



HD MADI Guide

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Chapter 1: Introduction

Avid® HD MADI is a 64-channel, digital audio interface designed for use with Avid HD Native and Pro Tools|HD hardware. HD MADI supports the Multichannel Audio Digital Interface (MADI) format and sample rates of up to 192 kHz.

HD MADI provides simplified connectivity between Pro Tools® and MADI-compatible audio equipment, such as routers, digital mixing consoles, VENUE systems (with the MADI option), and converters.

HD MADI Features

- 2 MADI Optical and Coaxial inputs and 2 MADI Optical and Coaxial outputs for up to 64 discrete channels of digital input and output (32 channels per DigiLink Mini port)
- Supports sample rates of 44.1, 48, 88.2, 96, 176.4, and 192 kHz
- 24- or 16-bit resolution
- Sample Rate Conversion (SRC) on input or output
- Front panel clock and SRC indicators
- Front panel signal present LEDs for input and output
- BNC Word Clock I/O for synchronizing HD MADI with external 1x Word Clock

- BNC Loop Sync I/O for synchronizing HD MADI with additional Avid HD audio interfaces and peripherals (such as HD I/O, HD OMNI, or SYNC HD)
- Dedicated BNC Word Clock input and XLR AES/EBU input (clock input only) for external MADI synchronization (when using SRC on output)
- Clock support for the following formats: Internal, Loop Sync, Word Clock, AES/EBU, and MADI
- Varispeed modes (supports both 64- and 56-channel standards)

What's Included

- HD MADI audio interface
- AC power cable
- 2 DigiLink Mini cables (12 ft.)
- 2 DigiLink Mini adapters
- 2 BNC cables (2 ft.)
- 4 rubber adhesive feet
- 4 rack screws and washers
- *HD MADI Guide*
- *Health and Safety Guide*
- Registration Information Card

System Requirements and Compatibility

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

For complete system requirements and a list of qualified computers, operating systems, hard drives, and third-party devices, visit:

www.avid.com/compatibility

Registration

Review the enclosed Registration Information Card and follow the instructions on it to quickly register your purchase online. By registering, you become eligible to receive the following:

- Technical support information
- Software update and upgrade notices
- Hardware warranty information

Hardware Warranty

Your warranty can be found on the Registration Information Card.

About this Guide

This guide provides a basic overview of HD MADI features and functionality.

For hardware installation instructions for your HD Native hardware, see the *HD Native Install Guide*.

For hardware installation instructions for your Pro Tools|HD hardware, see the *Pro Tools|HD User Guide*.

For Pro Tools installation instructions, see the *Pro Tools Installation Guide*.

For additional information about using Pro Tools software, see the Pro Tools Reference Guide (in Pro Tools, choose Help > Pro Tools Reference Guide).

Conventions Used in This Guide

All of our guides use the following conventions to indicate menu choices and key commands:

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

The names of Commands, Options, and Settings that appear on-screen are in a different font.

The following symbols are used to highlight important information:

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

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

 *Shortcuts show you useful keyboard or mouse shortcuts.*

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

About www.avid.com

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

Product Registration Register your purchase online.

Support and Downloads Contact Avid Customer Success (technical support); download software updates and the latest online manuals; browse the Compatibility documents for system requirements; search the online Knowledge Base or join the worldwide Pro Tools community on the User Conference.

Training and Education Study on your own using courses available online or find out how you can learn in a classroom setting at a certified Pro Tools training center.

Products and Developers Learn about Avid products; download demo software or learn about our Development Partners and their plugins, applications, and hardware.

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

Chapter 2: HD MADI Overview

This chapter provides an overview of the front and back panel features of HD MADI.

HD MADI Front Panel



HD MADI front panel

Power Switch and LED Ring

This button turns HD MADI on and off. The LED ring around the power button will light green or orange to indicate the system status:

Green LED Ring Indicates that the unit has powered up successfully and is connected to an active system.

Orange LED Ring Indicates that 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 internal crystal oscillator for HD MADI: 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz, or 192 kHz. The sample rate is set when you create a new session, and can be changed in the Pro Tools Hardware Setup or Playback Engine dialogs if no session is open.

Loop Master LED

The LOOP MASTER LED indicates which audio interface is the master peripheral. The Loop Master LED will be continuously lit on the current Loop Master peripheral only, and unlit on all other peripherals. (Only one Avid HD peripheral can be Loop Master at a time.) The Loop Master LED will always be lit with a single interface.

With HD Native hardware, Loop Master defaults to the first audio interface connected to DiGiLink Mini Port 1 on the HD Native card.

For Pro Tools|HD systems, Loop Master defaults to the first audio interface connected to the primary, or “core” Pro Tools|HD card—on Pro Tools|HD (for PCIe) this is the Accel Core card. On Pro Tools|HD (for PCI) this is the HD Core card.

Sync Mode LEDs

The SYNC MODE LEDs indicate the current Clock Source as set in Pro Tools.

INT (Internal) Indicates HD MADI sample clock is generated by its internal crystal oscillator, as determined by the session Sample Rate.

DIG (Digital) Indicates that MADI digital sync is providing system clock.

LOOP Indicates that HD MADI is slaving to another peripheral using Loop Sync.

EXT (External) Indicates that HD MADI is using the Word Clock in port (BNC) for system synchronization.

When synchronized to Word Clock, External Clock input and output do not have to be at the same Word Clock Rate. Synchronization to External Clock is typically 1x the current session sample rate. However, for sample rates higher than 48 kHz, HD MADI generates a choice of 1x, 2x, or 4x the base rate of 44.1 kHz or 48 kHz, as follows:

Session Sample Rate	Word Clock Support
44.1 kHz	44.1 kHz
48 kHz	48 kHz
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

Sample Rate Convert

HD MADI provides real-time sample rate conversion on Input or Output. Sample Rate Convert (SRC) is configured in the Pro Tools Hardware Setup dialog (Setup > Hardware).

Input Indicates HD MADI Sample Rate Convert on Input is active.

Output Indicates HD MADI Sample Rate Convert on Output is active.

AES/EBU Indicates that AES/EBU is being used as the clock source for the MADI ports when using Sample Rate Conversion (SRC). If AES/EBU is selected as the Clock Source for Sample Rate Conversion in the Hardware Setup dialog, but no valid word clock is detected, the AES/EBU LED blinks on and off until a valid clock source is selected.

Word Clock Indicates that the dedicated (SRC) Word Clock ports are being used as the clock source for the MADI ports when using Sample Rate Conversion (SRC). If Word Clock is selected as the external sync format for Sample Rate Convert in the Hardware Setup dialog, but no valid word clock is detected, the AES/EBU LED blinks on and off until a valid clock source is selected.

Signal Present

The Signal Present LEDs indicate signal for Input and Output. The top LED indicates input and the bottom LED indicates output.

Input Lights when signal is being passed to Pro Tools from the MADI input ports.

Output Lights when signal is being passed from Pro Tools to the MADI output ports.

HD MADI Back Panel



HD MADI back panel

MADI Optical In and Out

HD MADI provides 2 sets of MADI Optical In and Out ports. Using high-quality optical cable, connect these ports to the corresponding MADI optical inputs and outputs of MADI-compatible audio equipment (such as routers, digital mixing consoles, and converters).

⚠ *The maximum length for MADI optical cables is 2 kilometers (SC FDDI fiber-optic cable).*

MADI Coaxial In and Out

HD MADI provides 2 sets of MADI Coaxial In and Out ports. Using high-quality coaxial cable, connect these ports to the corresponding MADI coaxial inputs and outputs of MADI-compatible audio equipment (such as routers, digital mixing consoles, and converters).

⚠ *HD MADI supports 75 Ohm coaxial (BNC) cable (such as Belden 1855 and 1694 type). The maximum length for copper MADI coaxial cables is 100 meters.*

Number of Channels

For Pro Tools sessions at 44.1 and 48 kHz, up to 64 channels of MADI Optical I/O are available through each set of inputs (Optical or Coaxial). At higher sample rates, both sets can be used to achieve up to 64 channels of MADI Optical or Coaxial I/O as shown in the following table.

Channels of HD MADI by port (optical or coaxial) and sample rate

Port	Channels	Sample rate
1 (Normal Mode)	1–64	44.1/48 kHz
1 (Split Mode)	1–32	44.1/48 kHz
2 (Split Mode)	33–64	44.1/48 kHz
1	1–32	88.2/96 kHz
2	33–64	88.2/96 kHz
1	1–16	176.4/192 kHz
2	17–32	176.4/192 kHz

Real-Time Sample Rate Conversion

HD MADI inputs can stream in at any sample rate and be converted to the current Pro Tools session sample rate using hardware-based real-time sample-rate conversion (SRC). SRC is also supported on output.

Primary DigiLink Mini Ports

HD MADI provides 2 Primary DigiLink Mini Ports. The Primary port is where the DigiLink Mini cable connects HD MADI to an HD Native or Pro Tools|HD card. Each Primary port sends and receives up to 32 channels to and from the card to which it is connected.

DigiLink Mini Cables and Adapters

Avid provides various cables and adapters to connect Avid HD audio interfaces to HD Native and Pro Tools|HD cards.



For more information about DigiLink Mini cables and adapters, visit the Avid website (www.avid.com).

DigiLink Mini Cables

Use DigiLink Mini cables to connect HD MADI to an HD Native card.

There are five different lengths of DigiLink Mini cables:

- 18" (0.46m) (sold separately)
- 12' (3.6m) (2 included with HD MADI)
- 25' (7.62m) (sold separately)
- 50' (15.25m), the maximum length supported for 176.4 kHz and 192 kHz sessions (sold separately)
- 100' (30.5m), the maximum length supported by 88.2 kHz and 96 kHz sessions (sold separately)

DigiLink Mini Adapters

Use DigiLink cables with DigiLink Mini adapters to connect to connect HD MADI to Pro Tools|HD cards.

There are two types of DigiLink Mini adapters:

- 12" DigiLink Mini female to DigiLink male
- 12" DigiLink Mini male to DigiLink female

SRC AES/EBU

A single female AES/EBU port (clock input only) is provided for synchronizing to an external AES/EBU digital clock source when using MADI Sample Rate Conversion (SRC) on output. This can be configured in the Pro Tools Hardware Setup dialog.

SRC Word Clock In 1 & 2

The SRC Word Clock In ports 1 & 2 are standard BNC connector that provides Word Clock input for synchronizing to an external Word Clock digital clock source when using MADI Sample Rate Conversion (SRC) on MADI output. This can be configured in the Pro Tools Hardware Setup dialog.

Word Clock In & Out

The Word Clock In and Out ports are standard BNC connectors that receive and output word clock signal. These ports can be used to synchronize HD MADI with any word clock-capable device.

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



Because the Loop Sync and Word Clock ports pass crucial timing information, use high-quality 75-ohm coaxial cables.

LOOP SYNC In and Out

Loop Sync is a dedicated clock loop for synchronizing multiple Avid HD peripherals together (such as a SYNC HD and one or more audio interfaces). Loop Sync uses a word clock signal based on sample rates of either 44.1 kHz or 48 kHz. As sample rate increases in the system, Loop Sync operates at 1x, 2x, or 4x the base rate of 44.1 kHz or 48 kHz.

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

AC Power

This connector accepts a standard AC power cable. HD MADI 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.

Chapter 3: Connecting HD MADI

HD MADI provides up to 64-channels of digital I/O with Avid HD Native or Pro Tools|HD hardware.

HD Native With HD Native hardware, HD MADI is connected to the HD Native card using 2 DigiLink Mini cables. See “Connecting HD MADI to an HD Native Card” on page 12.

 *For more information about installing the HD Native card, see the HD Native Install Guide.*

Pro Tools|HD With Pro Tools|HD hardware, HD MADI is connected to a Pro Tools|HD card using a DigiLink cable with a DigiLink to DigiLink Mini adapter. For full 64-channel support, two Pro Tools|HD cards are required. See “Connecting HD MADI to Pro Tools|HD Cards” on page 14.

 *For more information about installing Pro Tools|HD cards, see the Pro Tools|HD User Guide.*

Rack Mounting HD Audio Interfaces

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

Connecting HD MADI to an HD Native Card

You can get a full 64 channels of I/O with HD MADI connected to an HD Native card using two DigiLink Mini cables. However, HD MADI will be the only audio interface in the system.

To connect HD MADI to an HD Native card:

- 1 Connect HD MADI Primary Port 1 to DigiLink Mini Port 1 on the HD Native card with the included DigiLink Mini cable.
- 2 Connect HD MADI Primary Port 2 to DigiLink Mini Port 2 on the HD Native card with the included DigiLink Mini cable.

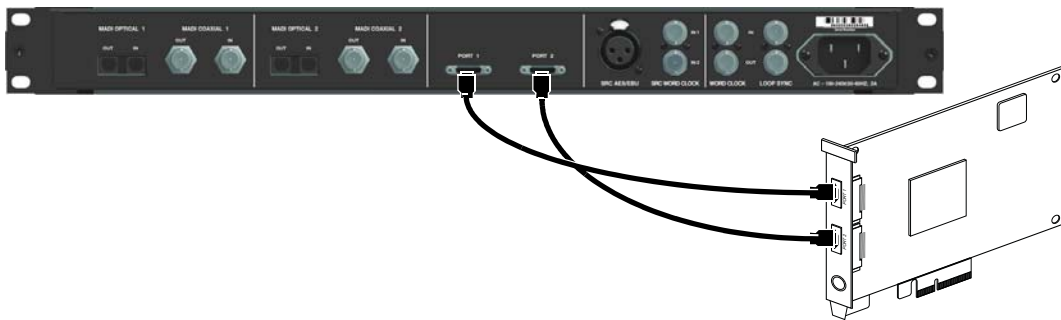


Figure 1. HD MADI connected to DigiLink Mini Ports 1 and 2 of an HD Native card (64-channel system)

Connecting Loop Sync

If you are using two (or more) Pro Tools audio interfaces or a SYNC peripheral, Loop Sync must be connected to maintain proper clock synchronization among the devices. For examples that include a SYNC peripheral, see the *SYNC HD Guide*. For an example of connecting multiple audio interfaces, see Figure 2 below.

To make Loop Sync connections:

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

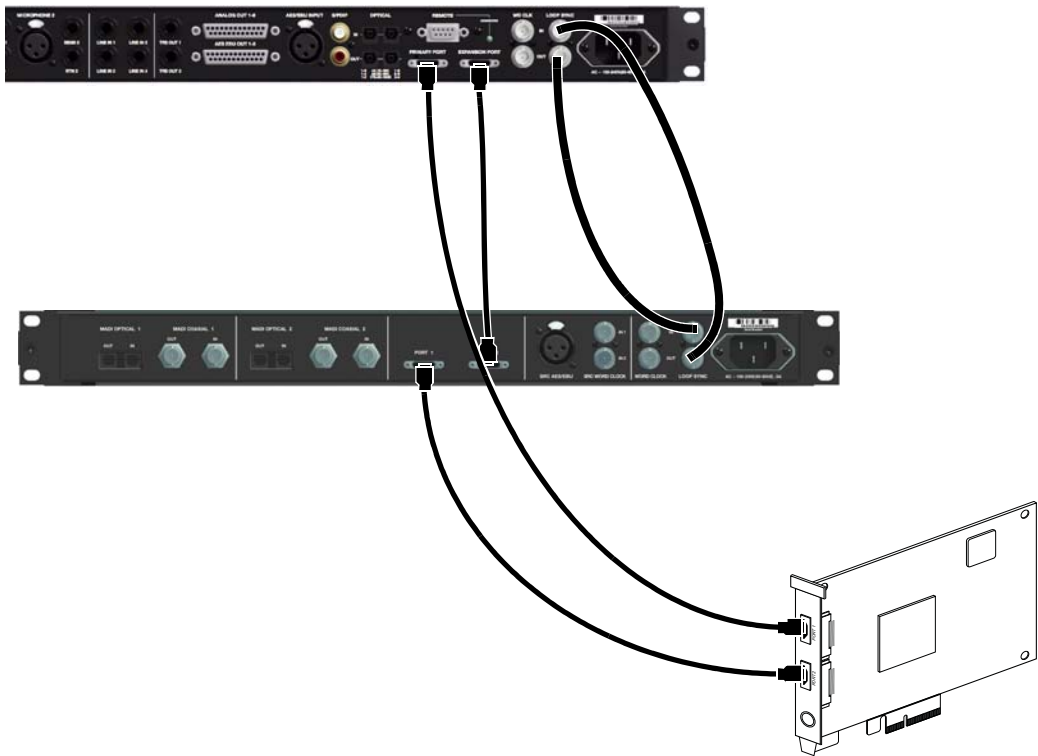


Figure 2. DigiLink and Loop Sync connections with HD OMNI (top), HD MADI (below), and an HD Native card (right) (48-channel system)

Connecting HD MADI to Pro Tools|HD Cards

You can get a full 64 channels of MADI I/O with HD MADI connected to two Pro Tools|HD cards using two DigiLink Mini cables. If you have more than two Pro Tools|HD cards in your system (such as with a Pro Tools|HD 3 Accel system), you can connect additional Avid HD audio interfaces (such as HD I/O or HD OMNI).

To connect HD MADI to a Pro Tools|HD 2 or greater system:

- 1 Connect HD MADI Primary Port 1 to the DigiLink Port on the Pro Tools|HD Accel Core card with a DigiLink cable and a DigiLink to DigiLink Mini adapter.
- 2 Connect HD MADI Primary Port 2 to the DigiLink Port on the Pro Tools|HD Accel card with a DigiLink cable and a DigiLink to DigiLink Mini adapter.

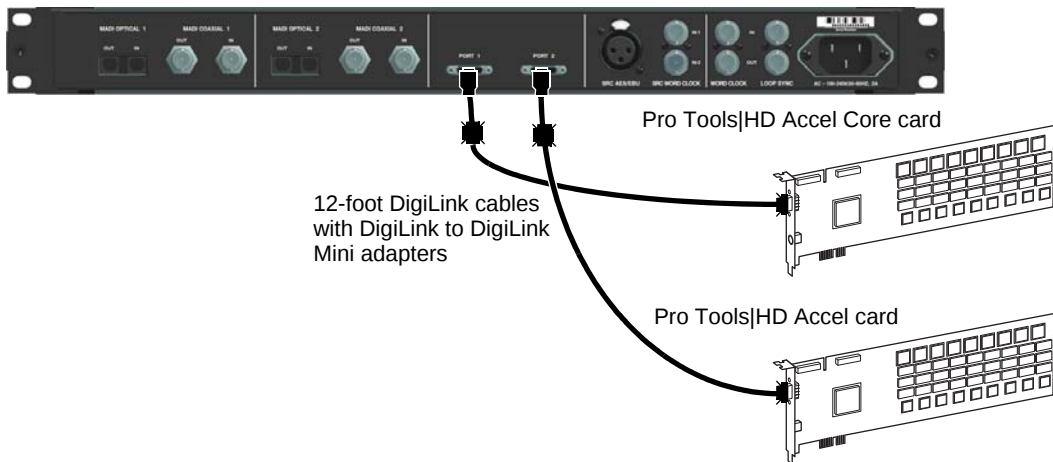


Figure 3. HD MADI connected to DigiLink Ports on a Pro Tools|HD Accel Core card and a Pro Tools|HD Accel card (64-channel system)

Connecting Loop Sync

If you are using two (or more) Pro Tools audio interfaces or a SYNC peripheral, Loop Sync must be connected to maintain proper clock synchronization among the devices. For examples that include a SYNC peripheral, see the *SYNC HD Guide*. For an example of connecting multiple audio interfaces, see Figure 4 below.

To make Loop Sync connections:

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

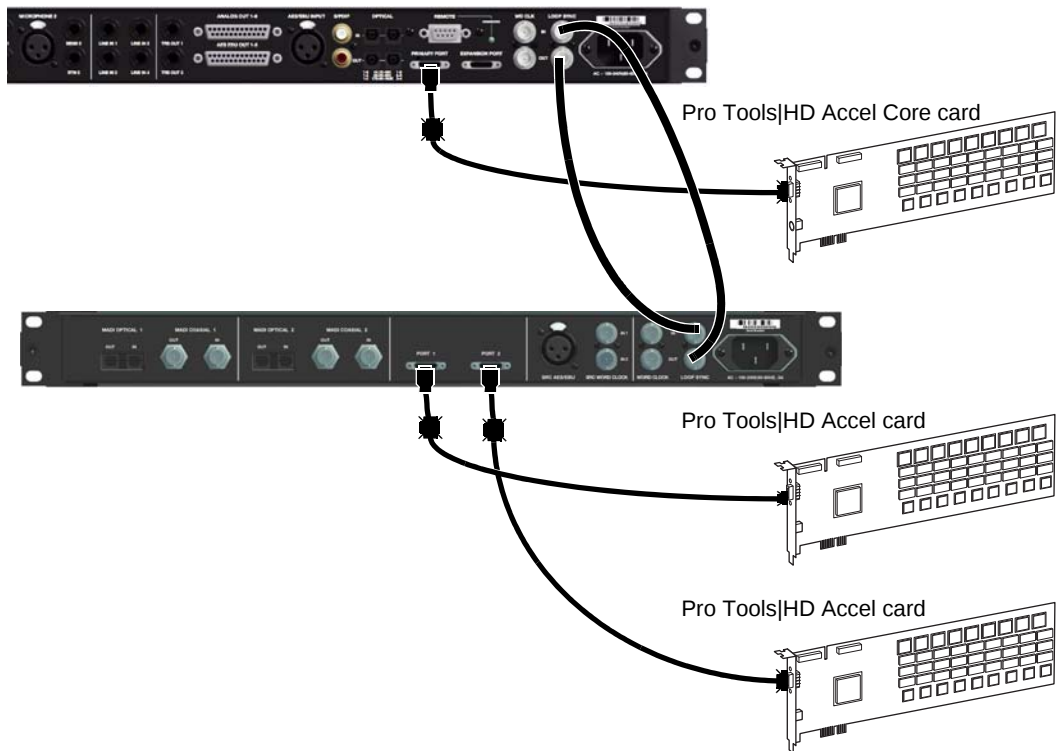


Figure 4. DigiLink and Loop Sync connections between HD OMNI (top), HD MADI (below), and an HD3 system (right)

Chapter 4: Configuring HD MADI in Pro Tools

This chapter explains how to configure HD MADI in Pro Tools.

 For more information about configuring Pro Tools, see the Pro Tools Reference Guide.

Hardware Setup

In the Hardware Setup dialog, you can set the default sample rate (if no session is open) and clock source for your system, as well as access a range of controls specific to each type of audio interface connected to your Pro Tools system.

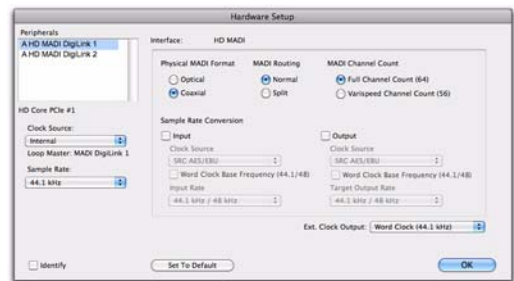
Default Sample Rate

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

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

To change the default Sample Rate for new sessions:

- 1 If a Pro Tools session is currently open, close it.
- 2 Choose Setup > Hardware.



Hardware Setup dialog, HD MADI (Port 1 shown)

- 3 From the Sample Rate pop-up menu, select the sample rate that you want.
- 4 Click OK.

High Sample Rates and Expanded Pro Tools|HD Systems

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

Clock Source

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

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

External If you are transferring material into Pro Tools from an external digital device, or if you utilize a common house clock signal, you will synchronize Pro Tools to that digital device or common signal. The external options for HD MADI are dependant on the sample rate and include:

Available Clock Sources for HD MADI

44.1/48 kHz	88.2/96 kHz	176.4/192 kHz
SYNC/SYNC HD (if present)	SYNC/SYNC HD (if present)	SYNC/SYNC HD (if present)
Internal	Internal	Internal
MADI IN	MADI IN	MADI IN
Word Clock (44.1/48 kHz)	Word Clock (44.1/48 kHz)	Word Clock (44.1/48 kHz)
	Word Clock (96 kHz)	Word Clock (176.4/192 kHz)

To select the Clock Source:

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

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

Identify

If you have multiple audio interfaces of the same type connected to your system, you should confirm the identity of each interface. This ensures that you select the appropriate interface in the Peripherals list when defining its inputs and outputs, and other settings, in the Hardware Setup dialog.

To identify audio interfaces in your system:

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



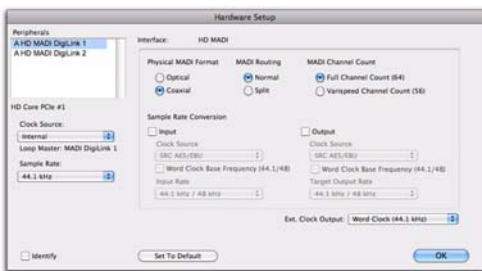
Use the Up and Down Arrow keys to scroll through the Peripherals list in the Hardware Setup dialog.

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

Configuring HD MADI

To configure controls for HD MADI:

- 1 Choose Setup > Hardware.
- 2 From the Peripherals list, select either HD MADI DigiLink 1 or HD MADI DigiLink 2 and configure the options as desired.



HD MADI Hardware Setup



The settings for HD MADI DigiLink 1 and HD MADI DigiLink 2 are linked, any changes are global regardless of which is selected in the Peripherals list.

- 3 When you are finished, click OK.

HD MADI Hardware Setup Options

HD MADI provides a single page of Hardware Setup options. These settings determine which physical MADI ports are used, MADI routing, and whether or not sample rate conversion is applied to MADI input and output.

Physical MADI

The Physical MADI setting lets you select the physical MADI I/O ports for HD MADI input and output.

Optical Select this option to use the Optical MADI ports for input and output.

Coaxial Select this option to use the Coaxial MADI ports for input and output.

MADI Routing

The MADI Routing setting lets you choose between Normal or Split MADI input routing options.

Normal Uses just the first Physical MADI port (Optical 1 or Coaxial 1) for MADI input. The number of available input channels varies depending on the sample rate (see Table 1 on page 20).

Split Uses both of the currently-selected Physical MADI ports (Optical 1 and 2 or Coaxial 1 and 2) for MADI input. The number of available input channels varies with sample rate (see Table 1 on page 20). At 88.2 or 96 kHz, channels are routed across two 32-channel groups for connecting to DigiLink Mini ports 1 and 2. At 176.4 or 192 kHz, all channels appear in Pro Tools on MADI DigiLink 1.

MADI Channel Count

The MADI Channel Count setting lets you choose between Standard channel modes or Varispeed channel modes.

Full Channel Count (64) Select this option for up to 64 channels of MADI I/O without varispeed. The number of available channels is dependent on the session sample rate (see Table 1 on page 20).

Varispeed Channel Count (56) Select this option for up to 56 channels of MADI I/O with varispeed. The number of available channels is dependent on the session sample rate (see Table 1 on page 20).

Table 1. Available MADI channels by sample rate

Session Sample Rate	Full Channel Count	Varispeed Channel Count
44.1/48 kHz	64	56
88.2/96 kHz	32	28
176.4/192 kHz	16	14

When using Varispeed, or when working with higher sample rates, any unavailable channels become grayed out in the I/O Setup dialog.

HD MADI VSO Range

When using Varispeed with HD MADI, it is possible to exceed the available bandwidth. When Varispeed exceeds the maximum frequency for the current nominal sample rate, audio drops out. The maximum frequency for Varispeed at each nominal sample rate is listed in Table 2.

Table 2. Varispeed maximum sample rate limits

Nominal sample rate	Channel Count	Maximum Frequency
44.1/48 kHz	64	48.8 kHz
44.1/48 kHz	56	55.6 kHz
88.2/96 kHz	32	97.5 kHz
88.2/96 kHz	28	111.5 kHz
176.4/192 kHz	16	194.9 kHz
176.4/192 kHz	14	223.0 kHz

Sample Rate Conversion

Input

Enable the Input option to apply sample rate conversion on input. Select this option if HD MADI is receiving external MADI sources at any sample rate other than the Pro Tools Session sample rate.

Clock Source

Select the desired Clock Source option to set the clock source for Sample Rate Conversion (SRC) on input.

SRC Word Clock In 1 Select this option to clock to the SRC Word Clock In 1 port for SRC.

SRC Word Clock In 2 Select this option to clock to the SRC Word Clock In 2 port for SRC.

SRC AES/EBU Select this option to clock to the SRC AES/EBU port for SRC.

MADI IN Select this option to clock to the incoming MADI signal (Optical or Coaxial) for SRC.

Word Clock Base Frequency (44.1/48)

Enable this option if you are synchronizing to Word Clock at either 44.1 kHz or 48 kHz, but you are receiving input at a sample rate of 88.2 kHz or higher.

Input Rate

Select the correct input sample rate frequency range for the incoming MADI signal:

- 44.1 kHz/48 kHz
- 88.2 kHz/96 kHz
- 176.4 kHz/192 kHz

Output

Enable the Output option to apply sample rate conversion on output. Select this option if HD MADI is sending to external MADI sources at any sample rate other than the Pro Tools Session sample rate.

Clock Source

Select the desired Clock Source option to set the clock source for Sample Rate Conversion (SRC) on output.

SRC Word Clock In 1 Select this option to clock to the SRC Word Clock In 1 port for SRC.

SRC Word Clock In 2 Select this option to clock to the SRC Word Clock In 2 port for SRC.

SRC AES/EBU Select this option to clock to the SRC AES/EBU port for SRC.

MADI IN Select this option to clock to the incoming MADI signal (Optical or Coaxial) for SRC.

Word Clock Base Frequency (44.1/48)

Enable this option if you are synchronizing to Word Clock at either 44.1 kHz or 48 kHz, but you are sending at a sample rate of 88.2 kHz or higher.

Target Output Rate

Select the desired output sample rate frequency range for the MADI signal target output:

- 44.1 kHz/48 kHz
- 88.2 kHz/96 kHz
- 176.4 kHz/192 kHz

If the Word Clock Base Frequency option is enabled, the Target Output Rate setting multiplies the Word Base Frequency (either 44.1 or 48 kHz) to match the output sample rate range.

Ext. Clock Output

If you want to send clock output to other devices attached to HD MADI, select the appropriate output from the Ext. Clock Output pop-up menu.

The available options for Ext. Clock Output change depending on the session sample rate. See the table below for a list of default external clock settings and available options.

Ext. Clock Output options by sample rate

Sample Rate (kHz)	Available Ext. Clock Default	Available Ext. Clock Option
44.1 kHz	Word Clock (44.1 kHz)	N/A
48 kHz	Word Clock (48 kHz)	N/A
88.2 kHz	Word Clock (88.2 kHz)	Word Clock (44.1 kHz)
96 kHz	Word Clock (96 kHz)	Word Clock (48 kHz)
176.4 kHz	Word Clock (176.4 kHz)	Word Clock (44.1 kHz)
192 kHz	Word Clock (192 kHz)	Word Clock (48 kHz)

Set To Default

The Set To Default button restores all settings to the factory defaults.

Pro Tools I/O Setup

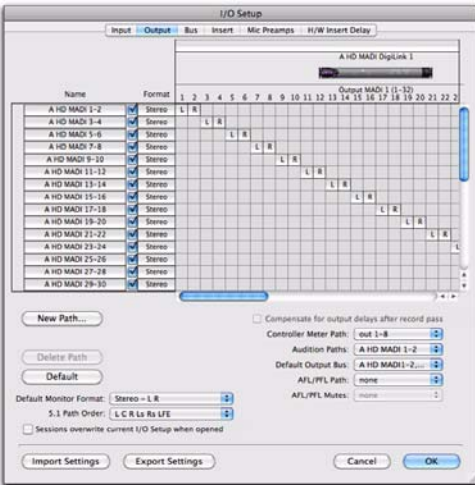
This section describes how to configure input, output, and bus signal paths for HD MADI in the Pro Tools I/O Setup.

 For more information the I/O Setup dialog, see the Pro Tools Reference Guide.

Opening the I/O Setup Dialog

To open the I/O Setup dialog:

- 1 Make sure HD MADI is configured properly in the Hardware Setup dialog (see “Hardware Setup” on page 17).
- 2 Choose Setup > I/O.



I/O Setup dialog (Output page with HD MADI shown)

Closing the I/O Setup Dialog

To close the I/O Setup dialog and save changes:

- Click OK.

When you click OK, Pro Tools checks several settings for routing validity (to prevent feed-back loops).

To close the I/O Setup dialog without saving changes:

- Click Cancel.

Since HD MADI supports up to 64 channels of I/O, and each DigiLink port supports up to 32 channels of I/O, each DigiLink port is represented as 32 channels of MADI I/O in the I/O Setup (see Figure 5).

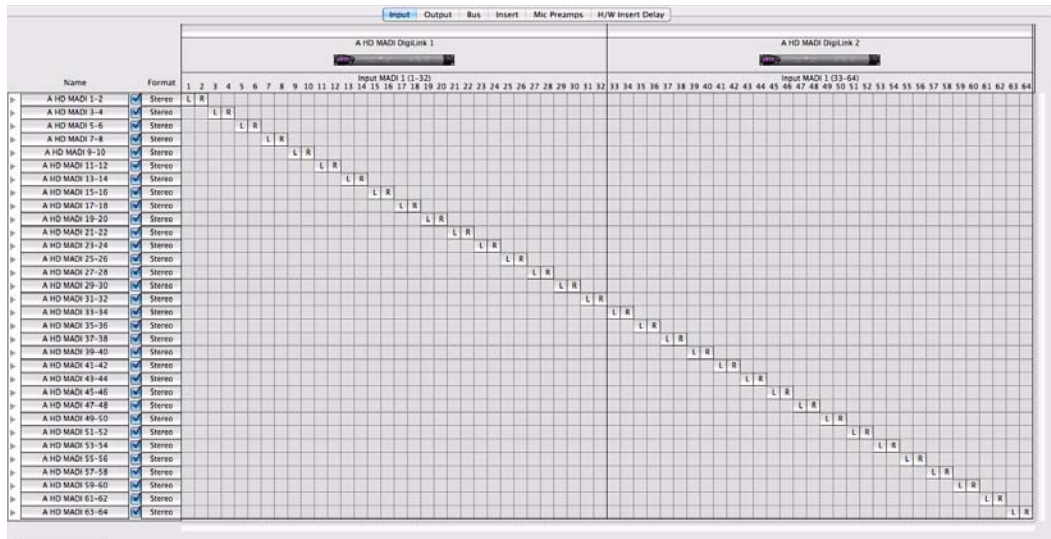
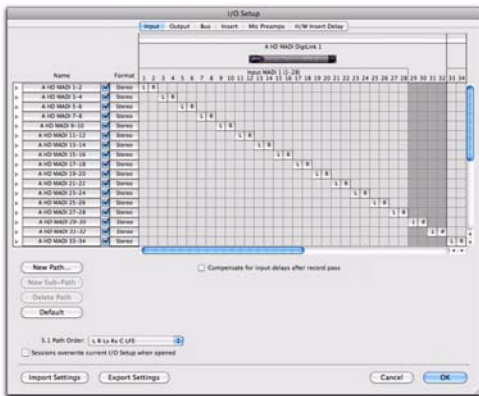


Figure 5. HD MADI in the I/O Setup with both DigiLink ports connected

Varispeed Channel Count and Inactive I/O

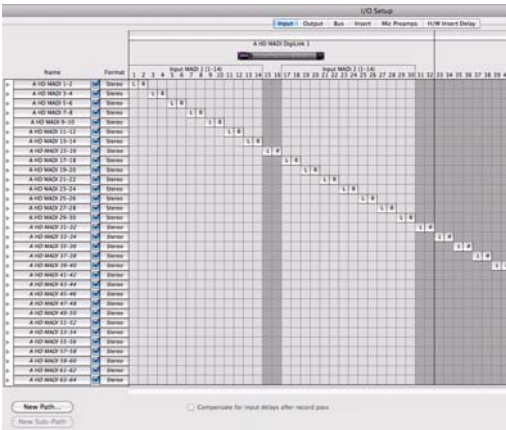
When Varispeed Channel Count is enabled in the Hardware Setup, the reduced channel count results in the highest numbered physical input and output channels being made inactive. For example, at 48 kHz with Varispeed Channel Count (28) option enabled, channels 29–32 of HD MADI DigiLink 1 and channels 61–64 of HD MADI DigiLink 2 are made inactive.



I/O Setup, Input page with inactive channels

Split Mode at 176.4/192 kHz

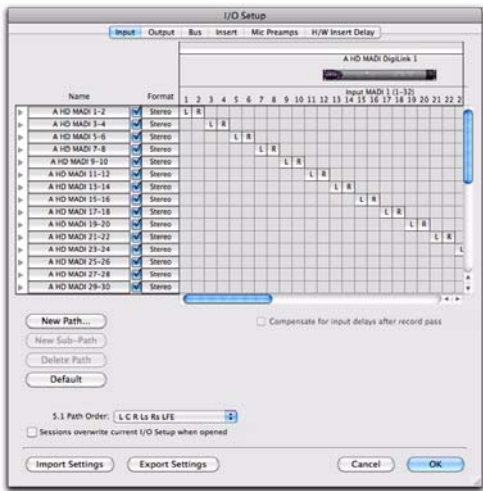
When HD MADI is operating at 176.4 kHz or 192 kHz, the Split option is enabled automatically. Additionally, in the I/O Setup, both HD MADI DigiLink ports are represented on the matrix for HD MADI DigiLink 1. All inputs and outputs on the matrix for HD MADI DigiLink 2 are greyed out, but the corresponding physical input and output ports are represented under HD MADI DigiLink 1.



I/O Setup, Input page at 192 kHz

Input

The Input page of the I/O Setup lets you configure input signal path names, formats, and source channel. Multichannel input paths (stereo or greater) can have any number of sub-paths. Input names and channel formats are saved with the system.

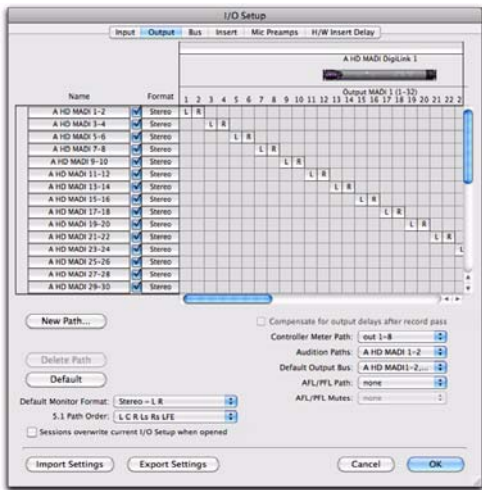


I/O Setup, Input page

💡 Unlike other HD audio interfaces (such as HD I/O), HD MADI physical Input and Output channel mappings are “hard-coded” (“hard-wired”) according to the selected settings for MADI Routing (Normal or Split), Varispeed (number of available channels), and Sample Rate (number of available channels).

Output

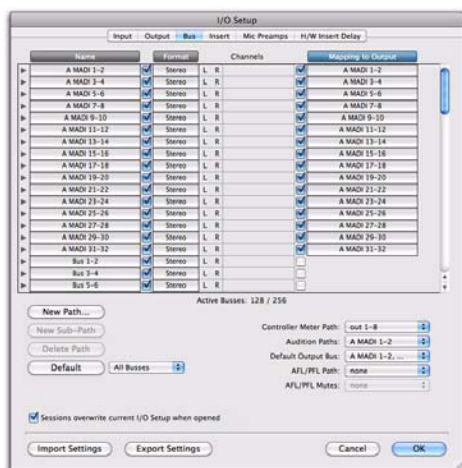
The Output page of the I/O Setup lets you configure output signal path names and formats. Output names and channel formats are saved with the system.



I/O Setup, Output page

Bus

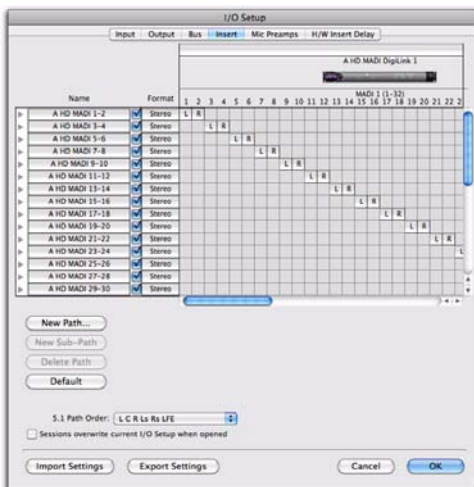
The Bus page lets you configure internal and output bus signal path names and formats, and map output busses to output paths (defined on the Output page). Multichannel busses (stereo or greater) can have any number of sub-paths. Output bus and internal mix bus names and channel formats are saved with the session. Output bus paths to output channel mappings are automatically generated depending on the defined session output bus paths and the available system output channel paths.



I/O Setup, Bus page

Insert

The Insert page of the I/O Setup lets you name Hardware Inserts that you may have connected to your Pro Tools audio interface.



I/O Setup, Insert page

Mic Preamps

The Mic Preamps page of the I/O Setup is used for configuring hardware connections with a PRE peripheral (if present). PRE requires an analog to MADI converter to connect to HD MADI.

H/W Insert Delays

The H/W Insert Delays page of the I/O Setup is used for compensating for the delay (latency) of any Hardware Inserts.

Appendix A: Compliance Information

Environmental Compliance

Disposal of Waste Equipment by Users in the European Union



This symbol on the product or its packaging indicates that this product must not be disposed of with other waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city recycling office or the dealer from whom you purchased the product.

Proposition 65 Warning

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

Perchlorate Notice

This product may contain a lithium coin battery. The State of California requires the following disclosure statement: "Perchlorate Material – special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate."

Recycling Notice



EMC (Electromagnetic Compliance)

Avid declares that this product complies with the following standards regulating emissions and immunity:

- FCC Part 15 Class A
- EN55103-1 E4
- EN55103-2 E4
- AS/NZS CISPR 22 Class A
- CISPR 22 Class A

FCC Compliance for United States

Communication Statement

Note: 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. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Any modifications to the unit, unless expressly approved by Avid, could void the user's authority to operate the equipment.

Argentina Conformity



Australia and New Zealand EMC Regulations



Canadian Compliance

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union Declaration of Conformity

(EMC and Safety)



Avid is authorized to apply the CE (Conformité Européenne) mark on this compliant equipment thereby declaring conformity to EMC Directive 2004/108/EC and Low Voltage Directive 2006/95/EC.

Korean EMC Regulations

다음을 주지하십시오: 이 장비는 상업적인 사용을 위한 EMC 등록을 얻었다. 그것이 잘못되게 판매되거나 구매되면 일 경우에는, 가정 사용을 위해 증명된 장비를 위해 그것을 교환하십시오.

Safety Compliance

Safety Statement

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

Warning



Important Safety Instructions

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

10) Protect power cords from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the equipment.

11) Only use attachments/accessories specified by the manufacturer.

12) For products that are not rack-mountable: Use only with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the equipment. When a cart is used, use caution when moving the cart/equipment combination to avoid injury from tip-over.

13) Unplug this equipment during lightning storms or when unused for long periods of time.

14) Refer all servicing to qualified service personnel. Servicing is required when the equipment has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the equipment, the equipment has been exposed to rain or moisture, does not operate normally, or has been dropped.

15) For products that are a Mains powered device: The equipment shall not be exposed to dripping or splashing and no objects filled with liquids (such as vases) shall be placed on the equipment.

Warning! To reduce the risk of fire or electric shock, do not expose this equipment to rain or moisture.

16) For products containing a lithium battery: CAUTION! Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type.

17) For products with a power switch: The main power switch is located on the front panel of the HD MADI. It should remain accessible after installation.

18) The equipment shall be used at a maximum ambient temperature of 40° C.

תאימות לתקני הבטיחות

הצהרת בטיחות

מכשיר זה נבדק ונמצא תואם לדרישות רישוי הבטיחות של ארצות הברית וקנדה, בהתאם למפרט של תקני UL: UL60065 7th / IEC 60065 7th וכן UL: UL60065 7th / IEC 60065 7th וכן Avid Inc. Canadian CAN/CSA C22.2 60065:03 קיבלה אישור לסמן את מוצריה התואמים בסימון הרלוונטי של UL ו-CUL.

אזהרה



הוראות בטיחות חשובות

- 1) יש לקרוא את ההוראות.
- 2) יש לשמור את ההוראות במקום בטוח.
- 3) יש לשים לב לכל האזהרות.
- 4) יש לפעול בהתאם להוראות.
- 5) אין להשתמש במכשיר זה ליד מים.
- 6) יש לנקות את המכשיר רק באמצעות מטלית יבשה.
- 7) אין לחסום שום פתח אוורור. יש לבצע את ההתקנה בהתאם להוראות היצרן.
- 8) אין להתקין את המכשיר ליד מקורות חום כגון מקרנים, פתחי אוורור של מערכות הסקה מרכזיות, תנורים או פריטי ציוד אחרים (לרבות מגברים) המפיקים חום.

9) אין לעשות דבר שעלול להפריע לתכלית הבטיחותית של תקע מקוטב או תקע עם הארקה. תקע מקוטב מצויד בשני להבים, שאחד מהם רחב יותר. תקע עם הארקה מצויד בשני להבים ובנוסף בפין הארקה. הלהב הרחב או פין הארקה נועדו לשמור על בטיחות המשתמש. אם התקע שסופק לא מתאים לשקע החשמל, יש להתייעץ עם חשמלאי לצורך החלפתו בתקע מתאים.

10) יש להגן על כבלי החשמל כדי למנוע קיפול או דריכה עליהם, זאת במיוחד בסמוך לתקעים, למפצלי שקעים ובנקודות היציאה של כבלי החשמל מהמכשירים.

11) יש להשתמש אך ורק באבזרים אשר אושרו על-ידי היצרן.

12) כאשר מדובר במוצרים שלא ניתן להתקיןם בארון ציוד: יש להשתמש בעגלות, מעמדים, חצובות מדפים או שולחנות המאושרים על-ידי היצרן או הנמכרים עם פריט הציוד הרלוונטי. כאשר מניחים את המכשיר על עגלה, יש לנקוט זהירות בעת הזזתה, כדי למנוע נפילה העלולה לגרום לפגיעה.

13) יש לנתק את המכשיר משקע החשמל בזמן סערת ברקים או כאשר הוא לא בשימוש במשך תקופה ארוכה.

14) בכל טיפול במכשיר יש לפנות לאנשי שירות מוסמכים. טיפול נדרש כאשר המכשיר ניזוק בצורה כלשהי, לדוגמה במקרים הבאים: נזק לכבל או לתקע חשמלי; שפיכת נוזלים או נפילת חפצים לתוך המכשיר; חשיפת המכשיר לגשם או ללחות; ליקוי בפעולתו הרגילה של המכשיר; נפילת המכשיר.

15) כאשר מדובר במוצרים המחוברים לרשת החשמל: יש למנוע את חשיפת המכשיר לטפטוף או התזה של נוזלים. כמו כן, אין להניח על המכשיר חפצים המכילים נוזלים (כגון אגרטלים).

אזהרה! כדי לצמצם סכנה של אש או מכת חשמל, אין לחשוף את המכשיר לנשם או לחות.

16) כאשר המוצר מכיל סוללת ליתיום: **זהירות!** קיימת סכנת התפוצצות אם החלפת הסוללה לא מתבצעת בצורה נכונה. יש להחליף את הסוללה רק בסוללה זהה או שוות ערך.

17) כאשר המוצר מצויד במתג הפעלה: מתג ההפעלה הראשי נמצא על הלוח הקדמי של ה-HD MADI. יש להקפיד שהגישה אליו חופשית גם לאחר התקנת המכשיר.

18) אין להשתמש במכשיר כאשר טמפרטורת הסביבה עולה על 40°C .



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