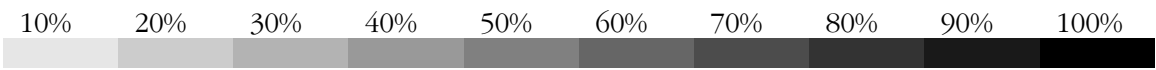




## Reference Manual

**ALESIS**

This page intentionally left blank



# Table Of Contents

<b>Introduction .....</b>	<b>3</b>
Welcome!.....	3
<b>About the ADAT AI4 .....</b>	<b>4</b>
Important Features of your AI4.....	4
<b>How to Use This Manual .....</b>	<b>6</b>
<b>Important Safety Instructions .....</b>	<b>7</b>
<b>Important Safety Instructions (English).....</b>	<b>7</b>
Safety symbols used in this product .....	7
Please follow these precautions when using this product:..	7
<b>Instructions de Sécurité Importantes</b>	
<b>(French).....</b>	<b>9</b>
Symboles utilisés dans ce produit .....	9
Veuillez suivre ces précautions lors de l'utilisation de	
l'appareil:.....	9
<b>Lesen Sie bitte die folgende</b>	
<b>Sicherheitshinweise (German) .....</b>	<b>11</b>
Sicherheit Symbole verwendet in diesem Produkt.....	11
Folgen Sie bitte diesen Vorkehrungen, wenn dieses	
Produkt verwendet wird:.....	11
<b>CE Declaration Of Conformity .....</b>	<b>13</b>
<b>FCC Compliance Statement .....</b>	<b>13</b>
<b>Getting Started .....</b>	<b>15</b>
Unpacking and Inspection .....	15
Mounting the AI4 .....	15
AC Power Hookup.....	15
Line Conditioners and Protectors .....	16
<b>Signal Connections .....</b>	<b>17</b>
AES/EBU Connections .....	18
ADAT Optical Connections.....	18
Word Clock Input.....	18
A Word About Digital Clocks .....	19
<b>Operation .....</b>	<b>21</b>
Selecting the AES/EBU Clock Source.....	21
Selecting the ADAT Optical Clock Source .....	22
<b>Applications.....</b>	<b>23</b>
Using an AES/EBU-equipped Digital Mixer with an	
HD24 .....	24
Using a Word Clock Generator .....	26
Using the Alesis MasterLink as a High-resolution	
Analog/Digital Converter with the ADAT HD24 .....	27
Using an Optical Digital Soundcard with a Digital Mixer	
and an Alesis MasterLink, Synced to Word Clock .....	27
<b>Troubleshooting .....</b>	<b>29</b>
Troubleshooting Index .....	29

## Table Of Contents

<b>Specifications.....</b>	<b>31</b>
Inputs .....	31
Outputs.....	31
Resolution.....	31
Mechanical .....	31
<b>Warranty/Contact Alesis.....</b>	<b>33</b>
Alesis Limited Warranty .....	33
Alesis Contact Information .....	33

# Introduction

## Welcome!

Thank you for making the Alesis ADAT AI4™ a part of your studio. Since 1984, we've been designing and building creative tools for the audio community. We believe in our products, because we've heard the results that creative people like you have achieved with them. One of Alesis' goals is to make high-quality studio equipment available to everyone, and this Reference Manual is an important part of that. After all, there's no point in making equipment with all kinds of capabilities if no one explains how to use them. So, we try to write our manuals as carefully as we build our products.

The goal of this manual is to get you the information you need as quickly as possible, with a minimum of hassle. We hope we've achieved that. If not, please drop us an email and give us your suggestions on how we could improve future editions of this manual.

We hope your investment will bring you many years of creative enjoyment and help you achieve your goals.

Sincerely,  
The people of Alesis

### About the ADAT AI4

Anyone who's ever tried to interconnect digital gear will tell you that digital connections aren't as simple as plugging two jacks together. Like people speaking different languages, various digital formats cannot talk to one another without some form of translation. The AI4 can convert up to eight channels of AES/EBU format signal to Alesis ADAT Optical format (and vice versa). Because these are two of the most popular formats in digital audio, the AI4 will let you interface a wide range of gear.

### Important Features of your AI4

#### ***Sample Rates of up to 96kHz***

In case you haven't noticed, sample rates are like the price of baseball tickets—they keep going higher. This is good news if your main interest is sound quality (and bad news if you like to sit behind the first base dugout). The AI4 can keep up with the emerging professional standard of 96 kHz, while maintaining compatibility with the still popular rates of 44.1 kHz, 48 kHz—and everything in between.

#### ***AES/EBU Ins and Outs***

The AI4 sports four XLR AES/EBU inputs and four XLR AES/EBU outputs; each carries a stereo signal. You can transmit/receive up to eight simultaneous channels at any sample rate between 44.1 kHz and 96 kHz.

#### ***Optical Interface***

The ADAT optical interface includes a pair of TOSLINK-style transmitters and two TOSLINK-style receivers. By dividing the connections into pairs, we're able to support eight channels of 24-bit audio at sample rates of up to 96 kHz.

#### ***BNC Word Clock Input***

The AI4 can sync up to a wide range of professional digital gear via industry standard Word Clock input. The AI4 can accept Word Clock of any frequency between 23kHz and 105kHz.

#### ***Independent Clocking Capabilities***

The AI4's AES-to-Optical and Optical-to-AES data paths have independent clocking capabilities. This allows the AI4 to act as two independent interfaces in one unit, routing separate and asynchronous signals through each data stream.

#### ***Front Panel Clock Selection***

The AI4 gives you front panel access to clock selection. Front panel LEDs indicate the current clock source, eliminating any confusion as to which devices are clock master and slaves in your studio.

## ***AES-to-Optical***

The AI4's AES-to-Optical section lets you choose either word clock or any of the four AES inputs as clock master. Use the front panel buttons to toggle among the clock source options. Corresponding LEDs illustrate the current clock source and sample rate.

## ***Optical-to-AES***

The AI4's Optical-to-AES section lets you choose either Optical input or the word clock input as clock master. As with the AES-to-Optical, front panel buttons let you select the clock source, and LEDs keep you informed about clock source and current sample rate.

## ***Simple User Interface***

Although it's built for professional use, the AI4's main mission is to simplify your life. Its straightforward user interface is designed to keep you working without having to dip into this manual very often.

## ***AI4 Key Features***

- 8 Channels of AES/EBU to ADAT Optical format conversion
- 8 Channels of ADAT Optical to AES/EBU format conversion
- Separate clocking for each format conversion
- Support for nominal sample rates from 44.1kHz to 96kHz
- BNC word clock input
- Simple user interface
- Internal Switching Power Supply supporting voltages ranging from 100-230V at 50/60 Hz
- Standard 1-U Rack Mount Design
- Front panel input and clock source selection

## How to Use This Manual

This manual is divided into the following sections describing the various functions and applications for the AI4. While it's always good idea to read through the entire manual once carefully, if you have a general knowledge of digital interfaces, feel free to jump to the table of contents and zone in on the features you need.

*Chapter 1: Getting Started.* Takes you through unpacking, inspecting, and mounting your AI4

*Chapter 2: Connections.* Details all the connections on your AI4

*Chapter 3: Operations.* Details each light and button on the AI4's front panel

*Chapter 4: Applications.* Shows you how to use the AI4 in your studio

*Chapter 5: Troubleshooting.* Problems and solutions, service information, and specifications.

*Helpful tips and advice are highlighted in a shaded box like this*



*When something important appears in the manual, an exclamation mark (like the one shown at left) will appear with some explanatory text. This symbol indicates that this information is vital when operating the AI4.*



# Important Safety Instructions

## Important Safety Instructions (English)

### Safety symbols used in this product



This symbol alerts the user that there are important operating and maintenance instructions in the literature accompanying this unit.



This symbol warns the user of uninsulated voltage within the unit that can cause dangerous electric shocks.



This symbol warns the user that output connectors contain voltages that can cause dangerous electrical shock.

### Please follow these precautions when using this product:



1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a damp cloth. Do not spray any liquid cleaner onto the faceplate, as this may damage the front panel controls or cause a dangerous condition.
7. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. When the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Use only attachments or accessories specified by the manufacturer.

Continued next page

## Important Safety Instructions



12. Use only with a cart, stand, bracket, or table designed for use with professional audio or music equipment. In any installation, make sure that injury or damage will not result from cables pulling on the apparatus and its mounting. If a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.



13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as when the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. This unit produces heat when operated normally. Operate in a well-ventilated area with at least six inches of clearance from peripheral equipment.
16. This product, in combination with an amplifier and headphones or speakers, may be capable of producing sound levels that could cause permanent hearing loss. Do not operate for a long period of time at a high volume level or at a level that is uncomfortable. If you experience any hearing loss or ringing in the ears, you should consult an audiologist.
17. Do not expose the apparatus to dripping or splashing. Do not place objects filled with liquids (flower vases, soft drink cans, coffee cups) on the apparatus.
18. **WARNING:** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

## Instructions de Sécurité Importantes (French)

### Symboles utilisés dans ce produit



Ce symbole alerte l'utilisateur qu'il existe des instructions de fonctionnement et de maintenance dans la documentation jointe avec ce produit.



Ce symbole avertit l'utilisateur de la présence d'une tension non isolée à l'intérieur de l'appareil pouvant engendrer des chocs électriques.



Ce symbole prévient l'utilisateur de la présence de tensions sur les raccordements de sorties, représentant un risque d'électrocution.

### Veillez suivre ces précautions lors de l'utilisation de l'appareil:



1. Lisez ces instructions.
2. Gardez ces instructions.
3. Tenez compte de tous les avertissements.
4. Suivez toutes les instructions.
5. N'utilisez pas cet appareil à proximité de l'eau.
6. Ne nettoyez qu'avec un chiffon humide. Il est potentiellement dangereux d'utiliser des pulvérisateurs ou nettoyeurs liquides sur cet appareil.
7. Installez selon les recommandations du constructeur.
8. Ne pas installer à proximité de sources de chaleur comme radiateurs, cuisinière ou autres appareils (dont les amplificateurs) produisant de la chaleur.
9. Ne pas enlever la prise de terre du cordon secteur. Une prise murale avec terre deux broches et une troisième reliée à la terre. Cette dernière est présente pour votre sécurité. Si le cordon secteur ne rentre pas dans la prise de courant, demandez à un électricien qualifié de remplacer la prise.
10. Évitez de marcher sur le cordon secteur ou de le pincer, en particulier au niveau de la prise, et aux endroits où il sort de l'appareil.
11. N'utilisez que des accessoires spécifiés par le constructeur.

Suite de la page suivante

## Important Safety Instructions



12. N'utilisez qu'avec un stand, ou table conçus pour l'utilisation d'audio professionnel ou instruments de musique. Dans toute installation, veillez de ne rien endommager à cause de câbles qui tirent sur des appareils et leur support.



13. Débranchez l'appareil lors d'un orage ou lorsqu'il n'est pas utilisé pendant longtemps.

14. Faites réparer par un personnel qualifié. Une réparation est nécessaire lorsque l'appareil a été endommagé de quelque sorte que ce soit, par exemple lorsque le cordon secteur ou la prise sont endommagés, si du liquide a coulé ou des objets se sont introduits dans l'appareil, si celui-ci a été exposé à la pluie ou à l'humidité, ne fonctionne pas normalement ou est tombé.

15. Puisque son fonctionnement normale génère de la chaleur, placez cet appareil au moins 15cm. des équipements périphériques et assurez que l'emplacement permet la circulation de l'air.

16. Ce produit, utilisé avec un amplificateur et un casque ou des enceintes, est capable de produire des niveaux sonores pouvant engendrer une perte permanente de l'ouïe. Ne l'utilisez pas pendant longtemps à un niveau sonore élevé ou à un niveau non confortable. Si vous remarquez une perte de l'ouïe ou un bourdonnement dans les oreilles, consultez un spécialiste.

17. N'exposez pas l'appareil à l'égoutture ou à l'éclaboussement. Ne placez pas les objets remplis de liquides (vases à fleur, boîtes de boisson non alcoolique, tasses de café) sur l'appareil.

18. **AVERTISSEMENT:** Pour réduire le risque du feu ou de décharge électrique, n'exposez pas cet appareil à la pluie ou à l'humidité.

## Lesen Sie bitte die folgende Sicherheitshinweise (German)

### Sicherheit Symbole verwendet in diesem Produkt



Dieses Symbol alarmiert den Benutzer, daß es wichtige Funktionen und Wartung Anweisungen in der Literatur gibt, die diese Maßeinheit begleitet.



Dieses Symbol warnt den Benutzer der nicht isolierten Spannung innerhalb der Maßeinheit, die gefährliche elektrische Schläge verursachen kann.



Dieses Symbol warnt den Benutzer, dem Ausgabestecker Spannungen enthalten, die gefährlichen elektrischen Schlag verursachen können.

### Folgen Sie bitte diesen Vorkehrungen, wenn dieses Produkt verwendet wird:



1. Lesen Sie die Hinweise.
2. Halten Sie sich an die Anleitung.
3. Beachten Sie alle Warnungen.
4. Beachten Sie alle Hinweise.
5. Bringen Sie das Gerät nie mit Wasser in Berührung.
6. Verwenden Sie zur Reinigung nur ein weiches Tuch. Verwenden Sie keine flüssigen Reinigungsmittel. Dies kann gefährliche Folgen haben.
7. Halten Sie sich beim Aufbau des Gerätes an die Angaben des Herstellers.
8. Stellen Sie das Gerät nicht in der Nähe von Heizkörpern, Heizungsklappen oder anderen Wärmequellen (einschließlich Verstärkern) auf.
9. Verfehlen Sie nicht den Zweck des grounding Terminals auf dem Netzstecker. Dieses Terminal wird für Ihre Sicherheit zur Verfügung gestellt.
10. Verlegen Sie das Netzkabel des Gerätes niemals so, daß man darüber stolpern kann oder daß es gequetscht wird.
11. Benutzen Sie nur das vom Hersteller empfohlene Zubehör.

Fortsetzung auf nächster Seite

## Important Safety Instructions



12. Verwenden Sie ausschließlich Wagen, Ständer, oder Tische, die speziell für professionelle Audio- und Musikinstrumente geeignet sind. Achten Sie immer darauf, daß die jeweiligen Geräte sicher installiert sind, um Schäden und Verletzungen zu vermeiden. Wenn Sie einen Rollwagen benutzen, achten Sie darauf, das dieser nicht umkippt, um Verletzungen auszuschließen.



13. Ziehen Sie während eines Gewitters oder wenn Sie das Gerät über einen längeren Zeitraum nicht benutzen den Netzstecker aus der Steckdose.
14. Die Wartung sollte nur durch qualifiziertes Fachpersonal erfolgen. Die Wartung wird notwendig, wenn das Gerät beschädigt wurde oder aber das Stromkabel oder der Stecker, Gegenstände oder Flüssigkeit in das Gerät gelangt sind, das Gerät dem Regen oder Feuchtigkeit ausgesetzt war und deshalb nicht mehr normal arbeitet oder heruntergefallen ist.
15. Dieses Gerät produziert auch im normalen Betrieb Wärme. Achten Sie deshalb auf ausreichende Lüftung mit mindestens 15 cm Abstand von anderen Geräten.
16. Dieses Produkt kann in Verbindung mit einem Verstärker und Kopfhörern oder Lautsprechern Lautstärkepegel erzeugen, die anhaltende Gehörschäden verursachen. Betreiben Sie es nicht über längere Zeit mit hoher Lautstärke oder einem Pegel, der Ihnen unangenehm ist. Wenn Sie ein Nachlassen des Gehörs oder ein Klingeln in den Ohren feststellen, sollten Sie einen Ohrenarzt aufsuchen.
17. Setzen Sie den Apparat nicht Bratenfett oder dem Spritzen aus. Plazieren Sie die Nachrichten, die mit Flüssigkeiten (gefüllt werden Blumenvases, Getränkdosen, Kaffeetassen) nicht auf den Apparat.
18. **WARNING:** um die Gefahr des Feuers oder des elektrischen Schlages zu verringern, setzen Sie diesen Apparat nicht Regen oder Feuchtigkeit aus.

### CE Declaration Of Conformity

See our website at:

<http://www.alesis.com>

### FCC Compliance Statement

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## Important Safety Instructions

This page intentionally left blank



## Unpacking and Inspection

Your AI4 was carefully packed at the factory, and the carton it came in was designed to protect it from the trials and tribulations of shipping. Keep the box and all the packing materials, so that in the unlikely event that you need to return the AI4 for servicing, you can do so safely.

Before you start plugging things in, take a minute to go through the contents of the container. You should find the following:

- The AI4 with the same serial number as shown on the shipping carton
- AC Power cable
- This manual (but then again, if the manual was missing, you wouldn't be reading this).

## Mounting the AI4

The AI4 can mount in any standard 19" rack. It doesn't have any special cooling requirements (other than those that apply to any piece of audio gear), and it's not especially sensitive to RF. You can position it near other digital gear such as computers, monitors, and disk recorders, without worry.

## AC Power Hookup

The AI4 has a universal power supply that can work with voltages ranging from 100 to 230V, 50 or 60 Hz. The unit ships with an IEC cable suitable for the country in which it was sold.

While there are no special requirements for powering the AI4, it's a good idea to make all the audio connections before powering the unit up. Plug the female end of the IEC power cord into the AI4's power socket. Plug the male end into a grounded power outlet. Like a VCR, the AI4 has a soft power switch that puts the unit into a low power, "standby" mode. To completely power off the AI4, you must unplug the unit. A more convenient way to completely power down is to plug the AI4 into a power strip equipped with a switch.



*It's a good idea to register your purchase now, before you get so wrapped up in what you're doing that you forget all about it. Please log on to our website [www.alesis.com](http://www.alesis.com) and follow the links for online registration.*



*Alesis cannot be responsible for problems caused by using the AI4 or any associated equipment with improper AC wiring. This is sensitive gear—take common sense precautions and you should be okay.*



## Line Conditioners and Protectors

Although the AI4 is designed to tolerate typical voltage variations, in today's world the voltage coming from the AC line may contain spikes or transients that can possibly stress your gear and, over time, cause a failure. There are three main ways to protect against this, listed in ascending order of cost and complexity:

### ***Line spike/surge protectors***

Relatively inexpensive, these are designed to protect against strong surges and spikes, acting somewhat like fuses in that they need to be reset or replaced if they've been hit by an extremely strong spike.

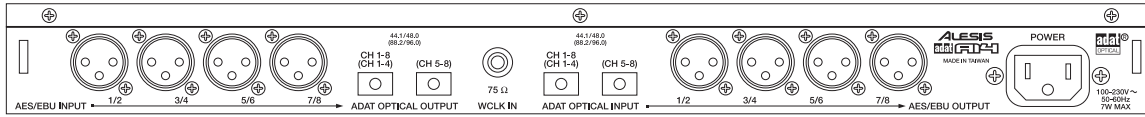
### ***Line filters.***

These generally combine spike/surge protection with filters that remove some line noise (dimmer hash, transients from other appliances, etc.).

### ***Uninterruptible power supply (UPS)***

This is the most sophisticated option. A UPS provides power even if the AC power line fails completely. Intended for computer applications, a UPS allows you to complete an orderly shutdown of a computer system in the event of a power outage, and the isolation it provides from the power line minimizes all forms of interference—spikes, noise, etc.

## 2 Signal Connections



Once you've got the AI4 safely mounted, it's time to cable in the rest of your gear. All connections are located on the back panel and fall into three categories:

### AES/EBU

AES/EBU is a standard digital connection used in many professional audio applications. Each AES/EBU line carries two channels of audio. You'll find AES/EBU connectors on outboard analog-to-digital converters, digital mixers, DAT and CD recorders, and other high-end digital audio devices.

### ADAT Optical

Also known in the industry as "Lightpipe," ADAT optical is the most popular multichannel digital audio interface in the world. In addition to support by all of Alesis' multitrack recorders, ADAT optical is widely supported by digital mixers, computer audio interfaces, third-party multitrack recorders, and even synthesizers and samplers.

### Word Clock

Word Clock has been described as a sort of digital "metronome" that can control sample timing. Although digital clock is transmitted over such connections as AES/EBU and ADAT Optical, some situations call for one central and stable clock. For example, if you're interconnecting more than two devices, you can use Word Clock as a central master to ensure that all of the connected units are receiving the same clock information at the same time.

### About Digital Audio Formats

*If you're new to digital audio formats, there are a couple of things you should know before proceeding (experts can skip this part). Each of the AI4's connections is designed to handle a specific signal format; they're not interchangeable with other formats, despite the fact that the connections may look similar. The AES/EBU connections, for example, use the same XLR connectors as balanced analog audio lines. But these jacks are not designed to handle analog signal. Optical connectors are sometimes used for stereo S/PDIF digital signals; again, the ADAT Optical connectors on your AI4 are not designed to handle S/PDIF. Connecting the wrong type of signal (for example a +4dBu analog line) can damage your AI4.*



## AES/EBU Connections

The AI4 uses standard XLR jacks for connecting to AES/EBU devices. Cables should conform to the AES3-1992 specification: shielded balanced lines with a nominal input impedance of 100 Ohms from 100kHz–2.288MHz.

The female jacks handle the incoming signal from AES/EBU compatible units such as digital mixers, A/D converters, DAT decks and others; the male jacks send outgoing signal to these same devices. Each AES/EBU jack handles two channels of digital audio.

You *can* connect the output of S/PDIF devices to the AI4's AES jacks, but these connections must still travel through a balanced line. We recommend using an impedance matching transformer to prevent reflections in the cable that can cause errors in the digital signal. S/PDIF signals that are routed to an AES connection may still produce errors.

## ADAT Optical Connections

The AI4's ADAT Optical connectors use the familiar TOSLINK-style transmitters, but they are somewhat different from conventional Lightpipe jacks.

Conventional ADAT Optical format can stream eight channels of 24-bit digital audio signal per cable. This standard works extremely well with sample rates of up to 48kHz. Examples of units using ADAT Optical connectors include the Alesis ADAT family of modular multitrack recorders; the Alesis ADAT Edit PCI computer audio interface; the ADAT HD24 24-track hard disk recording system; and a host of third-party digital soundcards, mixers, recorders, and A/D converters.

But in order for the AI4 to accommodate higher resolutions up to 96kHz, Alesis supports a "sample split" format that accepts four channels of 24-bit/96kHz audio per cable.

You have two options in setting up the AI4 for ADAT Optical. For signals with sample rates up to 48kHz, use the jacks labeled CH 1–8 (Ch 1–4). Signal coming from your source goes into the AI4's inputs; signal returning to the source goes to the AI4's outputs.

If you're working with higher resolutions, you'll divide the signal between two jacks. Route channels 1–4 to the CH 1–8 (Ch 1–4) jack; route channels 5–8 to the second jack, labeled (CH 5–8).

## Word Clock Input

In addition to routing and converting digital clock from any of the AES/EBU or ADAT Optical connectors, the AI4 can convert and route a master word clock to all connected digital audio devices. Connect the word clock output of the master clock source to the AI4's 75Ω BNC jack labeled World Clock In.

## A Word About Digital Clocks

In chapter four, we'll illustrate some applications for your AI4. But first, a brief explanation of digital clocks is in order. It's critical that every unit being connected with a digital connector like an ADAT Optical cable is running at the same clock speed.

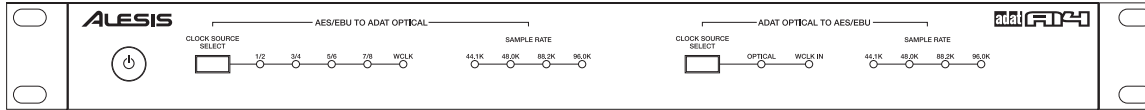
Digital audio signals like the ADAT Optical format are made up of digital sample words. Each word is a burst of numbers: a 24-bit, 48kHz signal is made up of a word 24 bits long, played 48,000 times every second. If the sending unit and the receiving unit aren't in perfect sync, the signal will be distorted. For example, if an ADAT was running at 48,000 samples per second (48kHz), and your digital mixer was running at 48,001 samples per second, you would hear a "click" when the samples didn't exactly line up.

The way to fix this is to set every unit in your studio to run from the same master clock. Whether it's an ADAT, computer-based editing workstation, digital mixer or DAT machine, you need to designate one unit in your studio as the master clock.

Every other digitally-connected unit needs to slave to this master. When routing signal between digital devices, the AI4 allows you to decide which device will be the master clock. Because you can change the clock source with a simple push of a button, you can decide which devices are masters and slaves as the situation warrants. Remember, though, that you also need configure to clock source of each device to the appropriate setting. The master device should be set to its internal clock; all other devices are slaves, and should be configured to sync to external clock.

Once you've cabled everything in, it's time to power up your gear. You can turn on your gear in any order, but note that whichever unit you've designated as clock source master must be turned on for the units designated as slaves to functions properly.

This page intentionally left blank.



Operation of the AI4 is extremely direct and straightforward. All the action starts—and ends—with the two Clock Source Select buttons. Press each button to cycle through the available clock sources at the respective AES/EBU and ADAT Optical inputs. The corresponding LEDs let you know which input is selected as the clock master, while the sample rate LEDs automatically indicate the incoming sample rate.

The AI4 routes and converts digital signal and digital clocks, but it isn't in itself a clock master. You must designate one device in your system as the master clock. The clock master can come from:

- Any of the AES/EBU inputs
- The ADAT Optical input
- The Word Clock input

Follow the manufacturer's instructions to set the clock status of the devices in your system. The master clock source can be connected to the AES/EBU, Word Clock, or ADAT Optical inputs.

## Selecting the AES/EBU Clock Source

The AI4's AES/EBU section can accept master clock from inputs 1/2, 3/4, 5/6, 7/8, or from the Word Clock input.

The front panel CLOCK SOURCE SELECT button toggles through these choices, lighting the CLOCK SOURCE LEDs to indicate which input is the active clock master.

When the selected input is receiving a valid clock, the CLOCK SOURCE LED will light green. If no valid clock source is present at the selected input, the LED will flash, and the outputs will be muted.

The SAMPLE RATE LED indicates the detected incoming nominal sample rate. If the actual sample rate is more than 2% different from the nearest nominal, the LED representing the closest match will flash.



## Selecting the ADAT Optical Clock Source

Clock source selection in the ADAT Optical section is similar to that in the AES/EBU section. Use the CLOCK SOURCE SELECT button to toggle between Optical and Word Clock inputs.

As above, the CLOCK SOURCE LEDs show which source is active, and flash if no valid clock is present. The SAMPLE RATE LEDs light solid to indicate the nominal sample rate. If the incoming sample rate deviates from the nominal by more than 2%, the LED indicating the closest matching nominal sample rate will flash.

If the Optical source is in a 96kHz sample split format—but doesn't fully comply with the Alesis spec by setting the appropriate user bit—you can "force" the AI4 to interpret it as 96kHz instead of 48kHz (or 88.2kHz instead of 44.1kHz) by pressing and holding the ADAT OPTICAL to AES/EBU CLOCK SOURCE SELECT button.

*If you're using a word clock generator to provide a stable master clock to all of your digital gear, you should select WORD CLOCK as the master clock, both for the AES/EBU and the ADAT Optical connections. See page 17 for more.*

### **ADAT Optical Signal Flow and the AI4**

*The AI4 can interface with one ADAT Optical device at a time. You cannot daisy-chain ADAT Optical-equipped devices connected to the AI4*



In the previous section, we discussed how you can cable in and set up your AI4. Now it's time to learn what you can do with it. Although the AI4 doesn't do much on its own, it *does* allow you to get the most out of the other digital audio gear in your studio.

The AI4 may have a simple user interface, but it's capable of solving a number of complex problems. It acts as your studio's digital Grand Central Terminal, routing signal to and from a number of destinations.

The best part of the AI4 is the way it allows otherwise incompatible devices to interact. You can use it to mate an AES-equipped digital mixer to a device with ADAT Optical inputs; use an AES equipped A/D converter to provide digital signal to an optical device (or vice-versa); sync devices (that would otherwise not recognize it) to word clock, and more. No matter what your studio configuration, if you're combining AES and optical inputs (as well as word clock), the AI4's stability and flexibility will save you time and frustration.

The AI4's clocking capabilities can help prevent common digital sync problems that can cause noise, dropouts, or other annoying artifacts. Once all your gear is following the same clock source, your audio should stream error free.

The configurations illustrated on the following pages show just a few of the applications for your AI4. Use them as a reference when cabling in your own gear.



## Using an AES/EBU-equipped Digital Mixer with an HD24

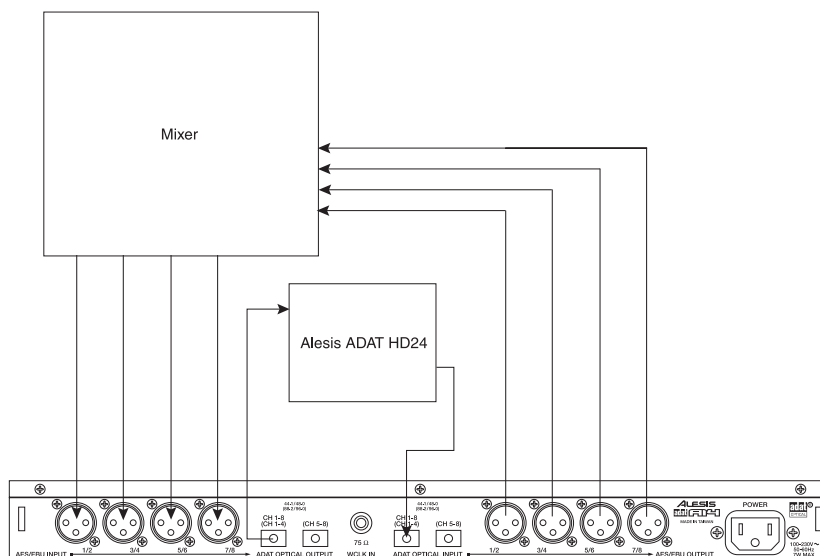
The AI4 can interface with the Alesis HD24 at sample rates of 44.1kHz, 48 kHz, 88.2kHz and 96kHz. In order to use the higher sample rates, you must make *two* optical connections to accommodate eight channels of audio. Each optical connection carries four channels of high-resolution audio.

### To route a 44.1 or 48 kHz signal through the AI4 to the ADAT HD24

1. Connect the mixer's AES/EBU outputs to the AI4 AES/EBU inputs.
2. Connect the AI4's Optical output 1–8 to ADAT HD24 Optical input 1–8
3. Set the mixer to internal clock the appropriate sample rate
4. On the HD24, select a new song and select the appropriate sampling rate
5. On the HD24, set input to DIGITAL INPUT; set master clock source to OPTICAL
6. Set the AI4's clock source to match that of the incoming signal

### To route a 44.1 or 48 kHz signal through the AI4 to an AES/EBU mixer

1. Connect the mixer's AI4 AES/EBU outputs to the mixer's AES/EBU inputs.
2. Connect to ADAT HD24 Optical output 1–8 to the AI4's Optical inputs 1–8
3. Set the AI4's clock source to match that of the incoming signal

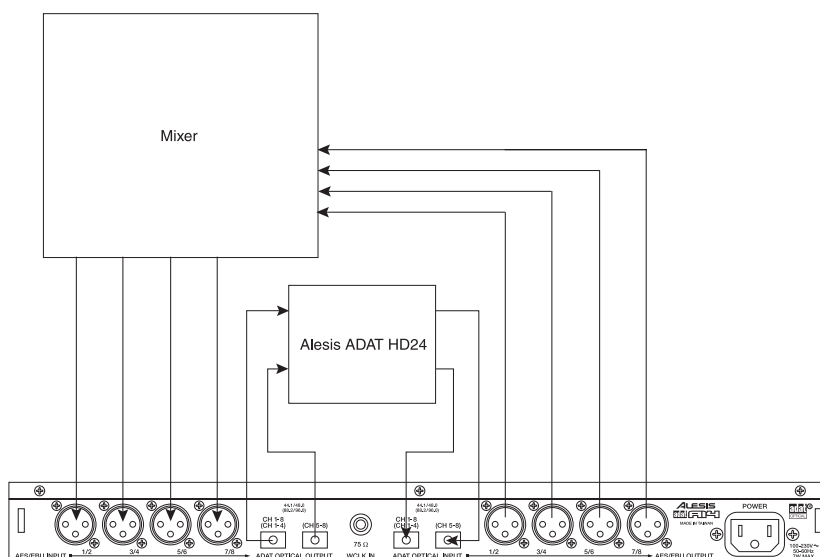


### **To route a high-resolution signal through the AI4 to the ADAT HD24**

1. Connect up to four of the mixer's AES/EBU outputs to the AI4's AES/EBU inputs
2. Connect the AI4's Optical output 1–4 to the ADAT HD24's Optical input 1–8
3. Connect the AI4's Optical output 5–8 to the ADAT HD24's Optical input 8–16
4. Set the mixer's clock to INTERNAL and choose the appropriate sample rate
5. On the HD24, select a new song and select 96kHz as the sampling rate
6. On the HD24, set input to DIGITAL INPUT; set master clock source to OPTICAL
7. Set the AI4's clock source to the AES/EBU input providing the master clock

### **To route a high-resolution signal through the AI4 to an AES/EBU mixer**

1. Connect up to four of the AI4's AES/EBU outputs to the mixer's AES/EBU interface
2. Connect the HD24's Optical outputs 1–8 to the AI4's Optical inputs 1–4
3. Connect the HD24's Optical outputs 9–16 to the AI4's Optical inputs 5–8
4. Set the HD24's clock source to INTERNAL
5. Set the Digital Mixer's clock source to AES/EBU
6. Set the AI4's clock source to OPTICAL.

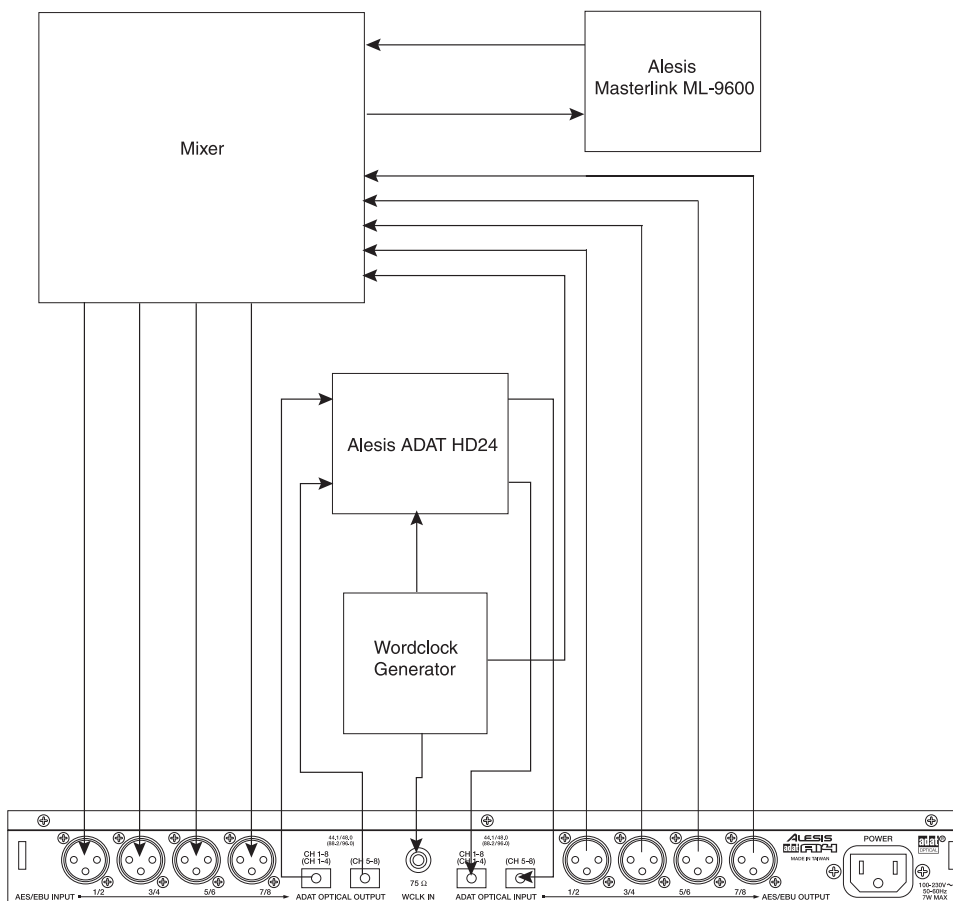


## Using a Word Clock Generator

Many professional studios use word clock as a stable master to keep all their digital gear in proper sync. This is especially important if you're connecting more than two pieces digital audio gear.

You can connect your digital audio devices as you would in any other studio configuration. In addition, you need to do the following

1. Connect the word clock generator to the Word Clock input using a standard 75Ω BNC cable
2. Set the AES/EBU device *and* the optical device (in this case, the mixer and the HD24) to slave to external clock
3. On the AI4, set the clock source to WORD CLOCK for both the AES/EBU and ADAT Optical sections



## Using the Alesis MasterLink as a High-Resolution Analog/Digital Converter with the ADAT HD24

In addition to its capabilities as a mixdown and mastering device, you can use the Alesis MasterLink as a high-resolution front end A/D converter and master clock.

1. Connect the MasterLink's AES/EBU output to the AI4's AES/EBU inputs 1/2
2. Connect the AI4's Optical outputs 1–8 (Ch 1–4) to the HD24 Optical inputs 1–8 (Ch 1–4)
3. On the MasterLink, set input source to ANALOG
4. Set the clock source on the HD24 to OPTICAL
5. Set the AI4 Clock Source to AES 1/2
6. Set up the HD24 to record high-resolution signal as detailed in the HD24 manual

## Using an Optical Digital Soundcard with a Digital Mixer and an Alesis MasterLink, Synced to Word Clock

1. Connect the soundcard's Optical inputs and outputs to the AI4's optical outputs and inputs respectively
2. Connect one of the AI4's AES/EBU outputs to the MasterLink's AES/EBU input
3. Connect up to three additional AI4 AES/EBU outputs to the AES inputs of the digital mixer
4. Connect The MasterLink's and the mixer's digital outputs to the respective AES/EBU inputs on the AI4
5. Connect the word clock generator to the AI4's Word Clock input
6. On the soundcard, set clock source to OPTICAL
7. On the MasterLink, set input to DIGITAL
8. On the mixer, set clock source to AES/EBU
9. On the AI4, set clock source to WORD CLOCK for both AES/EBU and ADAT Optical sections

This page intentionally left blank

## Troubleshooting Index

If you are experiencing problems while using the AI4, please use the following table to locate possible causes and solutions before contacting Alesis customer support for assistance

Symptom	Cause	Solution
Display does not light when power button is pressed	No Power	Check that power cable is plugged in properly
No Signal going to the ADAT Optical Output	No clock coming into the selected AES/EBU input	Change the AES/EBU Clock source select; check the clock settings on AES/EBU source device
No Signal at the AES/EBU Outputs	No clock coming into the ADAT Optical input	Make sure the AI4's optical clock source is set correctly; check the clock settings on the source Optical device
No signal at any outputs when source is set to word clock	Word clock generator not transmitting signal	Check that the word clock generator is powered on and configured correctly
Pre-recorded audio plays at the wrong speed	Incorrect sample rate settings	Check that the word clock generator is powered on and configured correctly
Pops, clicks, and signal drifting out of sync	Two running on their internal clocks	Designate one device as the clock master and <i>all</i> other device(s) as clock slaves
Unit does not respond to front panel controls	Unknown software conflict, Chubacabra, or static electricity	Unplug the AI4 to hard power down and power up

# 5

## Troubleshooting

This page intentionally left blank



# Specifications

## Inputs

AES Input Channels	8
AES Input Channels	4 XLR Connectors
ADAT Optical Input Channels	8
ADAT Optical Input	2 TOSLINK Optical Connectors
Word Clock	1 75Ω BNC Connector

## Outputs

AES Output Channels	8
AES Output Channels	4 XLR Connectors
ADAT Optical Output Channels	8
ADAT Optical Output	2 TOSLINK Optical Connectors

## Resolution

Bit Depth	Up to 24-bit (source dependent)
Sample Rates (normal)	32kHz–52kHz (source dependent)
Sample Rates (High Resolution)	52kHz–105kHz (source dependent)

## Mechanical

Size	1.75" H x 19.0" W x 5.8" D (45mm H x 483mm W x 147mm D)
Rack Spaces	1 Space
Weight	3lb 15oz (1.8kg)
Power Consumption	10 Watts max (100–230VAC/50–60Hz) 5 Watts max in standby mode

## Specifications

This page intentionally left blank

# Warranty / Contact Alesis

## Alesis Limited Warranty

ALESIS CORPORATION ("ALESIS") warrants this product to be free of defects in material and workmanship for a period of one (1) year for parts and for a period of one (1) year for labor from the date of original retail purchase. This warranty is enforceable only by the original retail purchaser and cannot be transferred or assigned.

The purchaser should complete and return the enclosed warranty card within 14 days of purchase. During the warranty period ALESIS shall, at its sole and absolute option, either repair or replace free of charge any product that proves to be defective on inspection by ALESIS or its authorized service representative. In all cases disputes concerning this warranty shall be resolved as prescribed by law. To obtain warranty service, the purchaser must first call or write ALESIS at the address and telephone number printed below to obtain a Return Authorization Number and instructions concerning where to return the unit for service. All inquiries must be accompanied by a description of the problem. All authorized returns must be sent to ALESIS or an authorized ALESIS repair facility postage prepaid, insured and properly packaged. Proof of purchase must be presented in the form of a bill of sale, canceled check or some other positive proof that the product is within the warranty period. ALESIS reserves the right to update any unit returned for repair. ALESIS reserves the right to change or improve design of the product at any time without prior notice.

This warranty does not cover claims for damage due to abuse, neglect, alteration or attempted repair by unauthorized personnel, and is limited to failures arising during normal use that are due to defects in material or workmanship in the product.

THE ABOVE WARRANTIES ARE IN LIEU OF ANY OTHER WARRANTIES OR REPRESENTATIONS WHETHER EXPRESS OR IMPLIED OR OTHERWISE, WITH RESPECT TO THE PRODUCT, AND SPECIFICALLY EXCLUDE ANY IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY OR OTHER IMPLIED WARRANTIES. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

IN NO EVENT WILL ALESIS BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL, INDIRECT OR OTHER DAMAGES RESULTING FROM THE BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, INCLUDING, AMONG OTHER THINGS, DAMAGE TO PROPERTY, DAMAGE BASED ON INCONVENIENCE OR ON LOSS OF USE OF THE PRODUCT, AND, TO THE EXTENT PERMITTED BY LAW, DAMAGES FOR PERSONAL INJURY. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. THIS CONTRACT SHALL BE GOVERNED BY THE INTERNAL LAWS OF THE STATE OF CALIFORNIA WITHOUT REFERENCE TO CONFLICTS OF LAWS. This warranty gives you specific legal rights, and you may also have other rights required by law which vary from state to state.

This warranty only applies to products sold to purchasers in the United States of America or Canada. The terms of this warranty and any obligations of Alesis under this warranty shall apply only within the country of sale. Without limiting the foregoing, repairs under this warranty shall be made only by a duly authorized Alesis service representative in the country of sale. For warranty information in all other countries please refer to your local distributor.

*For more effective service and product update notices, please register your AI4 online at:*

<http://www.alesis.com/support/warranty.htm>

## Alesis Contact Information

Alesis Distribution, LLC  
Los Angeles, USA

E-mail: [support@alesis.com](mailto:support@alesis.com)  
Website: <http://www.alesis.com>

Alesis AI4 Reference Manual  
Revision 1.0 by Emile Menasché

Copyright 2002, Alesis Distribution, LLC. All rights reserved  
Reproduction in whole or in part is prohibited. "AI4" is a trademark of Alesis Distribution, LLC. Specifications subject to change without notice.

7-51-0123-A  
4/30/02