/O in the chain to be Loop Master, you can use the digital or External Clock ports for synchronization on any peripherals without having to physically change any of the synchronization connections.

EXT (External) This setting indicates that 96 I/O is using the EXT CLOCK IN port for system synchronization. External Clock input and output do not have to be at the Word clock rate.

EXT CLOCK IN synchronization will typically be 1x the current session sample rate. However, for sample rates higher than 48 kHz, 96 I/O will generate a choice of 1x or a base rate of 48 kHz or 44.1 kHz, depending upon the higher rate, as follows:

Session Sample Rate	Word Clock Support
44.1 kHz	44.1 kHz (256x out only)
48 kHz	48 kHz (256x out only)
88.2 kHz	88.2 kHz 44.1 kHz
96 kHz	96 kHz 48 kHz

For a more detailed explanation of synchronization mode and External Clock issues, see the *SYNC I/O Guide*.

appendix a

Card Removal and Replacement

Removing an I/O Card

In the event of a problem with the A/D or D/A cards in your 96 I/O, you can remove the card and send it to Digidesign for repair.

The modular nature of the HD system allows you to simply return the specific card, instead of the entire 96 I/O. Your HD system will continue to function while missing a single card. It will not function if more than one of the factory-installed cards is removed.

⚠ *Before handling any of the cards or internal components of 96 I/O, discharge any static electricity by touching the outer casing of the power supply.*

To remove an I/O card from the 96 I/O:

1 Power off and disconnect the 96 I/O from your HD system.

2 Make sure that the 96 I/O is plugged in so that it is grounded.

3 Remove all of the 16 small phillips-head screws around the edges of the top cover. Don't lose the screws -- put them in a safe place!

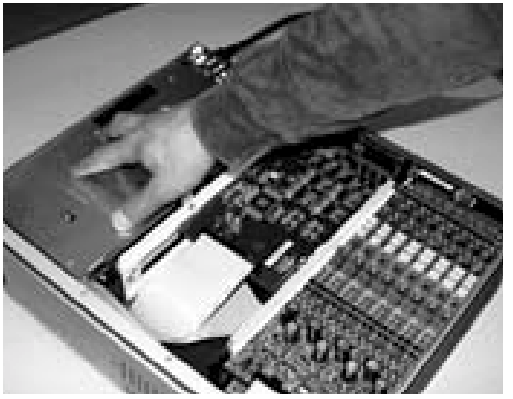
Removing the top cover screws

4 Lift off the top of the 96 I/O and set aside.

5 Gently pull the 50-pin connector off of the edge of the card.

6 Remove the five screws on the front plate of the card to be removed.

7 To discharge any static electricity, touch the power supply casing. It is a good idea to do this often, throughout the process.



Touching power supply casing to discharge any static electricity

8 Pull the card out by gripping the edges between your thumb and forefinger on each side. Pull straight back, lifting very slightly to avoid contact between components on the underside of the card and the 96 I/O back panel faceplate.

9 Place the card immediately in an anti-static bag and send it to Digidesign according to instructions from the Customer Support dept.

⚠ *When you pull a card out, pay particular attention to keeping components on the surfaces of the card from bumping into any of the internal components or the back panel faceplate on the 96 I/O.*

Hardware Setup Changes

When Removing a Card

In this case, the Hardware Setup dialog will reflect the change by setting the removed inputs and outputs to None. The remaining inputs and outputs will function normally.

For example, if you remove the Analog Input card, the Analog Input tab will disappear from the Hardware Setup dialog.

You will also lose the configuration of any pairs of inputs or outputs that were assigned to the card being removed.

Replacing an I/O Card

To replace a card:

1 Power off and disconnect the 96 I/O from your HD system.

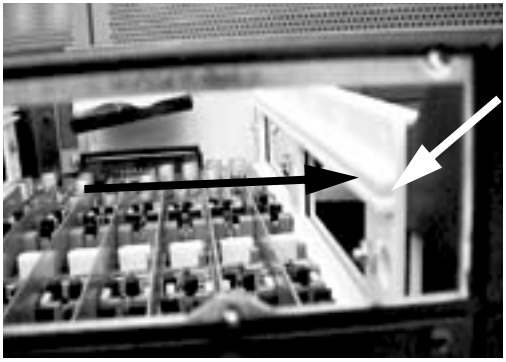
2 Make sure that the 96 I/O is plugged in so that it is grounded.

3 Remove the top cover of the 96 I/O by extracting all of the 16 small phillips-head screws around the edges of the top cover, and lifting it off.

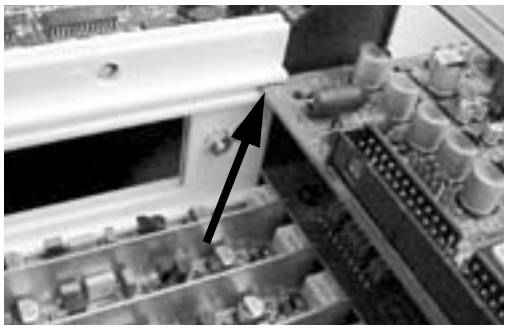
4 If the card you are replacing is still connected to the 96 I/O, see "Removing an I/O Card" on page 23.

5 To discharge any static electricity, touch the power supply casing. It is a good idea to do this often, throughout the process.

6 Look into the empty bay to locate the guide rails for the card to slide in on.



Example of an empty bay. Note guide rails along the inside edge

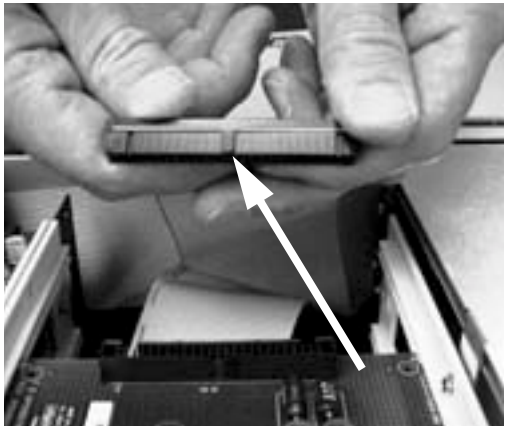


Placing the edge of the card into the guide rails

7 Slide the edges of the card into the guide rails on each side of the bay. Push the card all the way in until the card's faceplate is nearly flush with the rear panel of the 96 I/O.

8 Screw the card's faceplate onto the rear panel surface of the 96 I/O with the same screws you removed from the empty bay cover.

9 Locate the raised ridge in the middle of the 50-pin cable which connects to the 96 I/O chassis. This ridge is only on one side of the connector, and there is a matching groove on only one side of the 50-pin connector on the card.



Locating the ridge on the 50-pin cable and the matching groove on the 50-pin connectors on the card

10 Gently push the cable connector into the card's connector. The ridge on the cable connector must be line directly into the groove on the card connector. Be very careful not to bend any of the pins.

Pressing the 50-pin cable connector into the card

11 Place the top cover onto the 96 I/O and replace the screws that you removed with it.

12 Connect the 96 I/O to your HD system.

13 Press the Power switch.

14 When you power on the unit, the power LED should turn orange.

15 Start up the computer.

16 When you boot up the computer, the power ring should turn from orange to green.

– or –

If it doesn't, see "Troubleshooting" on page 26.

17 If the ring turns green, and the computer boots properly, launch Pro Tools.

18 Open the Hardware Setup dialog to confirm that the new card is recognized:

- If you installed a 96 AD card, you should see a new tab called Analog In 1–8.
- If you installed a 96 DA card, you should see a new tab called Analog Out 1–8.

19 If the new card does not appear in the Hardware Setup dialog, power down, check the seating of the card, and recheck the cables inside the 96 I/O.

Troubleshooting

If the power ring does not turn from orange to green when you boot the computer, make sure you reconnected the DigiLink cable to the Primary port on the rear of the unit. If the DigiLink cable is securely fastened and the other end is plugged into an HD Core or Process card in a computer that is booted, you may have inadvertently disconnected another 50-pin cable when installing the card.

Hardware Setup Changes

Whenever a card is removed or replaced, the Hardware Setup I/O routing reverts to original defaults.

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