

192 I/O Guide

Digidesign

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Communications & Safety Regulation Information

Compliance Statement

The model 192 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 192 I/O not authorized by Digidesign, Inc., could void the Certification and negate your authority to operate the 192 I/O. This 192 I/O 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 192 I/O.
- 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.

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 192 I/O

The Digidesign 192 I/O is a 16-channel digital audio interface for use in a Pro Tools|HD system. Featuring 24-bit analog-to-digital (A/D) and digital-to-analog (D/A) converters, the 192 I/O supports sampling rates of up to 192 kHz for superior dynamic range and low noise floor.

192 I/O Features

- 16 discrete channels of input and output, with 4-segment LED Meters to monitor input and output 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, 96 kHz, 176.4 kHz, and 192 kHz
 - Ten channels of 24-bit-supported AES/EBU I/O, eight channels of which support sampling rates of up to 192 kHz
 - Sixteen channels of Optical I/O, through two pairs of Lightpipe (ADAT) connectors; one pair of optical ports can be switched to two channels of optical S/PDIF I/O
 - Two 24-bit-capable S/PDIF I/O supporting sample rates of up to 96 kHz
- Real-time sample rate conversion on inputs of eight channels of either AES/EBU, Optical, or TDIF.
- Word Clock input and output for synchronizing 192 I/O with external Word Clock or 256x (Slave Clock) devices.
- Simultaneous use of up to eight 192 I/O units is supported, for a maximum of 96 channels of I/O at 96 kHz.
- Legacy Port for Digidesign MIX-series audio interfaces.
- Optional addition of cards to expand analog or digital I/O.

What's Included

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

System Requirements

The Digidesign 192 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 192 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, see 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 <i>N</i> key
Option-click	Hold down the Option key and click the mouse button

The following symbols are used to highlight important information:

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

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

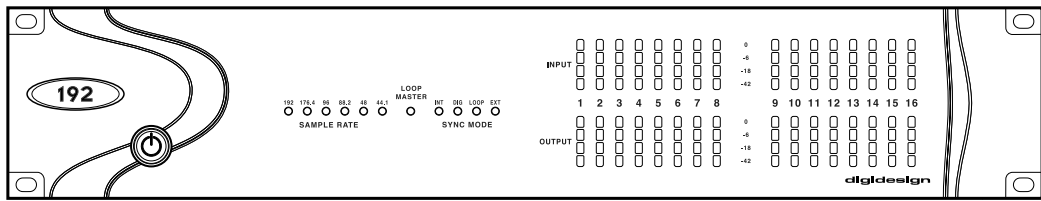
 *Cross References point to related sections in this and other Digidesign Guides.*

chapter 2

192 I/O Overview

192 I/O Front Panel

The 192 I/O has the following front panel features:



192 I/O Front Panel

Power Switch and LED Ring

This button turns the 192 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 192 I/O internal crystal oscillator, that can be 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz, or 192 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.

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 23.

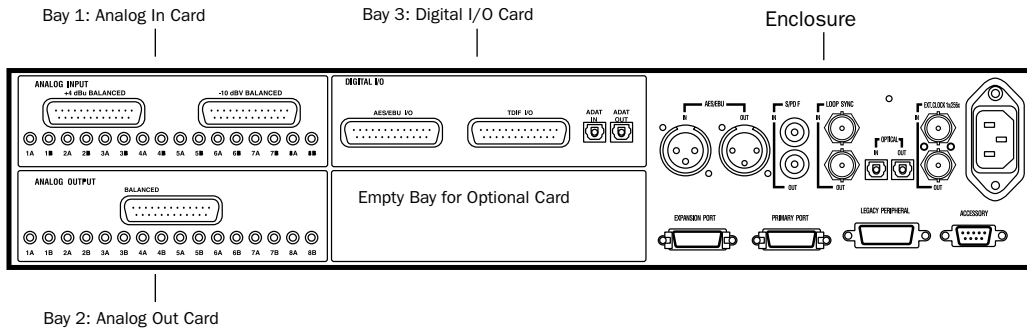
Meters

These four-segment LEDs indicate signal level for each of the sixteen channels. The top row of meters indicates input levels, and the bottom row shows output levels. 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; use the on-screen meters in Pro Tools to determine whether a signal is clipping. See the Pro Tools|HD Reference Guide.

192 I/O Back Panel



192 I/O Rear Panel

Although the 192 I/O is a 16-channel interface, it has up to 50 inputs and outputs that can be assigned to Pro Tools channels.

Installing an optional card provides even more I/O (depending on the card, you will get a total of 58, 66, or 74 inputs and outputs). See Appendix A, “Adding or Removing I/O Cards.”

Input and Output Cards

The 192 I/O features four bays for I/O cards. Bays 1–3 contain Analog In, Analog Out, and Digital I/O cards, respectively. The fourth bay is an expansion bay, for which you can purchase an additional audio card of your choice.

Analog Input

This section contains connectors for eight channels of analog audio input with 24-bit, 192 kHz A/D converters. Two dedicated Input Trims are provided for each input channel, and there is a soft-clip limiter function that helps to avoid digital clipping. See “Input Trims” on page 6, and “Soft Clip Limiting” on page 23.

Input is provided through two discrete DB-25 connectors, one for +4 and one for –10 operation. See Appendix B, “Pinout Diagrams for the DB-25 Connectors.”

+4 dBu Balanced

This DB-25 connector provides eight balanced input channels at +4 dBu nominal operating levels.

–10 dBV Balanced

This DB-25 connector provides eight balanced input channels at –10 dBV nominal operating levels.

Analog Input Options

For each channel, you can select input level and Input Trim settings from within the Hardware Setup dialog.


When you select an operating level for each input, you are simultaneously selecting which input the signal enters through. This lets you connect sources at both operating levels that are selectable from within Pro Tools.

Input Trims

Two dedicated Input Trims per analog input channel provide further calibration options and flexibility. Depending on how you utilize the two DB-25 input ports, you can use the A and B trim settings for numerous applications. See “Input Trims” on page 23.

Analog Output

This section contains a single DB-25 connector and Output Trims for eight channels of analog audio output. These balanced outputs operate at +4 dBu levels. See Appendix B, “Pinout Diagrams for the DB-25 Connectors.”


 *For -10 dBV gear, a special DigiSnake cable (sold separately) is available. If you want to make your own cable, be sure to use in-line transformers or resistor networks to properly pad the +4 dBu output to -10 dBV levels.*

See “About Output Levels” on page 21.

Output Trims

The output trims below the DB-25 connector are used to individually calibrate each channel's output level.

Two sets of Output Trims are provided for each channel allowing you to store a second set of headroom values. This allows you to match two different headroom values for either input connector.

 *Most consumer electronics operate at -10 dBV levels, and may not feature balanced inputs and outputs. You can connect -10 dBV signals to the -10 dBV inputs, but you will need to make sure that the negative terminals are not connected.*

See “Output Trims” on page 22.

Digital I/O

This section contains connectors for eight channels each of AES/EBU I/O, TDIF I/O, and Optical (ADAT) I/O. Only one digital format can be used at a time.

The inputs on the Digital I/O Card feature real-time sample rate conversion. For example, you can stream audio with a sample rate of 44.1 kHz into a 96 kHz session.

See “Digital Format Settings and Sample Rate Conversion” on page 19.

AES/EBU DB-25 connectors for eight channels of AES/EBU input and output. Each of the paired channels is a balanced three-conductor signal, and supports 192 kHz sample rates in dual-wire mode. Dual-wire mode uses two of 192 I/O's physical I/O channels of AES/EBU I/O to carry each single stream of 192 kHz audio. Therefore, only four simultaneous channels of AES/EBU I/O are available at 192 kHz.

TDIF DB-25 connectors for eight channels of TDIF input and output. Conforms to standard eight-channel TDIF pinouts.

See Appendix B, “Pinout Diagrams for the DB-25 Connectors.”

Optical (ADAT) Dedicated, eight-channel 24-bit capable Optical port. Using real-time sample rate conversion, these inputs will accept up to 48 kHz sample rates and convert them to a Pro Tools session running at up to 192 kHz. These outputs will only output at sampling rates of up to 48 kHz. Unlike the Optical port located on the enclosure, this Optical (ADAT) port is not switchable to Optical S/PDIF.

Enclosure Connectors

The right half of the back panel of 192 I/O features a set of non-removable connectors that are mounted to the enclosure.

These connectors feature two additional channels of AES/EBU I/O and another eight channels of Optical I/O. These ports are hardwired to the 192 I/O chassis and appear on-screen in the Pro Tools pop-up menus as AES/EBU [Encl], and Optical (ADAT) [Encl]. The reference to the enclosure [Encl] differentiates the chassis-mounted ports from the I/O of the same types on the Digital I/O Card.

Also mounted on the enclosure are two channels of S/PDIF I/O on RCA connectors, synchronization ports and connectors for installing 192 I/ to your HD system and attaching other Digidesign I/Os.

AES/EBU [Encl]

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. The enclosure ports do not support dual-wire mode (required for 176.4 kHz and higher sample rates), or provide real-time sample rate conversion (use the ports on the Digital I/O card for these features).

S/PDIF Stereo I/O

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.

Optical (ADAT) [Encl]

These are Optical ports that 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. This port does not feature real-time sample rate conversion.

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.

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.

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 192 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 192 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 192 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 192 I/O is a 16-channel only device, channels 17–32 are passed through to the Expansion or Legacy port.

Expansion DigiLink

The Expansion port is where the DigiLink cable connects an additional 192 I/O or 96 I/O to your base, or primary, 192 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 192 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|25 breakout cables.
- 50' (15.25m) cable (sold separately). This is the maximum length supported for 192 kHz sessions.
- 100' (30.5m) maximum cable length (sold separately), that only supports sample rates of 96 kHz or lower.

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 192 I/O to a new Pro Tools|HD system, refer to that guide now.

If you are adding the 192 I/O to an existing Pro Tools|HD system, you can probably use just the instructions here in this chapter of your 192 I/O Guide. Additional information can always be found in the *Getting Started with HD Guide*, and the *Expanded Systems Guide*.

Connecting the 192 I/O to an Existing HD System

If you are adding this interface to an existing Pro Tools|HD system, 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 192 I/O is 18' long. 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

Whenever a system includes at least one 192 I/O, a 192 I/O should be the primary audio interface, with any additional 192 I/O interfaces connected next. Following any and all 192 I/Os, any and all 96 I/Os should be connected. For Legacy peripherals, see “Legacy Port” on page 8.

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

To connect the 192 I/O to an existing HD System:

- If the existing system contains a single 96 I/O you will need to disconnect the 96 I/O from the HD Core card, then connect the 192 I/O directly to the primary HD Core card, followed by the 96 I/O. Connect the DigiLink cable from the DigiLink port on the primary HD Core card to the Primary port on the 192 I/O. Connect another DigiLink cable from the Expansion port on the 192 I/O to the Primary port on the 96 I/O.

💡 *The 96 I/O does not support 192 kHz, and you will not be able to run a session at 192 kHz unless the 192 I/O is the first interface connected to the HD Core card.*

- If the existing system contains a single 192 I/O, you can connect your 192 I/O directly to the first HD Process card or through the Expansion port of your 192 I/O. Connect the DigiLink cable from the Primary port of the new 192 I/O to either the Expansion port on the existing 192 I/O or the DigiLink port on the HD Process card.

- If you already have two 192 I/Os connected to your HD Core, connect the new 192 I/O directly to the first HD Process card. Connect the DigiLink cable from the Primary port of the new 192 I/O to 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 primary 192 I/O to the Loop Sync In of the new 192 I/O. Connect the Loop Sync Out from the new 192 I/O to the Loop Sync In of the primary 192 I/O.

To connect the 192 I/O into a Loop Sync chain:

- Connect the new 192 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 13).
- 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 192 I/O has been properly identified. Select each 192 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 192 I/O you have selected in the Peripherals list.
- 3 If you encounter any difficulties, delete the DigiSetup file (located in the System Folder/Prefereces), 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 13 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 192 I/O and any other Pro Tools audio interfaces. On power up, the status LEDs will flash. Wait at least fifteen seconds for the 192 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.

Making Signal Connections to the 192 I/O

Depending on how you plan to use the 192 I/O, the way you connect it to your studio will vary.

Setting Up Your Studio

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

Figure 1 on page 14 illustrates a studio setup with the 192 I/O connected to a mixing console, with effects and other gear routed into the console as well.

Figure 2 on page 15 diagram shows a setup without a mixer, where effects and monitoring gear are connected directly to the 192 I/O.

Example Studio Setup with a Mixing Console

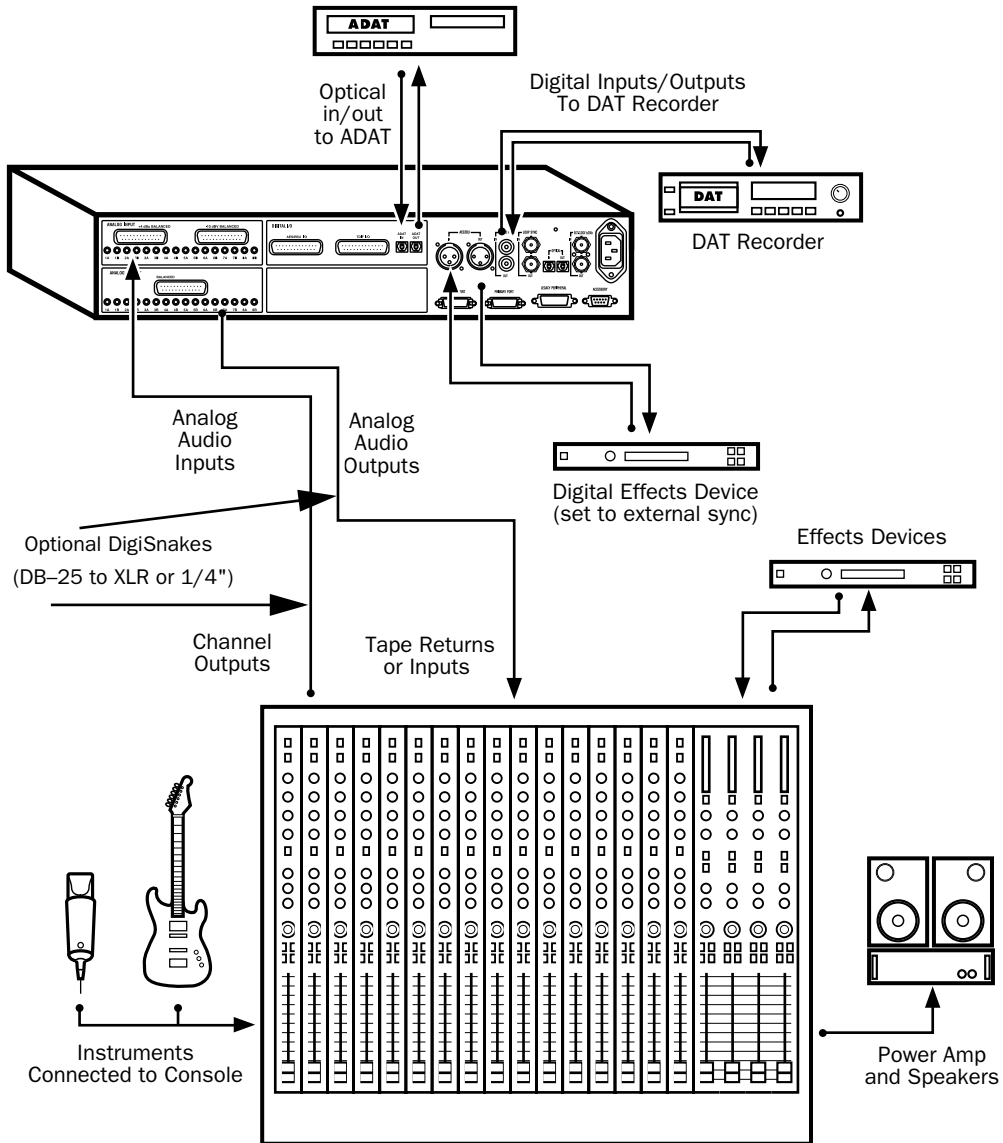


Figure 1. Example Studio Setup with a Mixing Console

Example Studio Setup without a Mixing Console

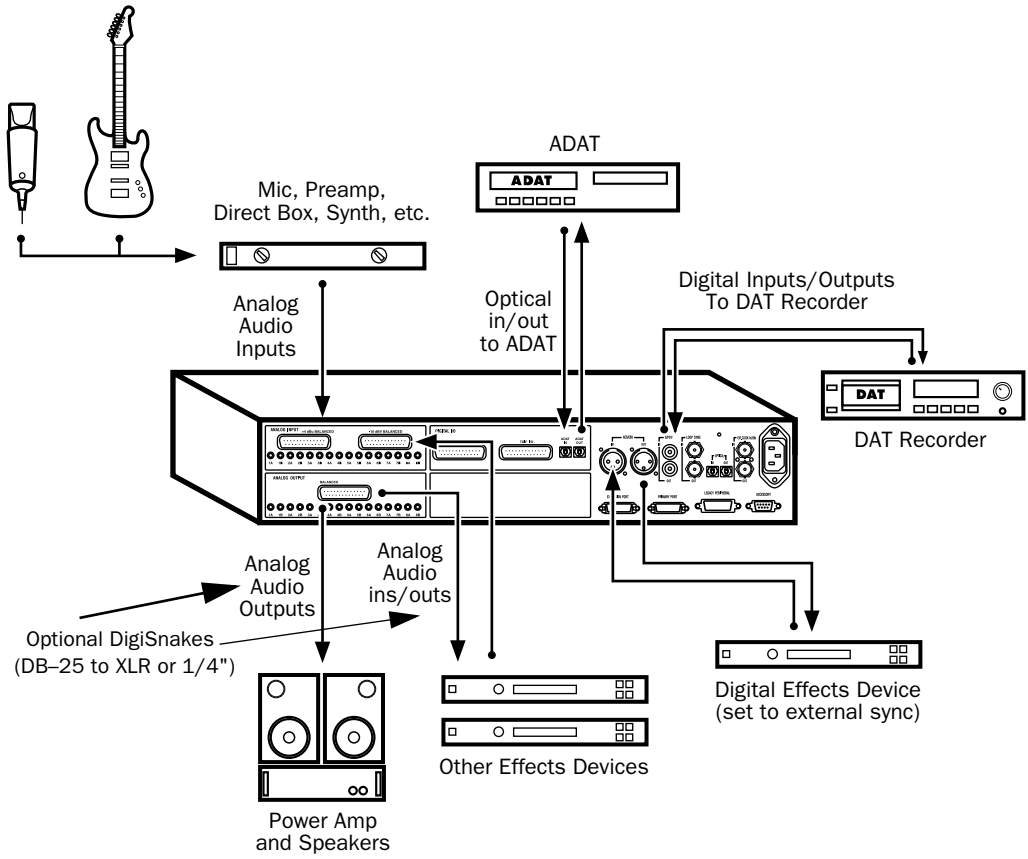


Figure 2. Example Studio Setup without a Mixing Console

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 192 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).

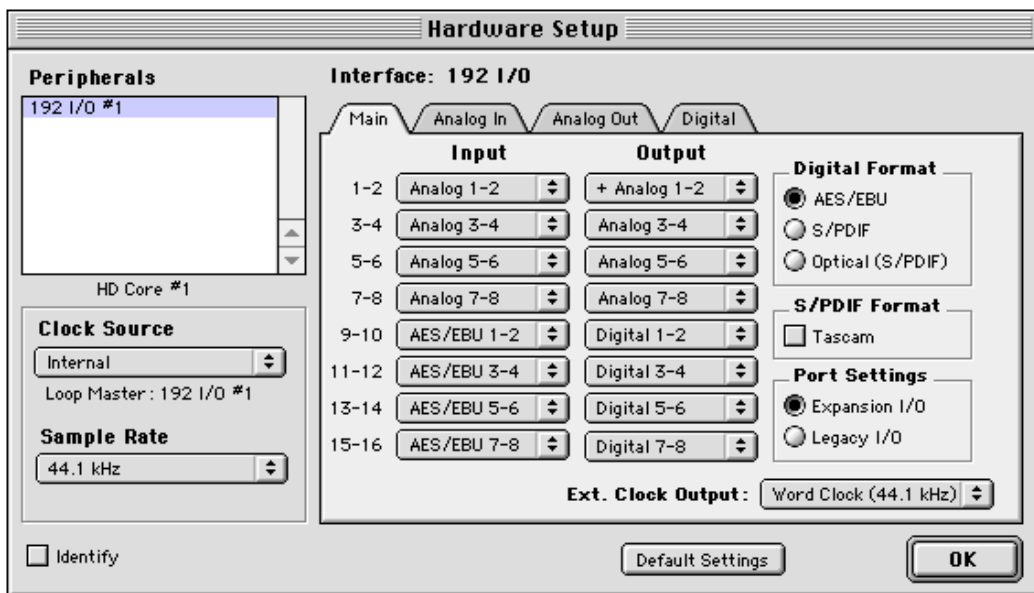
Configuring Hardware Setup (Audio Interfaces)

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.

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.



Hardware Setup dialog with Main tab selected

To configure audio interfaces:

1 In Pro Tools, choose Setups > Hardware.

2 From the Peripherals list, select your 192 I/O or any audio interface you would like to adjust. If you only have a single 192 I/O in your system, it will already be selected by default.

3 Make sure Main tab is chosen.



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 enclosure digital I/O of your choice. Choices include: AES/EBU, S/PDIF, and Optical (S/PDIF). Selecting Optical (S/PDIF) resets the Optical I/O port to two channels of S/PDIF, or TOS-Link, supporting up to 96 kHz. 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 23 for more information about non-internal clock settings.

6 From the Ext. Clock Output pop-up menu, 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 24.

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 Set To Default button on the lower edge of the Hardware Setup dialog.

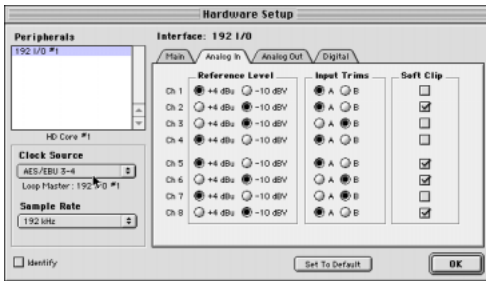
Certain functions and paths will be greyed-out as a result of other selections. For example, the Optical 1–8 channels will not be available for session rates of 88.2 kHz or higher.

To differentiate inputs and outputs of the same digital format, they are labelled differently in the input and output channel pop-up menus. For example, the stereo AES/EBU inputs and outputs that are mounted on the 192 I/O enclosure are identified as AES/EBU [Encl]; the eight channels of AES/EBU I/O that come on the Digital I/O card are listed as AES/EBU 1–2, AES/EBU 3–4, and so on.

Analog Input Settings

To configure analog input options:

- Click on the Analog In tab and select the Reference Input Level (+4 dBu or -10 dBV, which also determines which port is used on the rear of the 192 I/O), Input Trim settings (A or B), and Soft Clip limiter function, respectively, on each channel. See “Setting Operating Levels” on page 21 and “Soft Clip Limiting” on page 23.



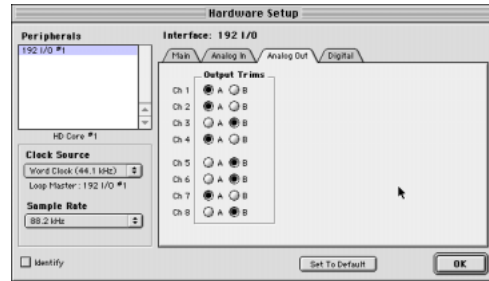
Hardware Setup dialog with Analog In tab selected

Refer to “192 I/O Back Panel” on page 5 to locate the different ports and connectors described in this section.

Analog Output Settings

To configure analog output options:

- Click on the Analog Out tab and select which trim setting will be used for the individual analog outputs. The default is A and comes from the factory set for a headroom value of 18 dB. The B trim comes from the factory with 20 dB of headroom. See “Setting Operating Levels” on page 21.




Hardware Setup dialog with Analog Out tab selected

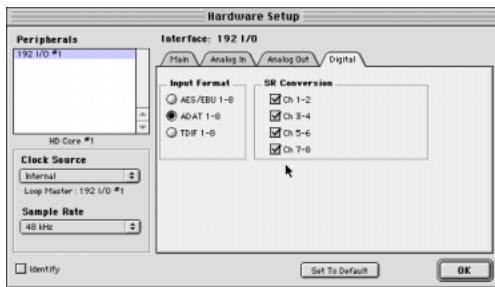
💡 While there are two discrete sets of inputs at the reference levels of -10 dBV and +4 dBu, there is only one set of outputs, set at a reference level of +4 dBu.

Digital Format Settings and Sample Rate Conversion

To configure digital formats and sample rate conversion:

- 1 Click on the Digital tab and select Input Format (AES/EBU, ADAT, or TDIF).
- 2 Enable real-time Sample Rate Conversion by selecting channel pairs (1–2, 3–4, 5–6, 7–8) in the SR Conversion box on the Digital tab.

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



Hardware Setup dialog with Digital tab selected

To configure additional interfaces:

- 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.

The following example shows how to configure an HD system with one 192 I/O and one 96 I/O in the Hardware Setup dialog:

- 1 From the Peripherals list, choose the 192 I/O (which should be your primary I/O). By default, the Main tab will be selected, and options and controls for the selected I/O will be available. The expansion interface connected to the primary I/O will appear below it in the Peripherals column.
- 2 In the Main page, ensure that Expansion I/O is selected under Port Settings. This is the default.
- 3 From the Peripherals list, select your secondary I/O (in this case, the 96 I/O).
- 4 Configure the Main page and other settings and 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 13) 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 192 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 [Encl] (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 [Encl] (AES/EBU, S/PDIF) outputs always mirror each other.

This allows you, for example, to quickly make a single output assignment in a Pro Tools session (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 192 I/O outputs in the Hardware Setup dialog.

To route Pro Tools channels to multiple 192 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 192 I/O output pair, except for Analog Outputs 1–2 which are by default mirrored to the two-channel Digital [Encl] pairs.

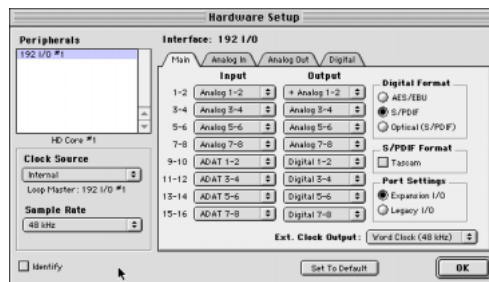
2 Select one of the outputs to which you want to route the output from Pro Tools.

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 192 I/O. These include setting input and output operating levels.



Hardware Setup dialog with 192 I/O as the Primary audio interface with Default settings

Choosing +4 dBu or –10 dBV Operating Levels

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

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

About Output Levels

It is important that you determine which line level is appropriate for your studio. In +4 dBu operating mode, the 192 I/O is a 24-bit digital audio device capable of producing audio signals up to +26 dBu across +4 dBu input/output. The default headroom value is 18 dB. This translates to a maximum output of +22 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.

Output Trims

18 dB and 20 dB Output Levels

The 192 I/O has two Output Trims for each output signal. You can switch between these Output Trim levels in software. Output Trim A is factory calibrated for 18 dB headroom. Output Trim B is calibrated for 20 dB headroom. If you want to change the inputs to 20 dB headroom, switch the Output Trims to B and follow the directions in the *Pro Tools Reference Guide* for Calibration mode.

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 192 I/O to operate at -10 dBV line levels and/or adjusting the Input Trims.

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 192 I/O to operate at -10 dBV line level.
- ◆ If your mixer can handle up to 15.5V (RMS) inputs, or has pads or attenuators on its inputs, then you can use the +4 dBu setting on the 192 I/O.
- ◆ 192 I/O is calibrated for 18 dB headroom at the +4 dBu setting.

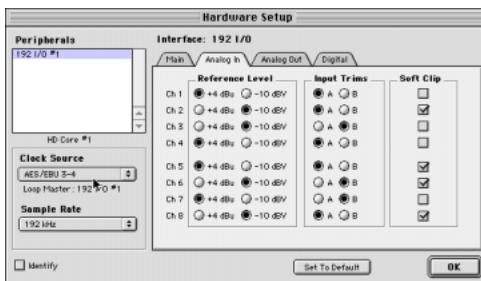
Most manuals contain device input specifications, including whether or not there are pads or attenuators. Consult the manufacturer's documentation for your mixer or power amplifier for further information.

Selecting Analog Input Operating Levels

If you want to switch the input levels of the 192 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.
- 3 If your 192 I/O is not the only peripheral, select it from the Peripherals list.



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

- 4 Click on the Analog In tab.
- 5 Select the input operating levels for each channel.
- 6 Click OK to leave the Hardware Setup dialog.

Input Trims

The Input Trims below the two DB-25 connectors on the Analog In card are used to store two different calibration settings (A and B) for each channel.

These two adjustable Input Trims are for precisely calibrating and switching between a choice of independently adjustable headroom settings for each channel. You can adjust each Input Trim by hand with a small screwdriver.

Choose between your A and B Input Trim settings from within Pro Tools in the Hardware Setup dialog on the Analog In tab.

For example, you could use the A trims for the +4 dBu port, and use the B trims for -10. Or, use A and B to maintain two different trims for any signal input port (+4 dBu or -10 dBV).

However, if you do are not using the -10 dBV input connector, the B trims can be used to store an alternate set of headroom values for the +4 dBu inputs. Once set, you can switch between the different trim headroom values for the same input level in the Analog Input tab in Hardware Setup.

See also “+4 dBu Balanced” on page 5 and “-10 dBV Balanced” on page 5.

Soft Clip Limiting

The Soft Clip limiter attenuates the incoming analog signal, providing extra protection from temporary clipping transients that can cause digital distortion when they exceed the maximum input of the unit.

With Soft Clip enabled, 192 I/O supports an additional 4 dB of headroom by rounding off the top 4 dB to the clip point. This is useful for eliminating that stray transient or emulating analog tape saturation.

To enable Soft Clip limiting:

- 1 Launch Pro Tools.
- 2 Choose Setups > Hardware Setup in Pro Tools.
- 3 Click on the Analog In tab.
- 4 Select Soft Clip for each channel to which you want to provide this protection.

Synchronization Mode and Clock Source

The 192 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.

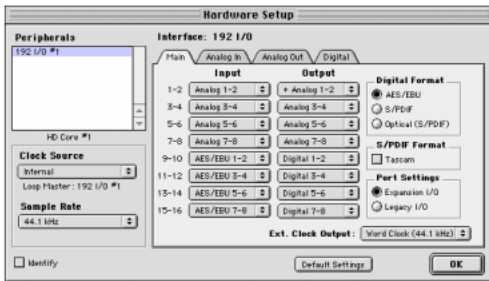
The Hardware Setup dialog lets you specify among digital input sources and select a clock source.

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

Pro Tools|HD and the 192 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 enclosure 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.

192 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 192 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 Enclosure 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

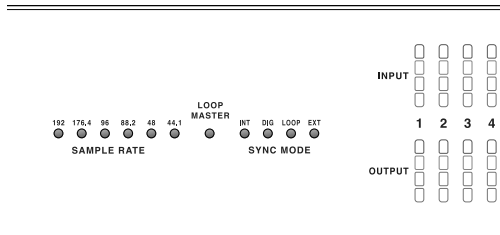
The Clock Source selector lets you choose among available digital clock choices to determine which HD-series interface, and which specific digital port on that interface, is providing clock to Pro Tools. Choices will include 1x Word at the session sample rate or base rate (for clocking to house video 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 192 I/O standard clock setting. In this mode, the 192 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, TDIF, 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, 192 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 is 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 192 I/O.

The 192 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) [Encl] 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, 192 I/O will switch to INT and the DIG LED will flash.

LOOP (Loop Master) This LOOP LED indicates that the 192 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 other. 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 192 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, 192 I/O will generate a choice of 1x or a base rate of 44.1 kHz or 48 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
176.4 kHz	176.4 kHz 44.1 kHz
192 kHz	192 kHz 48 kHz

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

appendix a

Adding or Removing I/O Cards

The 192 I/O comes with one available expansion bay on the rear of the unit. This bay lets you add another 192 AD Card, 192 DA Card, or 192 Digital Card (all sold separately) to increase the amount of available I/O on the unit.

The expansion bay is the only bay that allows for another card. The other three bays are hard-wired for the appropriate card (the upper left bay houses a 192 AD card; the upper right, the 192 Digital Card; and the lower left, the 192 DA card). See “Installing an I/O Card” on page 27.

Bay Number	Card Allowed
1	A/D
2	D/A
3	D/D
4	Any

⚠ *It is important that you follow the guidelines in this chapter to avoid damaging your 192 I/O or any of your I/O cards.*

These factory-installed cards can be removed, if needed, for servicing, or to swap out cards in the fourth bay for different studio setups. If you remove a single default card from the 192 I/O, the unit will continue to function while the audio card is being serviced. See “Removing an I/O Card” on page 30.

Installing an I/O Card

Installing an optional card in the expansion bay

To insert or replace a card:

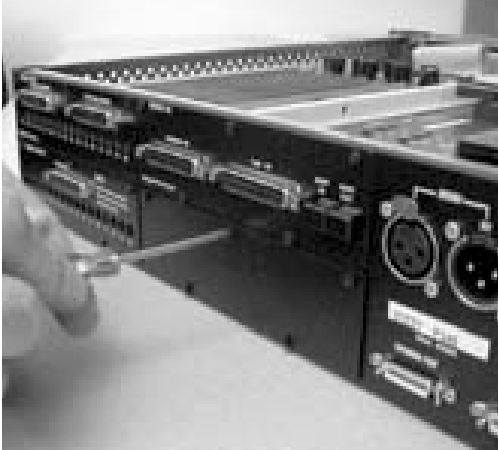
- 1 Power off and disconnect the 192 I/O from your HD system.
- 2 Make sure that the equipment is properly grounded.
- 3 Remove all 16 of the small Phillips-head screws around the edges of the top cover. Don't lose the screws—put them in a safe place!



Removing the top cover screws

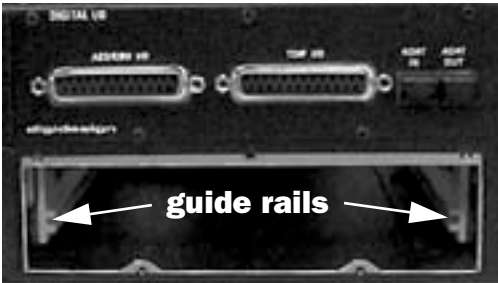
4 Lift off the top of the 192 I/O and set it aside.

5 Remove the five screws on the cover over the empty bay. Do not misplace these screws; note that they are a different size and shape from the top cover screws.

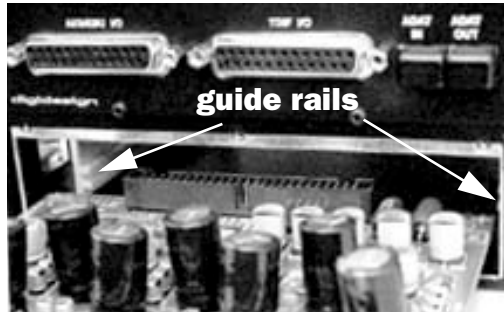


Removing the cover on the empty bay

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



Locating guide rails along sides of empty bay



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.

8 Gently push the card back into the bay, lifting slightly to keep components underneath the card from touching the rear panel.



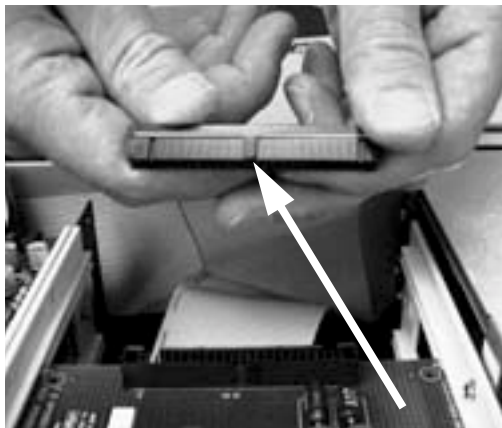
Lifting slightly while pushing the card back into the bay

9 Attach the card's faceplate onto the rear panel surface of the 192 I/O with the same screws you removed from the empty bay cover.



Attaching the card faceplate into the rear panel surface of the 192 I/O

10 Locate the raised ridge in the middle of the 50-pin cable which connects to the 192 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

11 Gently push the cable connector into the card's connector. The ridge on the cable connector must line directly into the groove on the card connector. Be very careful not to bend any of the pins or to over-stress the card.



Pressing the 50-pin cable connector into the card

12 Place the top cover onto the 192 I/O.

13 Replace the original screws.

14 Connect the 192 I/O to your HD system.

15 Power on your 192 I/O.

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

17 Start up the computer.

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

– or –

If it doesn't, see "Troubleshooting" on page 30.

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

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

- If you installed a 192 Digital card, you should see a new tab called Digital 9–16.
- If you installed a 192 AD card, you should see a new tab called Analog In 9–16.
- If you installed a 192 DA card, you should see a new tab called Analog Out 9–16.

21 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 192 I/O.

Hardware Setup Changes

After Adding a Card

The additional inputs and/or outputs provided by the new card will appear in the Hardware Setup dialog, with the same controls and parameters as for the original card of the same type.

For example, if you add an Analog Input card to the original three cards, a second Analog Input tab will appear in the Hardware Setup dialog. You can route these new inputs (which will in this case be called Analog Inputs 9–16) with the same controls and parameters as the factory-installed version of the card.



Whenever a card is added or removed from an HD I/O, the routing in the Hardware Setup dialog will revert to default assignments. If you have complex routing and/or mirroring in place, please note the assignments and reassign the inputs and outputs after the new card has been properly identified.

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.

Removing an I/O Card

In the event of a problem with one of the cards in your 192 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 192 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, or if the wrong card is in any of the first three bays.

⚠ *Before handling any of the cards or internal components of 192 I/O, discharge any static electricity by touching the outer casing of the power supply.*

To remove an I/O card from the 192 I/O:

- 1** Power off and disconnect the 192 I/O from your HD system.
- 2** Make sure that the equipment is properly grounded.
- 3** Remove the top cover of the 192 I/O by extracting the 16 small Phillips-head screws around the edges of the top cover, and lift it off. Put the screws in a safe place.
- 4** Remove the five screws on the front plate of the card to be removed.
- 5** Gently pull the 50-pin connector off of the edge of the card.

6 Pull the card out by gripping the edges between your thumb and forefinger. Pull straight back, lifting very slightly to avoid contact between components on the underside of the card and the 192 I/O back panel faceplate.

 *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 192 I/O.*

Hardware Setup Changes After Removing a Card

In this case, the Hardware Setup dialog will reflect the change by greying out the removed inputs and outputs, and reverting them to their default assignments. The remaining inputs and outputs will function normally.

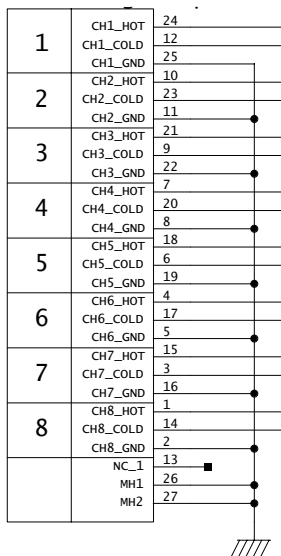
For example, if you remove the Analog Input card, the Analog Input tab will disappear from the Hardware Setup dialog.

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

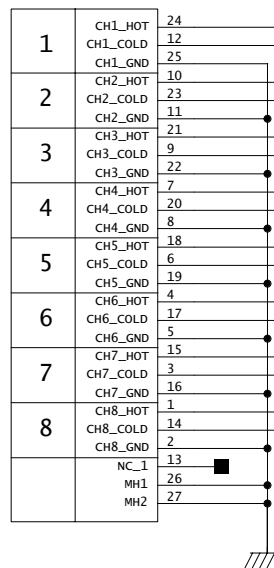
appendix b

Pinout Diagrams for the DB-25 Connectors

Analog Output DB-25

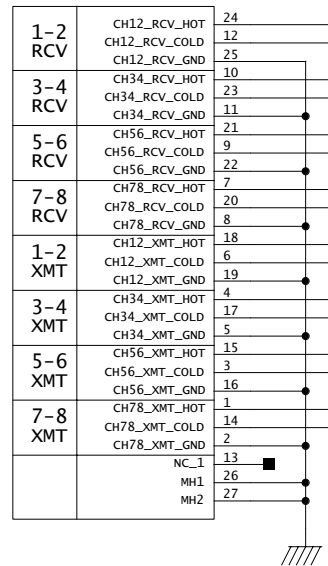
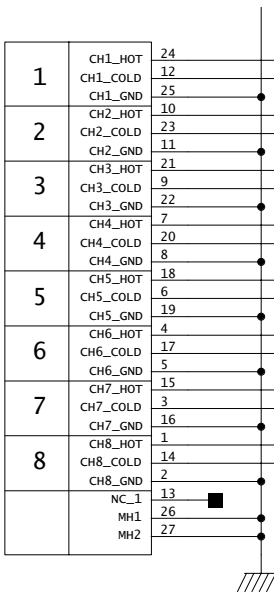


Analog Input (+4 dBu) DB-25

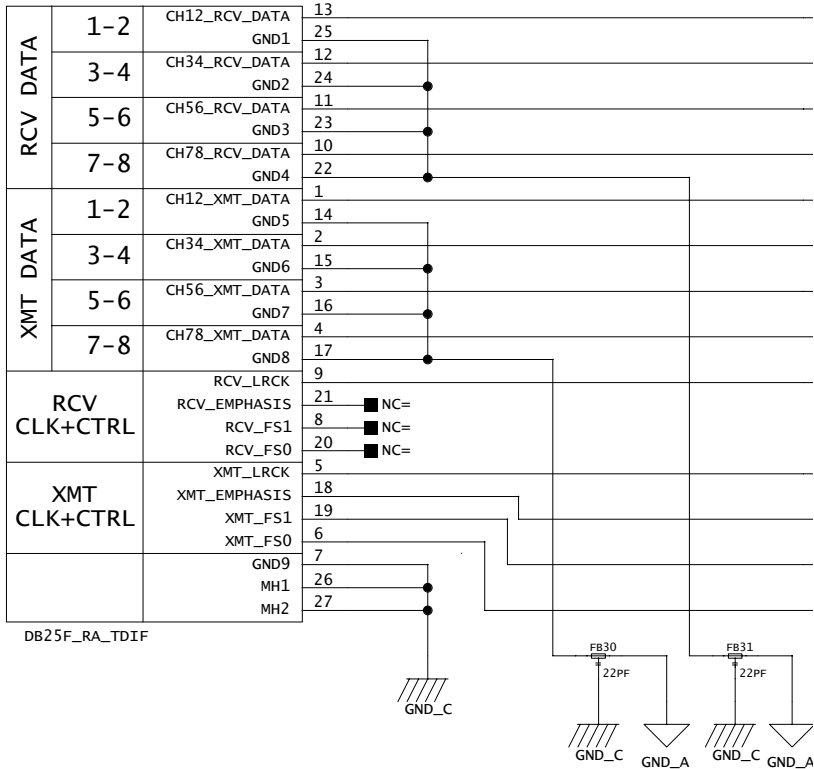


Analog Input (-10dBV) DB-25

AES/EBU DB-25



TDIF DB-25



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