MDR 24/96

Operation Guide

24 TRACK/24 BIT, DIGITAL AUDIO HARD DISK RECORDER

MACKIE®

The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure, that may be of sufficient magnitude to constitute a risk of electric shock to persons.

Le symbole clair avec point de fl che l'int rieur d'un triangle quilat ral est utilis pour alerter l'utilisateur de la pr sence l'int rieur du coffret de "voltage dangereux" non isol d'ampleur suffisante pour constituer un risque d' l ctrocution.

The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Le point d'exclamation l'int rieur d'un triangle quilat ral est employ pour alerter les utilisateurs de la pr sence d'instructions importantes pour le fonctionnement et l'entretien (service) dans le livret d'instruction accompagnant l'appareil.

Important Safety Instructions

1. Read instuctions — Read, understand and follow all safety and operating instructions before using the MDR24/96.
2. Retain Instructions — Keep these safety and operating instructions for future reference.
3. Heed Warnings — Follow all warnings on the MDR24/96 and in these operating instructions.
4. Water and Moisture — Do not use the MDR24/96 near water – for example, near a bathtub, kitchen sink, garden hose, incontinent poodle, sweaty drummer, etc. – or when condensation has formed on the unit.
5. Heat and Ventilation — Locate the MDR24/96 away from heat sources such as radiators, campfires, compost pits, heliarc welders, magma flows, etc. Do not block MDR24/96 ventilation openings or install in spaces that prevent adequate air circulation to the unit.
6. Power Sources — Connect the MDR24/96 only to a power source of the type described in these operating instructions or as marked on the MDR24/96.
7. Power Cord Protection — Route power supply cords so that they are not likely to be walked upon, tripped over, or abraded by items placed upon or against them. Pay particular attention to cords at plugs, convenience receptacles, and the point where they exit the MDR24/96.
8. Object and Liquid Entry — Do not drop objects or spill liquids into the MDR24/96. Clean only with a damp cloth; do not clean with liquid or aerosol cleaners.
9. Attachments — Use the MDR24/96 with only the accessories specified in this manual.
10. Damage Requiring Service — The MDR24/96 should be serviced only by qualified service personnel when:
    A. The power supply cord or the plug has been damaged; or
    B. Objects have fallen onto, or liquid has spilled into the unit; or
    C. The unit has been exposed to rain or water; or
    D. The unit does not appear to operate normally or exhibits a marked change in performance; or
    E. The unit has been dropped, or its chassis damaged.
11. Servicing — Do not attempt to service the MDR24/96. All servicing should be referred to the Mackie Service Department.
12. Lightning — Unplug the MDR 24/96 during lightning storms or when unused for long periods of time.
13. Grounding and Polarization — To prevent electric shock, do not use the MDR24/96 polarized plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure. Do not defeat the MDR24/96 grounding by plugging into an ungrounded receptacle or ground lift adapter.

This apparatus does not exceed the Class A/Class B (whichever is applicable) limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

ATTENTION — Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant las limites applicables aux appareils numériques de class A/de class B (selon le cas) prescrites dans le réglement sur le brouillage radioélectrique édicté par les ministere des communications du Canada.

FCC Information

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital devices, 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 installation. 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.

CE This product has been tested and complies with the following standards and directives as set forth by the European Union:

* EN 55022 Radiated and Conducted Emissions
* EN 61000-4-2 Electrostatic Discharge Immunity
* EN 61000-4-3 RF Electromagnetic Fields Immunity
* EN 61000-4-4 Electrical Fast Transient/Burst Immunity
* EN 60950/IEC 950 Electrical Safety Requirements

WARNING — To reduce the risk of fire or electric shock, do not expose this appliance to rain or moisture.

WARNING — Before applying power to the MDR24/96, make sure that the Voltage Selector switch next to the AC inlet jack on the rear panel is set to the line voltage used in your region. Powering-on the MDR24/96 with the Voltage Selector switch set incorrectly will cause an electrical and fire hazard that may result in irreparable damage to the unit.

Contents

Please write your serial number here for future reference:

Purchased at:

Date Of Purchase:

Manual Part No. 0000107 Rev. B 10/02

Introduction

Save your Box!

Uncle Jeff's Bottom Ten Reasons to Save the Box:

10. You think boxes grow on trees?
9. It's actually a time capsule, packed with a biological code that can't be decrypted until 2043.
8. Its festive graphics will cheer up those other boxes forgotten in your attic.
7. Impress your friends: tape it up and pretend that you actually have two MDR24/96s.
6. If you throw it away, bad people will know you have a studio in your house.
5. Someday, when paper costs more than steel, it could net you a fortune.
4. The MDR24/96 itself only costs $47.95. The balance is what you paid for the box.
3. Properly sealed, it can be used as a flotation device in the unlikely event of a water landing.
2. It's a great place to hide your old digital 8-track recorder.
1. If you collect ten MDR24/96 boxes, Greg will come over for dinner (this offer does not apply to dealers or distributors).

In the unlikely event that you should need to send the MDR24/96 back to Mackie for service, please use the shipping box it came in. This box has been specially designed to minimize damage to the MDR24/96 during shipping, so that it won't end up more broken than when you sent it.

How To Use This Guide

Welcome to the cutting edge of affordable multitrack recording and editing! We know you're feeling eager, but please take some time to read this Operation Guide before you jump into your first MDR24/96 session. The first part of this guide explains how to install and configure the various MDR24/96 I/O cards and connect the MDR24/96 to an analog or digital console. The second part describes how to start a session, operate the basic transport and monitoring controls, and explains the terms and conventions used to name, store, and retrieve projects on disk. Then the appendices contain information on troubleshooting and service, upgrading the software, cabling, and networking.

Updated manuals and the latest software releases can be obtained from Mackie's website at: www.mackie.com.

Conventions

The MDR24/96 Quick Start Guide uses the following conventions to help you find information quickly:

Text Conventions

a) File or folder names (example: *C:\HDR Projects\Ode To Masters\Ode To Masters.hdr*)
b) Software or hardware controls (example: **Punch**)
c) Proper names of objects on front/rear panel (example: **PLAY**)

Icons

This icon identifies in-depth explanations of features and practical tips. Though not required reading, they do offer some choice tidbits of knowledge that will leave you wiser for the reading.

This icon identifies information that is critically important to the operation of the MDR24/96. So for your own sake, please read these sections.

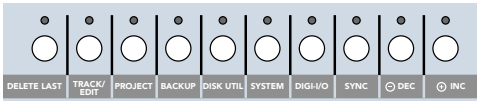
Front Panel User Interface Conventions

Most of the buttons on the front panel need no explanation (don't worry, we'll explain them anyway). The display (LCD) and the buttons immediately below it control the computer that's at the heart of the MDR24/96. Once you understand the functions, you'll find them to be intuitive.

Originally we plopped all of the controls onto the MDR24/96 front panel and found that after a while, it was entirely filled with buttons. So we decided to lose a few along the way, and hide the ones that were used less frequently (as often as you visited Aunt Sadie) somewhere under an LCD menu. To make up for missing buttons and the need for a road map, we stuck in a few Go Here and Go There buttons and here's what we came up with:

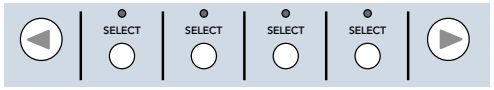
System Control Buttons

Most of the group of buttons immediately above the transport ("tape deck") controls open menus in the LCD. These are the entry points to the LCD menus and are called System Control buttons.



Page Left and Page Right Buttons

The large < and > buttons are page navigators. If a menu consists of more than one page, the top line on the 24 character by 4 line LCD readout will display a ← or → in the upper left or upper right corner to indicate the direction in which you may page to find more choices within that menu.



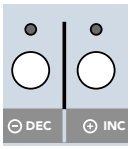
Select Buttons

The four **SELECT** buttons under the LCD are aligned under text describing the choices available within that menu. Examples include **Exit**, confirmation (**OK**), increment or decrement a number, scroll through choices, or advance through operational tiers ("follow the signs, you won't get lost"). Select buttons are soft buttons whose function changes depending on the operation you're performing.

Pairs of **SELECT** buttons with << >> displayed above them are used to select among choices or move a cursor '**v**' through a text field. The **(–)DEC** and **(+)INC** (decrement and increment) buttons scroll through choices in the active field. Sometimes they duplicate the << >> buttons and, at other times, they interact, where the << >> buttons select the character that will be changed by the **DEC** and **INC** buttons.

Pressing the **SELECT** button labeled **OK** in the display performs the menu operation in process. There's usually a button labeled **Cancel** should you decide not to complete an operation. Pressing any menu button will also back out without performing the operation.

Front Panel Display and Controls



The **(–)DEC** and **(+)INC** (decrement and increment) buttons are used to modify an alphabetical or numerical parameter displayed in the LCD such as Project Name or Time Code Offset. If the red LEDs above the buttons are glowing, they're active. Generally you can tell that a character can be edited with the **(–)DEC** and **(+)INC** buttons if it's sitting above a pair of << >> characters. The Select buttons below the << >> characters move a '**v**' cursor along numeric field, indicating which character will be changed by pressing the **(–)DEC** and **(+)INC** buttons.

Any time you're working in a menu, LED's will illuminate above any button that does something within that menu. Some operations, particularly those which could be disastrous like deleting data that can't be recovered, offer you a **Cancel** option, allowing you to quit without changing anything.

Depending on the menu and how many layers it has, **Exit** or **Cancel** may bring you back to a previous menu or all the way back to the top. You can also leave the menu by pressing the button that got you there (its red LED will be lit to remind you where you are), or by pressing the left < button when the ← symbol isn't displayed. You need not completely exit one menu before moving to another; just press another menu button to jump into a new menu.

Note: Whether or not a "Cancel" or "Exit" prompt appears above a SELECT button, it's okay to jump directly to one of the other top level menus without responding to a prompt. It's a quick "bail out" in case you've discovered that you're in the wrong menu for what you want to accomplish. Skipping an OK, Cancel, or Exit prompt will not harm or hang the MDR24/96.

Transport Controls

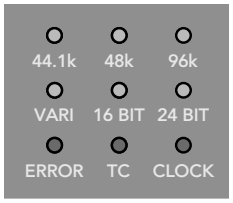
Transport operating controls are described in detail in other sections of this manual, so they won't be repeated here. This section describes the front panel displays and the setup and system function buttons located below the LCD.

Current Time Display

Current transport time is displayed in either Hours:Minutes:Seconds:Frames (SMPTE time) or musical score position in Bars:Beats:Ticks (BBT) if you are working on a project brought over from an HDR24/96. The project must be displaying BBT when last saved on the HDR. The display cannot be changed from the MDR24/96 directly.

In BBT mode, the front panel display only shows tick numbers when the transport is stopped. When running, the Ticks field contains hyphens (- -). Leading spaces in the Bars field are also filled with hyphens, as: - - 73:04:45. Bar numbers greater than 999 are displayed as hyphens. However, the display still counts beats (01 through 04) while the transport is running.

Status LEDs



The group of LEDs to the left of the time code display indicates the state of several of the current setup options.

- **44.1k**, **48k** and **96k** LEDs indicate the selected sample rate.
- **VARI** indicates that the sample rate is controlled by an external word clock source or video sync signal.
- **16 BIT** and **24 BIT** indicate the selected word length.
- **ERROR** indicates a clock or synchronization error; for example, a word clock frequency that is out of range.

TC indicates that the transport is receiving acceptable time code. This LED is only active when the MDR24/96 is set to chase time code. The LED blinks when time code is expected but is either not present or at the incorrect frame rate. When everything is in order with time code synchronization, it will be on.

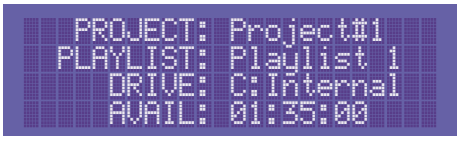
CLOCK indicates that a proper data clock signal is being received. It blinks if the MDR24/96 is expecting an external clock and it's not present. If all is well, when Internal clock is selected, the **CLOCK** LED will be on.

Front Panel Alphanumeric Display (LCD)

The front panel LCD, when not performing a setup or utility operation, is an informative summary of the current project. A screen saver blanks the display after ten minutes of display inactivity. To re-activate it, press one of the large < > buttons or any menu button.

Project Information Display

The following information is displayed on the MDR24/96 hardware front panel display after boot-up and whenever any front panel operation is exited.

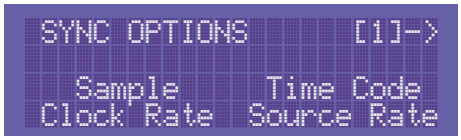


PROJECT: [Name of the currently loaded project]
PLAYLIST: [The currently loaded playlist version]
DRIVE: [The disk drive containing the Project — Internal or External]
AVAIL: [The amount of recording time left on the disk]

The MDR 24/96 allows only one playlist. If a project is brought from an HDR24/96, the last active playlist is used (you are not able to switch to other playlists from the MDR24/96).

Menu/Status Display

The LCD indicates menu choices and displays status information when a time-consuming operation, such as disk formatting or file copy is in process. The large < and > buttons scroll through the menu horizontally if there are more choices within the current level menu than can be displayed in the available display area. An arrow ← or → at the top corner of the display indicates that more choices are available, and in which direction to scroll in order to view them.



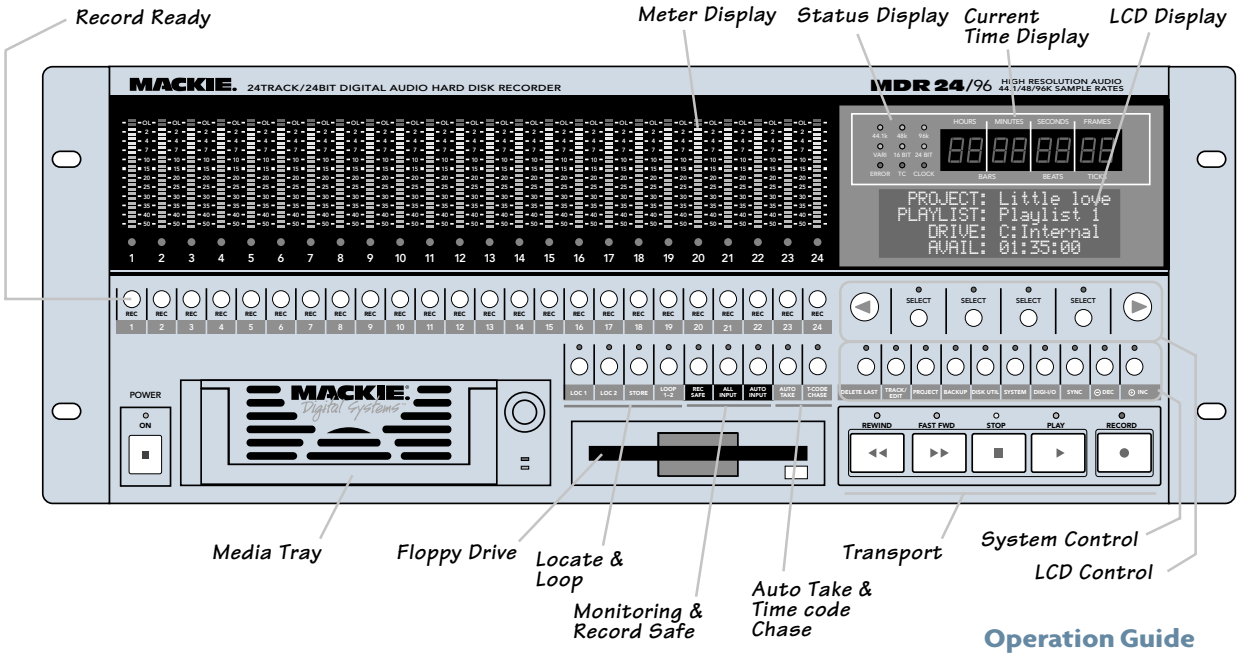
About "Tape"

No, you're not reading the wrong manual. Our goal was to build a hard disk recorder that is comfortable for someone familiar with tape recording, but that doesn't require you to get a brain transplant from a computer geek to use. When familiar terms such as Tape Inputs, Tape Returns, Transport, and the like are applied to the MDR24/96, they mean exactly what you expect them to mean. Where the well-worn shoe fits, we continue to wear it.

Overview

By combining traditional multitrack tape recording features with the power and flexibility of hard disk recording, the Mackie Designs MDR24/96 takes multitrack recording to a level never before achieved by a product in its price range. In addition to the standard battery of traditional tape-based features, the MDR24/96:

- Combines the familiarity of a multitrack tape machine with the security of non-destructive recording and non-degrading recording media.
- Records simultaneously on all 24 tracks at 44.1 or 48 kHz and on 12 tracks at 88.2 or 96 kHz. At 48 kHz the internal hard drive stores over 2200 track-minutes of 24-bit audio (90 minutes of 24 full tracks). That's more than six reels of 2-inch tape at 30 inches per second! At 96 kHz the drive stores 1100 track-minutes of 24-bit audio (45 minutes of 24 full tracks).
- Has eight Virtual Takes per track, allowing you to record multiple passes without having to change routing and bussing assignments or use additional tracks.
- Iinterfaces with any analog or digital console. The MDR24/96 uses the same I/O cards as the Mackie Digital 8•Bus console: the AIO•8 (24-bit analog A/D and D/A), DIO•8 (TDIF/ADAT Optical), PDI•8 (AES/EBU), OPT•24 and low-cost OPT•8 (ADAT Optical).
- Provides three convenient methods of backup: Mackie Media M•90, a removable hard drive (also capable of 24-track recording and playback), Mackie Media PROJECT, a removable drive using inexpensive, removable 2.2 GB ORB cartridges; and data transfer to another computer through the MDR24/96's 100 Base-T Ethernet port via the built-in FTP server.
- Offers two optional remote control devices — the compact Remote 24 for smaller project studios, and the full-featured Remote 48 for controlling up to 48 tracks on two MDR24/96 recorders.



Setup and Configuration

This chapter explains how to set up and configure the MDR24/96 for use in your studio. Two application examples show how to interface the MDR24/96 with analog and digital recording consoles.

Required Equipment

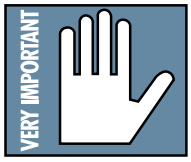
Of course, there's more to a studio than a recorder and some musicians. At a minimum, you'll need the following to make the MDR24/96 feel at home:

- Three Mackie 8-channel I/O (input/output) cards.
- A console with a minimum of 24 tape sends (buses or direct outputs) and returns (line inputs or monitor returns). If your analog console has only 8 tape sends, use Y-cord splitters to send Tape Out 1 to MDR24/96 Inputs 1, 9 and 17; Tape Out 2 to MDR24/96 Inputs 2, 10, and 18, and so forth.
- Cables to connect the MDR24/96 to the console: 3 or 6 multi-channel snakes or fiber optic cables, depending on your I/O setup.
- All the stuff that typically connects to a console: microphones, instruments, outboard equipment, control room monitors, and so on.

Installation

This section describes how to install the I/O cards and how to connect the MDR24/96 to your console. Before you begin, you should choose a location for your MDR24/96 considering the following:

- If you're not using the Remote 24 or Remote 48, position the front panel within convenient reach of your normal recording/mixing position. Be aware that although analog and AES/EBU cables can be fairly long, TDIF and Remote 24/Remote 48 cables are limited to about 10 meters. ADAT Optical cables can reach up to about 15 meters.
- The MDR24/96 requires a reliable AC power source with a good ground. Do not use a ground lift adapter or plug the MDR24/96 into an ungrounded receptacle. Remember, this is a computer. Using an uninterruptible power supply (UPS) to power the MDR24/96 is a good idea to avoid an unexpected shutdown and protect it from transient line voltages.



Warning!

Before applying power to the MDR24/96, make sure that the Voltage Selector switch next to the AC inlet jack on the rear panel is set to the line voltage used in your region. Powering-on the MDR24/96 with the Voltage Selector switch set incorrectly can cause an electrical and fire hazard that may result in irreparable damage to the unit.

I/O Cards and Cables

While the MDR24/96 ships with AIO•8 cards already installed, three other flavors of I/O cards are also available. All I/O cards can be mixed and matched in any combination.

AIO•8

- Each AIO•8 provides 8 analog line-level inputs and outputs on two 25-pin D-subminiature (DB25) connectors. These connectors are pin-for-pin compatible with the analog (not TDIF) DB25 connectors found on the TASCAM DTRS recorders. DB25 cables that break out to XLR or 1/4" TRS connectors for mating with your console are readily available.

DIO•8

- Each DIO•8 provides 8 digital inputs and outputs in two formats:

  1. TASCAM Digital Interface (TDIF) provides 8 input and output channels of digital audio on a single DB25 connector. It requires a TASCAM PW-88D or equivalent TDIF-compatible cable.

  2. ADAT Optical provides 8 channels of digital audio on fiber-optic cable. Two optical cables are required for each card, one for inputs, the other for outputs. Both cables must connect to the same device, creating a closed loop.

  3. The DIO•8 also provides a TDIF word clock sync output for use with older TASCAM equipment.

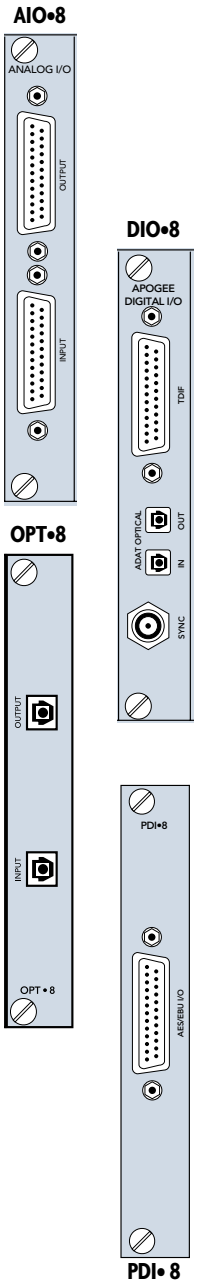
OPT• 8

- The OPT•8 is a low-cost, ADAT Optical-only version of the DIO•8 card. The previous ADAT information also applies to this card.

PDI• 8

- Each PDI•8 carries four stereo pairs (eight channels) of digital input and output on a single DB25 connector. This card supports the AES/EBU (IEC-958 Type 1) digital interfacing standard carrying two channels of digital audio on a single balanced cable. The PDI•8 can also be configured for the consumer (IEC-958 Type 2, or S/PDIF) data format if required. DB25 cables that break out to XLR connectors, and double-ended DB25 to DB25 AES/EBU cables for mating with your console, are readily available.

  The PDI•8 is the only Mackie I/O card that currently supports 88.2 or 96 kHz operation. At these sample rates, the PDI•8 card runs in “double-wide” (dual-wire) mode. In double-wide mode, the PDI•8 carries four mono channels of digital I/O by transmitting two consecutive 88.2/96k samples of the same channel on a single conductor.

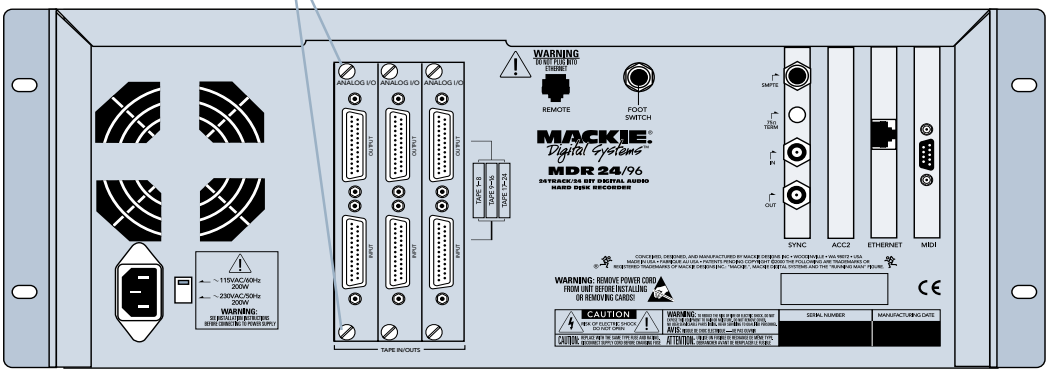


Note: Different manufacturers use different wiring standards for DB25 interface cables (both analog and digital) that otherwise look the same. Make sure the cable you are using is the correct one. See Appendix E for a list of compatible MDR24/96 I/O card cables.

To replace the AIO-8 cards with different I/O cards:

1. If the MDR24/96 is plugged into AC power, unplug it.

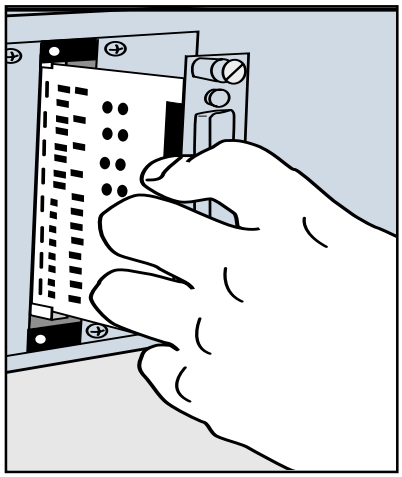
2. Unscrew the thumbscrews at the top and bottom of each I/O card to be removed. Grasp one thumbscrew with each hand and gently pull the card out.



3. Before you take I/O cards from their bags, touch a grounded metal object to discharge any static electricity from your body.

4. Remove the new I/O card from its anti-static bag and put the I/O card you just removed from the MDR24/96 into the bag.

5. Hold the new card so the component side faces left and line up the top and bottom edges with the white card guides. Push the card all the way into the slot until its faceplate is flush with the back panel.



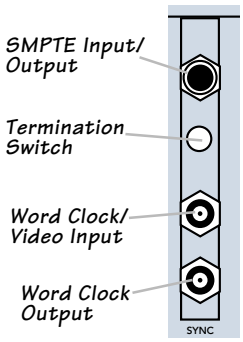
6. Hand-tighten the thumbscrews at the top and bottom of the card. Do not use a screwdriver.

If you want to hook up the MDR24/96 I/O cables to your console right now, see the console hookup diagrams in the "Hookups" section (page 23). Be sure to come right back here when you're done.

Note: Always hand tighten the thumbscrews at the top and bottom of all I/O cards before operating the MDR 24/96.

Sync Card and Cables - Word Clock and Digital Synchronization

The Sync Card provides ports to synchronize the MDR24/96's sample clock and time/transport position to other equipment. The functions of the jacks and switch, from top to bottom are:



- SMPTE Input / Output – This 1/4" TRS jack serves as an input when slaved to incoming SMPTE time code, and as an output when generating SMPTE time code to synchronize other devices with the MDR24/96.
- Termination Switch – This pushbutton switch selects the termination impedance of the Word Clock / Video Input jack. When the switch is out, the impedance is 3.3kΩ (bridging); when in, the impedance is 75Ω (terminated).
- Word Clock / Video Input – This BNC jack receives either word clock, composite video, or video blackburst as determined by the MDR24/96 Sample Clock setting. Use this input when the MDR24/96 is operating as a word clock slave.
- Word Clock Output – This BNC jack transmits word clock to other devices in the system when the MDR24/96 is configured as the clock master.

Whenever digital audio connections are made between devices, the sample clock of every device must run at exactly the same rate. This is usually accomplished by selecting one device as the "master" clock source and distributing its word clock signal to all the "slave" devices in the system. The master is configured to run from its internal clock, and the slaves from external word clock. Some digital interfaces are self-clocking (such as the AES input on many DAT machines) and do not require a separate work clock connection. Others simply cannot be configured as slaves. The master/slave designation must be made correctly for each device to avoid the clicks and pops associated with asynchronous clocks.

Whenever time code (positional) synchronization is used, all the devices in a system, both analog and digital, must be synchronized to a common timing (speed) reference. This is often achieved by distributing video from a master video sync generator (sometimes called "house sync") to all the slave devices in the system when word clock cannot otherwise be used. The MDR24/96, like many other digital devices, can synchronize its sample clock to a video signal. However, video does not provide enough timing precision to properly synchronize devices whose digital audio paths are interconnected; word clock must be used instead.

Generally it doesn't matter which device in a system serves as the word clock master, except when synchronizing to time code or video. For example, if your MDR24/96 Inputs and Outputs are connected to the Tape Inputs and Outputs of a Mackie Digital 8•Bus console using TDIF, either the MDR24/96 or D8B can be the word clock master. However, if you later synchronize the MDR24/96 to time code from a VTR, you must lock the VTR and MDR24/96 to a master video sync source and lock the D8B (which can't sync to video) to word clock from the MDR24/96. In this case the MDR24/96 becomes both a video slave and a word clock master. For more detailed information on setups involving video and time code synchronization, see the HDR24/96 Technical Reference manual, available to download at www.mackie.com.

Note: For audio-for-video applications, the MDR24/96 can lock its word clock to a video signal. In this configuration, there must be only one word clock dependent device (The MDR24/96) locked to the video source. The MDR24/96 then becomes the word clock master for the other digital devices in the system (for example, a digital mixing console). Do not attempt to lock multiple digital devices to the video signal, or you'll get clicks.

The following are recommended setups for establishing proper sample clock synchronization with the devices connected to the MDR24/96 digital I/O cards.

TDIF (DIO•8)

With the MDR24/96 as a master, connect Word Clock Out of the MDR24/96 to Word Clock In on the receiving device(s). If connecting to older TASCAM DTRS recorders, use the Sync Out port on the first DIO•8 card instead of Word Clock Out. If there is more than one DTRS recorder in the chain, connect Sync Out to the word clock input of the first DTRS recorder only; the other recorders are synchronized through their interconnecting DTRS cables.

With the MDR24/96 operating as a slave to another TDIF device, connect the word clock output from the master TDIF device to Word Clock In on the MDR24/96.

ADAT Optical (DIO•8, OPT•8)

With the MDR24/96 as a master, set the receiving device(s) to derive sample clock from their ADAT Optical ports if the ports are self-clocking. In this case, no word clock connection is necessary. If the ADAT Optical ports on the receiving devices are not self-clocking, connect Word Clock Out of the MDR24/96 to Word Clock In on the receiving device(s).

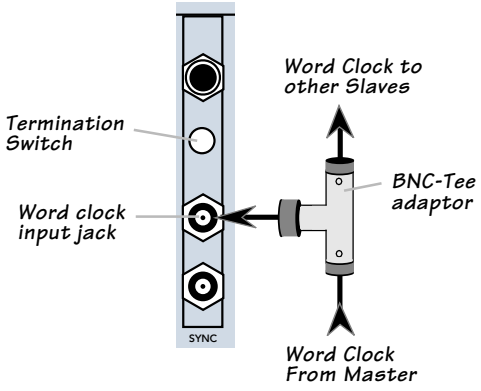
With the MDR24/96 configured as a slave, connect the word clock out of the master ADAT Optical device to Word Clock In on the MDR24/96.

AES/EBU (PDI•8)

With the MDR24/96 as a master, set the receiving device(s) to derive their sample clock from the AES/EBU ports if the ports are self-clocking. In this instance, no word clock connection is necessary. If the AES/EBU ports on the receiving device(s) are not self-clocking, connect Word Clock Out of the MDR24/96 to Word Clock In of the receiving device(s).

With the MDR24/96 as a slave, connect the word clock out of the master AES/EBU device to Word Clock In on the MDR24/96.

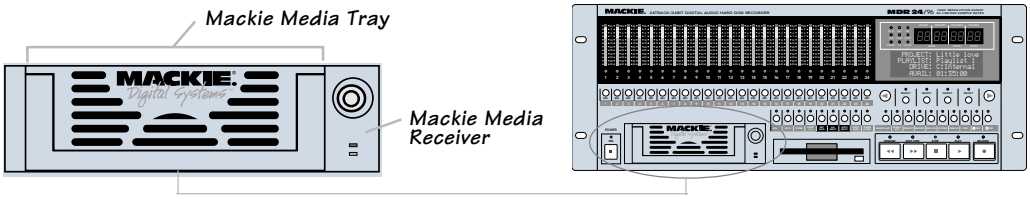
Note: Use 75 Ω coaxial cables when connecting word clock or video to the Sync Card Word Clock/Video input jack. If the MDR24/96 is at the end of a cable that's connected to several devices, push the Termination Switch in; otherwise leave it out and use a BNC Tee adapter to feed the signal on to the next device in the chain.



Note: If you are using an MDR24/96 with the Mackie Digital 8•Bus console, you may need to turn on the Digital 8•Bus first. The Clock I/O on the D8B prefers not to see an active signal at its Word Clock input when it powers up.

Mackie Media (Optional)

The MDR24/96 emulates the tape library tradition with Mackie Media M•90 and Mackie Media PROJECT drives. Both drives come complete with a plug-in tray for quick removal and a nifty storage case for shelving and transporting the drives. Trays can be purchased separately if you want to use your own UDMA IDE drives. The MDR24/96 can record or play directly off the M•90 so you can change sessions as quickly as changing tape on a 24-track—no backup time required. PROJECT drives are for backup only and use removable 2.2GB ORB cartridges that fit in your pocket. Each can hold a couple of 5-minute 24-track masters.



To install or remove a Mackie Media tray:

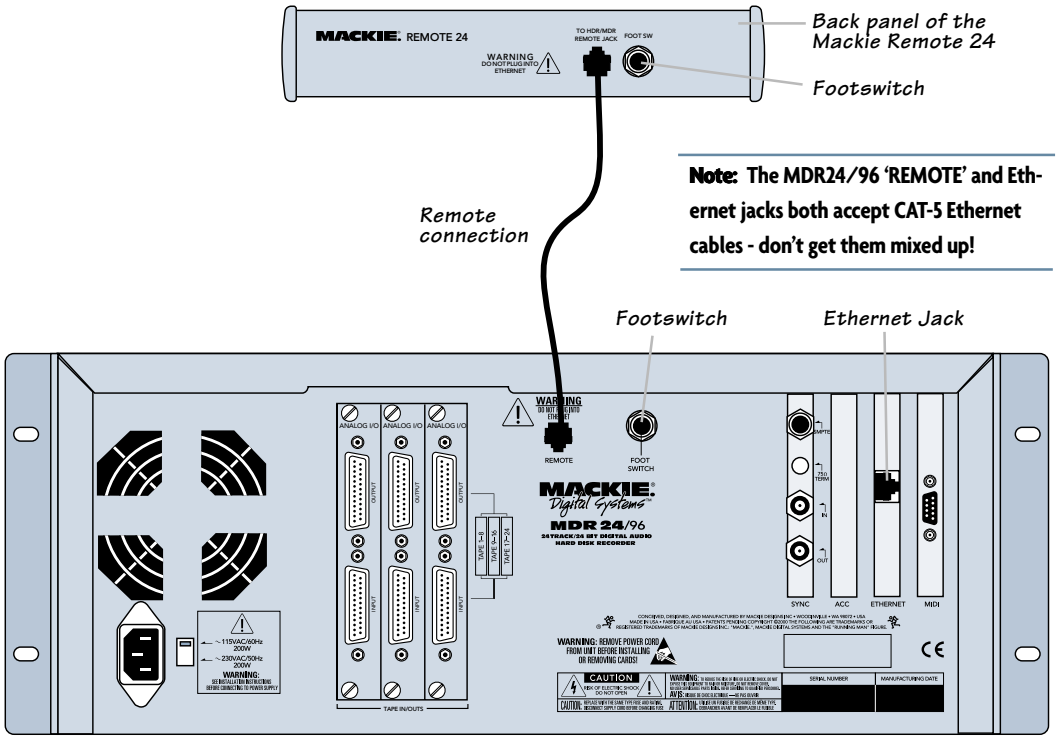
1. Power the MDR24/96 off whenever inserting or removing media trays. **If you have an active project, don't forget to save it first!**
2. To remove a drive, first unlock it by inserting the key and turning it a quarter-turn counterclockwise. Two keys are packed with the recorder, and one with each M•90 drive.
3. Lift the bail handle to release the drive, and pull it out of the drive bay.
4. To install a new M•90 or PROJECT drive, slide the media tray into the front panel drive bay. Press it firmly into place, and latch it by pressing the bail handle downward until it's fully seated.
5. Insert the key into the lock and turn it a quarter-turn clockwise. The key locks the drive into place and powers the tray.
6. The MDR24/96 will automatically detect the Mackie Media drive when you next power it up.

Note: Mackie Media are hard drives, and as we all know, hard drives involve some pretty intricate technology. So don't shake the little darlin', and if a tray has just come in from a freezing car or airplane cargo hold, do not install it until it has reached room temperature.

Note: The Remotes duplicate nearly all of the front panel operating controls. When we describe a front panel operation, you'll probably find it available on the Remote also. If you have a Remote, try it both ways. If you don't have a Remote yet, think of how convenient it would be.

Remote 24 / Remote 48 (Optional)

Installing either remote is as simple as plugging in a telephone. Connect one end of the cable (supplied with the Remote) to the **REMOTE** jack on MDR24/96 rear panel, and the other end to the **TO HDR REMOTE JACK** jack on the Remote 24, or to the **TO HDR** jack on the Remote 48. It's OK to plug or unplug either Remote with the MDR24/96 powered on. However, if you plug the Remote 48 into the MDR24/96 while both are powered on, you must power cycle the Remote 48 to reset the connection.



Note: The MDR24/96 'REMOTE' and Ethernet jacks both accept CAT-5 Ethernet cables - don't get them mixed up!

Note: If you are using an MDR24/96 with the Mackie Digital 8•Bus console, you may need to turn on the Digital 8•Bus first. The Clock I/O on the D8B prefers not to see an active signal at its Word Clock input when it powers up.

Footswitch (Optional)

For hands-free do-it-yourself punches and other frequently-used functions like Play/Stop, Punch In/Out, and Take Select, connect the cable of a momentary, normally open footswitch to the **FOOT SWITCH** 1/4" TS jack on the rear panel of the MDR24/96, the Remote 24, or Remote 48. If you have a Remote installed you can connect two foot switches, one to the MDR24/96 and one to the Remote. Each footswitch functions independently of the other. Footswitch functionality is assigned in the front panel System menu.

Power-Up

OK, NOW you can turn it on. Assuming you have already connected the MDR24/96 to your console, power up the MDR24/96 first, then the outboard equipment and console, and finally the power amplifiers or powered monitors. Audio equipment tends to generate unexpected clicks and pops when you power it up, so by powering up your monitoring system last, you'll save your speakers and your ears.

Before you read the next section, take a quick, self-guided tour of the front panel display and controls to get a sense of where they are.

Configuration

Before starting a Project, you will need to configure the MDR24/96 I/O card options and synchronization parameters. These parameters determine where the sample clock is coming from, how fast the sample clock runs, and how many bits are recorded in every sample. Some options, like sample rate and bit depth, will become "standards" that you won't need to change very often. Others, like Time Code Source, you may need to change from project to project.

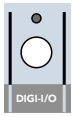
I/O Cards

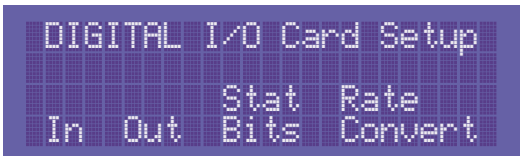
Only the DIO•8 and PDI•8 cards require special configuration. If you are using AIO•8, OPT•8, or OPT•24 cards only, you can skip to the next section.

DIO•8 Card

To set the DIO•8 input and output formats:

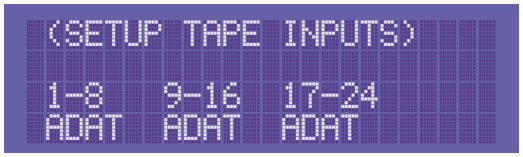
1. Press **DIGI-I/O** to enter the Digital I/O Card Setup menu.





2. Select **In**.

The **SETUP TAPE INPUTS** menu shows you the current input settings for each of the three I/O cards.

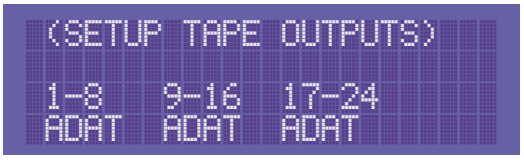


3. Press the **SELECT** button corresponding to each DIO•8 card and toggle the selection between **ADAT** and **TDIF**.

4. Press the Page Left (<) button to return to the previous screen.

5. Now select **Out**.

The **SETUP TAPE OUTPUTS** menu shows you the current output settings for each of the three I/O cards.



6. For each DIO•8 card present, press the **SELECT** button to choose the desired output format. Or, select the **TD–>AD** or **AD–>TD** option to convert between formats, bypassing the MDR24/96 tape signal path entirely.

7. When done, press **DIGI-I/O** to exit the menu.

Note: The front panel display's backlight switches off after several minutes of inactivity. It'll come back on automatically when it's needed to display new information, but you can revive it at any time by pressing either the Page Left (‹) or Page Right (›) button below the display.

PDI•8 Card

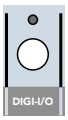
The PDI•8 card options include sample rate conversion for each stereo AES/EBU input, and status bit control (pro/consumer mode) for each output. When a PDI•8 card is first installed, its default settings are for sample rate conversion **Off**, and channel status bits set to indicate the **Pro** (AES/EBU) format. In most circumstances you won't need to change these settings. However, if the device(s) connected to the PDI•8 inputs cannot be made a clock master or slave (such as a CD player with a digital out), enabling sample rate conversion on each affected input will effectively re-clock the incoming data.

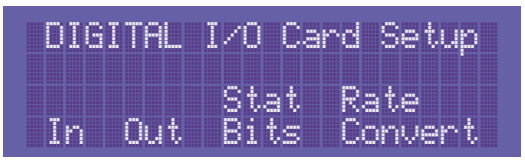
Occasionally you'll run across a device that will not recognize the digital audio output from the PDI•8 card. Changing the status bits on the affected output(s) from **Pro** to **Consumer** (S/PDIF) may solve the problem.

Remember that with the AES/EBU format, channels come in pairs, so rather than eight settings, you have four, one for each pair of channels.

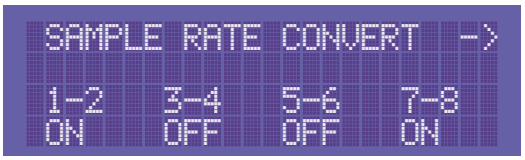
To set the PDI•8 card options:

1. Press **DIGI-I/O** to enter the **DIGITAL I/O Card Setup** menu.





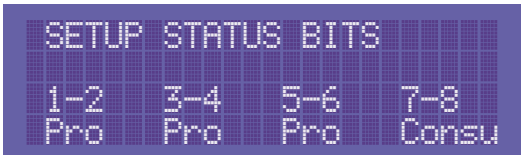
2. Select **Rate Convert**. The **SAMPLE RATE CONVERT** menu shows you the sample rate conversion settings for inputs 1-8.



3. Press the **SELECT** button corresponding to the desired input channel(s) and toggle the selection. **On** enables sample rate conversion, **Off** disables it (default).

4. Press the Page Right (>) button to scroll to channels 9-16. Repeat the procedure for channels 9-16 and 17-24. Press Page Left (<) until you return to the **DIGITAL I/O Card Setup** menu.

5. Select **Stat Bits**. The **SETUP STATUS BITS** menu shows you the current status bit settings for outputs 1-8.

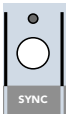


6. Press the **SELECT** button corresponding to the desired output channel(s) to toggle the selection between **Pro** (default) and **Consu**.

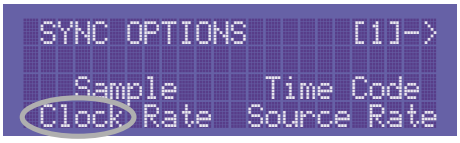
7. Press the Page Right (>) button to scroll to channels 9-16. Repeat the procedure for channels 9-16 and 17-24. Press **DIGI-I/O** to exit.

Synchronization

Synchronization Options



Sample Clock



The Sample Clock setting determines the source of the MDR24/96 sample clock. If the MDR24/96 is a clock master or is not connected to any other digital device(s), set it to **Internal**. If the MDR24/96 is a word clock slave, set it to **Word Clock**.

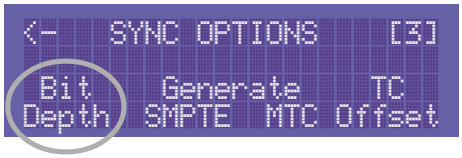
When **Video** is selected as the clock source, an additional parameter, the video frame rate is required. This is actually set as the Video Field Rate (twice as fast). **Video Field** magically appends itself to the list of Sync Options in the LCD display. However, you'll have to hunt it down as there are normally 3 pages of Sync Options and Video Field appears on a new page 4. Video Field Rate options are **B&W (60Hz)**, **NTSC (59.94 Hz)**, and **PAL (50 Hz)**. If you're doing post in the U.S. then choose **NTSC**, and if you're doing post (or music) in Europe then choose **PAL**. If you're doing music in the U.S. and you're just using a black burst generator to keep the clocking universal and solid for the studio, then set the field rate as well as the BB Generator to use 60 Hz. The integral number of frames per second will make you much happier than NTSC ever will. The 60 Hz setting can also be used in HDTV production, where many permutations of frame rate and raster lines are available.

Note: The PDI·8 is the only Mackie I/O card that currently supports 88.2 or 96 kHz operation. Do not operate the MDR24/96 at these Sample Rates with AIO·8, DIO·8, or OPT·8 cards installed.

Sample Rate

The Sample Rate determines how fast the MDR24/96 sample clock runs. Compact discs use a 44.1 kHz sample rate, while some DVD disks use 96 kHz. The video production folks prefer 48 kHz because their digital video recorders use 48 kHz. Even though the MDR24/96 supports four Sample Rates, you can only choose between two at any given time. The range of available rates is determined by the current Project's Sample Rate mode. The Sample Rate mode determines whether a Project will be a 24-track 44.1 kHz or 48 kHz Project, or a 12-track 88.2 kHz or 96 kHz Project. To change the Sample Rate to a setting that is not available, first create or open a Project with the desired Sample Rate mode.

Bit-Depth



The Bit Depth setting determines how many bits are contained in each audio sample recorded to disk (the bit "resolution"). While 16-Bit audio takes up 1/3 less disk space than 24-Bit audio, 24-Bit audio offers the potential for greater dynamic range (the difference between the softest and loudest sounds that can be recorded) and captures a more accurate "image" of the sound.

Note: You must still select the MDR24/96's Sample Rate even if it's slaved to another device's clock. If you don't set it correctly, the MDR24/96 time display will run at the wrong rate, even though audio will play at the right speed.

Time Code Chase

If the MDR is set to slave to external time code (MTC or SMPTE time code), engaging the Time Code Chase mode causes the MDR24/96 transport to follow time code coming from an external master source. If disengaged, the MDR will go off line and will no longer follow the external time code. This function is enabled with the **T. CODE CHASE** button.

In the Time Code Chase mode, pressing the **PLAY** button causes the transport to wait in an armed state for time code to start. Start, stop, wind, and locate functions follow the time code master.

Note: When operating in sync with external time code, you'd nomally stop the MDR24/96 by stopping the time code master, not the recorder. If you're recording when chasing time code, pressing Stop or Play will punch out of recording.

The MDR24/96 does not resolve its word clock to incoming time code, it only uses time code to synchronize transport time. Once the MDR24/96 transport has jumped to the time code time and started running, it runs on its internal clock, while continuously monitoring the incoming time code. It will stay locked as long as the time code doesn't drop out or otherwise become corrupt for longer than its "flywheel" window of ten frames. If the time code problem is corrected within that window, the MDR24/96 will continue to chase. If not, it will drop out of time code chase mode and stop.

You can disengage TC Chase on the fly, however, without interrupting the MDR24/96's operation. If you're working with really poor quality time code, for example what might come from an inexpensive VCR, by disengaging TC Chase after the MDR24/96 has found its time code-related position, it will free-run and not sweat the unstable time code. Synchronization won't be perfect, but this is a means of working with problem time code.

Time Code Source

The MDR24/96 can chase time code from either MIDI In or SMPTE In. Use **Time Code Source** to select either SMPTE or MTC.

Time Code Frame Rate

There are four standard time code frame rates, each developed for a specific application. In addition, two of the frame rates have variations called drop-frame, mostly used in broadcast applications to correct timing issues caused by the 29.97 frame rate. Use the **Time Code Rate** option to set the time code frame rate to one of the following settings: **30**, **30 Drop**, **29.97**, **29.97 Drop**, **25** and **24**. If you're not involved in video or broadcast applications, 30 frames per second (fps) is your best choice.

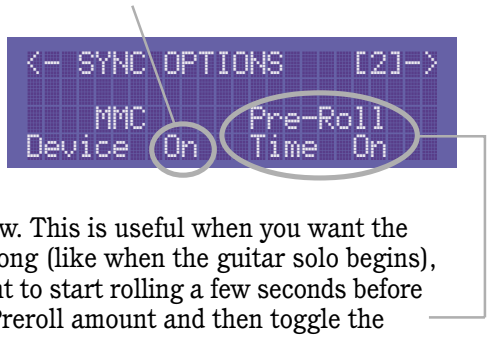
MMC Device ID

You can set the MMC (MIDI Machine Control) Device ID independently for each group of eight tracks. Most 24-track MMC control devices share the same Device ID for the three 8-track blocks.

Send MMC

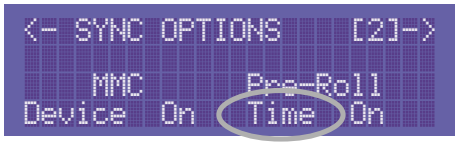
Use **MMC On/Off** to toggle MIDI Machine Control at the MDR24/96 MIDI Out.

Pre-Roll Time



Preroll is the amount of time by which the transport location is offset when jumping to a locate point. If Preroll is other than zero, the transport will locate to a point earlier than the locate time by the amount of time set in the Preroll window. This is useful when you want the locator to accurately define a point in the song (like when the guitar solo begins), but when punching in at that point, you want to start rolling a few seconds before hand. The MDR 24/96 allows you to set a Preroll amount and then toggle the Preroll on or off as needed.

To set the Preroll amount:



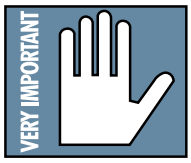
1. Press the **SYNC** button and press the Right Arrow button to move to page two of the **SYNC OPTIONS** menu.
2. Press the **Pre-Roll Time** select button.
3. Use the << and >> select buttons to select Hours, Minutes, Seconds, or Frames and use the **(–) DEC** and **(+) INC** buttons to set the amount for that field. Press the **Zero** select button to reset the Preroll amount to zero.
4. Press the **OK** select button to return to the **SYNC OPTIONS** menu when you are satisfied with the Preroll amount displayed.

Pre-Roll Enable

When Preroll enable is on, Locate points are offset by the Preroll time. When Preroll enable is off, there is no preroll offset.

To turn Preroll on or off:

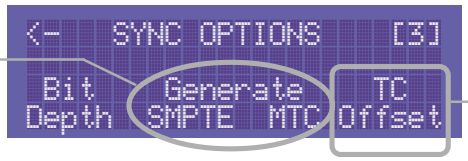
1. Press the **SYNC** button and press the Right Arrow button to move to page two of the **SYNC OPTIONS** menu.
2. Press the **Pre-Roll On** select button.
3. Use the << and >> select buttons to turn Preroll on or off.
4. Press the **OK** select button to make your selection and to return to the **SYNC OPTIONS** menu.



Note: It is not possible to generate and chase SMPTE time code simultaneously. If Generate SMPTE is selected as the time code Source, an error message will appear if you also select Time Code Chase.

Generate SMPTE/MTC

These options allow you to select whether SMPTE time code or MIDI time code (or both) are generated.



Time Code Offset

This is the amount of time (hours, minutes, seconds and frames) that is added to the incoming time code value, and the resulting time is the Current Time of the MDR24/96 when in Time Code Chase. Negative can be selected to subtract the offset value from the incoming time code.

To set the TC Offset:

1. Select **TC Offset** from the **SYNC OPTIONS** menu.
2. Select **Set**.

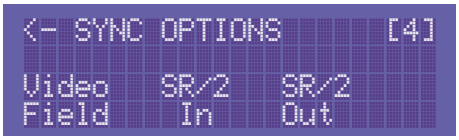
Use the Select buttons to move the "**vv**" cursor among fields, and then use the Select buttons to change the value. Negative can be selected from the **TC Offset** menu.

To configure the MDR24/96 synchronization settings:

1. Press **SYNC** to enter the **SYNC OPTIONS** menu. Select **Sample Clock**. Select either **Internal** or **Word Clock** according to your setup using the **(–)Dec / (+)Inc** or << / >> buttons.
2. Select **OK** to return to the **SYNC OPTIONS** menu.
3. Select **Sample Rate**. Using the **(–)Dec / (+)Inc** or << / >> buttons, set the Sample Rate to **44.1 kHz** or **48 kHz** (**88.2 kHz** or **96 kHz**). Select **OK**.
4. Move to the third page of the **SYNC OPTIONS** menu with the Page Right (>) button.
5. Select **Bit Depth**. Set the Bit Depth to **16 Bit** or **24 Bit** using the **(–)Dec / (+)Inc** or << / >> buttons. Select **OK**.

Word Clock Divisors (88.2/96 kHz operation only)

Some devices that support double-wide AES at 88.2 and 96 kHz can only transmit or receive word clock at 0.5x the Sample Rate. The Word Clock divisors determine whether Word Clock In and Word Clock Out run at 1x or 0.5x the MDR24/96 Sample Rate. Both divisors can be set independently.



Sync Settings for 88.2/96 kHz operation only:

1. Move to the last page of the **SYNC OPTIONS** menu with the Page Right **(>)** button. Select **SR/2 In**.
2. Set the Word Clock Input divisor to **On** or **Off** using the **(–)Dec / (+)Inc** or << / >> buttons. **Off** selects 1x operation, **On** selects 0.5x operation.
3. Select **OK**, then Select **SR/2 Out** and set the Word Clock Output divisor to **On** or **Off**.
4. Select **OK** and press the **SYNC** button to exit the menu.

Hookups

This section shows how the MDR24/96 is typically connected to both analog and digital consoles (using the Mackie Analog and Digital 8•Bus consoles as examples). These examples assume that the rest of your studio equipment (monitors, sound sources, outboard processing, etc.) is already connected, or that you know how to connect it.

Before you begin, note how the three eight-channel I/O cards are arranged on the MDR24/96 rear panel: 1-8 is on the left, 9-16 is in the center, and 17-24 is on the right. Labeling each cable before you begin will make connecting the MDR24/96 to your console easier.

The specific hookups for each MDR24/96 I/O card are shown below.

Note: If you are using a D8B console with either DIO•8, PDI•8, or OPT•8 cards installed, then a Clock I/O card must also be installed in the D8B to properly synchronize its word clock with the MDR24/96.

Analog Hookup (AIO•8)

This example describes the hookup for the 24•8 analog console.

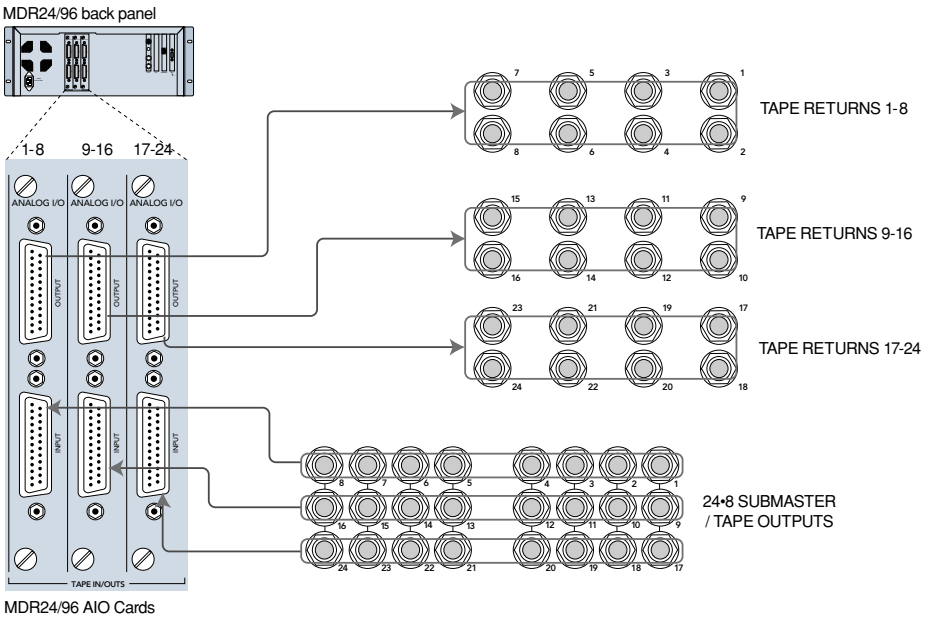
Cables & Hardware

(3) AIO•8 cards for MDR24/96
(6) Analog snakes, DB25 to eight 1/4" TRS phone plugs

Hookup

1. Connect three snakes to the MDR24/96 Inputs (bottom connector). If you want to have the ability to route any console input to any recorder track, then connect the 1/4" plugs on each of the three snakes to the like-numbered Submaster/Tape Output jacks on the 8•Bus console. This works as long as you don't record more than 8-channels at a time, since the Submaster Outputs 9-16 and 17-24 are the same as outputs 1-8.

   Alternately, you can connect the console's direct outputs to the recorder's inputs, so that each console channel feeds the like-numbered recorder track. Or, you can use a combination of direct and subgroup outs. The hookup diagram below shows the MDR24/96 inputs connected to the Submaster Outputs.



2. Connect three snakes to the MDR24/96 Outputs (top connector). Connect the plug end of the snakes to the like-numbered Tape Return jacks on the 24•8 console.

MDR24/96 Settings

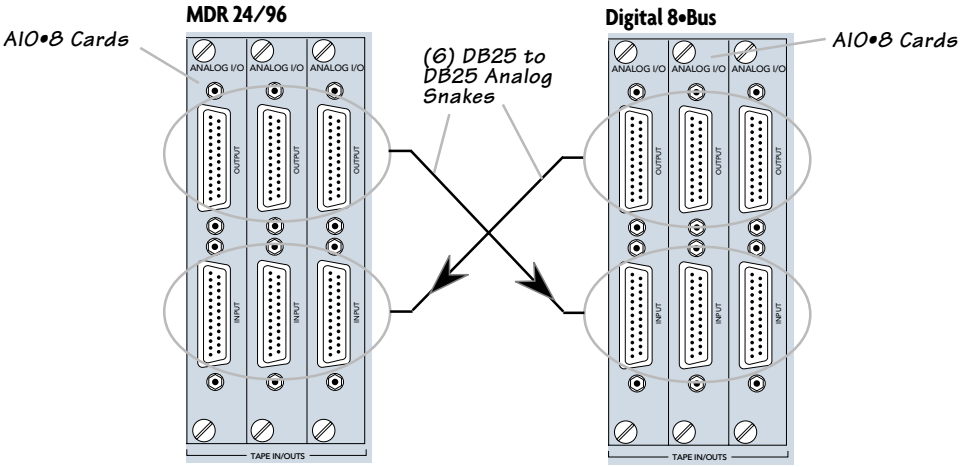
1. Set the **Sample Clock** to **Internal**.
2. Set the **Sample Rate** and **Bit Depth** according to your preference.

Console Settings

Set the 24•8 console to the nominal +4 dBu operating level by setting the five Operating Level switches in the **Sub Out** and **Tape Return** sections to the 'OUT' position.

This example describes the hookup for the D8B console equipped for analog I/O.

Note: Some older AIO•8 cards have the Input jack labeled as "From Tape" and the Output jack labeled as "To Tape." Otherwise, they operate identically. Sigh ... long story.



Cables & Hardware

(3) AIO•8 cards for MDR24/96
(3) AIO•8 cards for D8B
(6) DB25 to DB25 analog snakes

Hookup

1. Connect three snakes between the MDR24/96 Inputs (bottom connector) and the corresponding D8B Tape Outputs (top connector).

2. Connect three snakes between the MDR24/96 Outputs (top connector) and the corresponding D8B Tape Inputs (bottom connector).

MDR24/96 Settings

1. Set the **Sample Clock** to **Internal**.
2. Set the **Sample Rate** and **Bit Depth** according to your preference. It is not necessary to set the D8B and MDR24/96 to the same sample rate since, with analog connections, the sample clocks on the two units are not synchronized.

Console Settings

1. Set the D8B **Sample Clock** to **44.1 k Internal** or **48 k Internal** according to your preference.

TDIF Hookup (DIO•8)

Cables & Hardware

(3) DIO•8 cards for MDR24/96
(3) DIO•8 cards for D8B
(1) Clock I/O card for D8B
(3) TDIF cables
(1) 75 Ω BNC word clock cable

Hookup

1. Connect the three TDIF cables between the corresponding TDIF jacks on the MDR24/96 and D8B.

2. When TDIF is used, the D8B must have a Clock I/O card installed. To make the D8B the clock master, connect its Word Clock Out (not DIO•8 Sync out) to the MDR24/96 Word Clock In. To make the MDR24/96 the clock master, connect its Word Clock Out to the D8B Word Clock In. See *Figure 1*.

Note: Determining which unit in *Figure 1* provides the master clock depends on your application.

MDR24/96 Settings

1. Set the Tape Input format for each DIO•8 card to **TDIF**, and the Tape Output format to **TDIF**.

2. If the MDR24/96 is the clock master, set the **Sample Clock** to **Internal**; if it is a clock slave, set it to **Word Clock** and depress the 75 Ω termination switch on the Sync card.

3. Set the **Sample Rate** to **44.1 kHz** or **48 kHz** according to your preference.

Console Settings

1. Set the Tape Input and Tape Output format for each DIO•8 card to **TDIF**.

2. If the D8B is the clock master, set the **Sample Clock** to either **44.1 k Internal** or **48 k Internal**; if it is a clock slave, set the **Sample Clock** to either **44.1 kHz** or **48 kHz**. Set the sample rate to match the sample rate selected on the MDR24/96.

TDIF Hookup with DIO•8

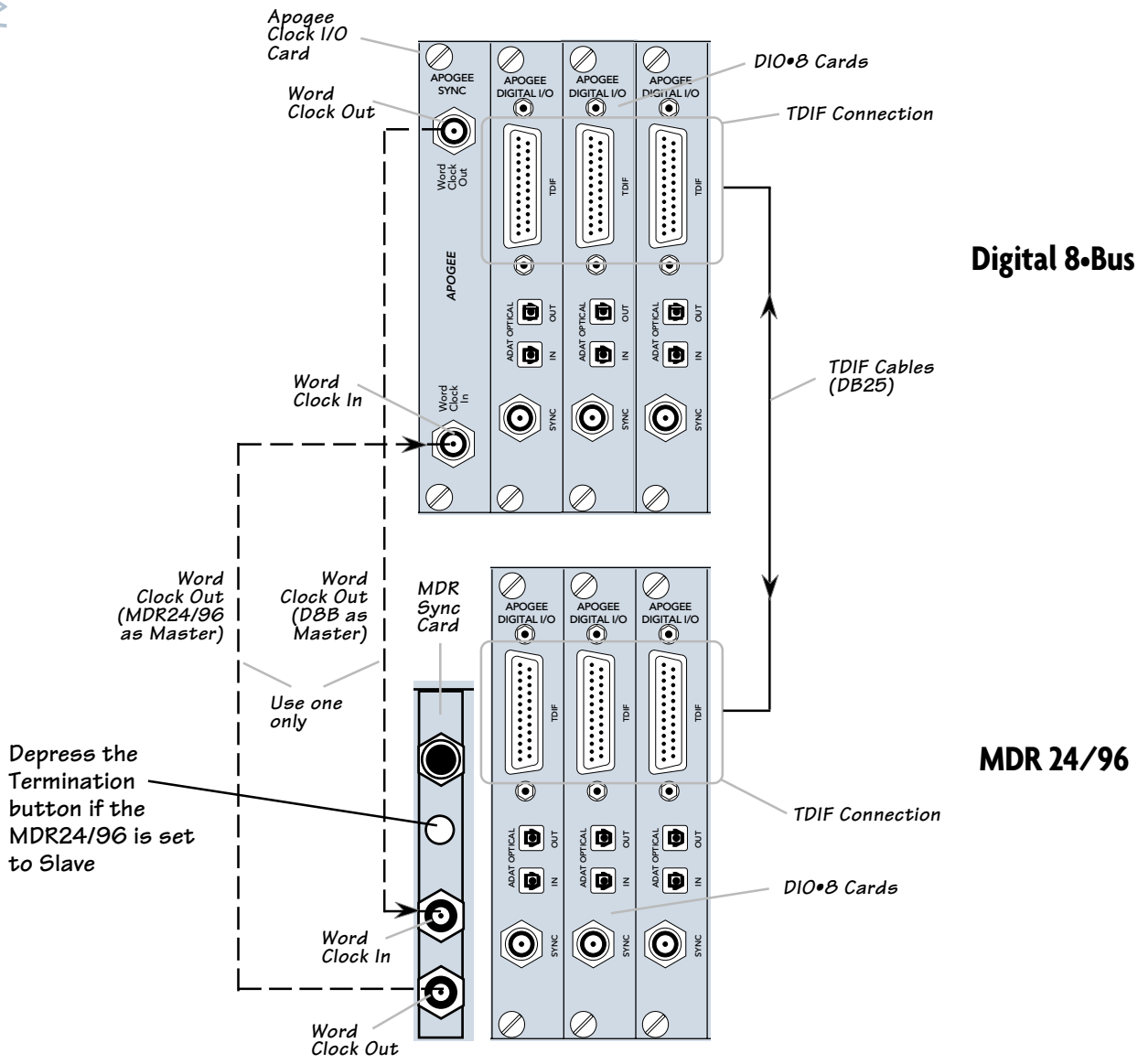


Figure 1

Note: **The Word Clock connections shown here are the same for Figure 2, 3, and 4.**

ADAT Optical Hookup (DIO•8 or OPT•8)

Cables & Hardware

(3) DIO•8 or OPT•8 cards for MDR24/96
(3) DIO•8 or OPT•8 cards for D8B
(1) Clock I/O card for D8B
(6) ADAT Optical cables
(1) 75Ω BNC word clock cable

Hookup

1. Connect three ADAT Optical cables from the MDR24/96 Optical Outputs to the Optical Inputs on the corresponding D8B I/O cards.

2. Connect three ADAT Optical cables from the MDR24/96 Optical Inputs to the Optical Outputs on the corresponding D8B I/O cards.

3. When ADAT Optical is used, the D8B must have a Clock I/O card installed. To make the D8B the clock master, connect its Word Clock Out to the MDR24/96 Word Clock In. To make the MDR24/96 the clock master, connect its Word Clock Out to the D8B Word Clock In.

Note: Determining which unit in *Figures 2 & 3* provides master clock depends on your application.

MDR24/96 Settings

1. If you have DIO•8 cards installed, set the Tape Input and Tape Output format for each card to **ADAT**. OPT•8 cards need no configuration.

2. If the MDR24/96 is the clock master, set the **Sample Clock** to **Internal**; If the MDR24/96 is a clock slave, set the **Sample Clock** to **Word Clock** and depress the 75Ω termination button on the Sync card.

3. Set the **Sample Rate** to **44.1 kHz** or **48 kHz** according to your preference.

Console Settings

1. If you have DIO•8 cards installed, set the Tape Input and Tape Output format for each card to **ADAT**. OPT•8 cards need no configuration.

2. If the D8B is the clock master, set the **Sample Clock** to either **44.1 k Internal** or **48 k Internal**; if it is a clock slave, then set the **Sample Clock** to either **44.1 kHz** or **48 kHz**. Set the sample rate to match the sample rate selected on the MDR24/96.

ADAT Optical Hookup with DIO•8

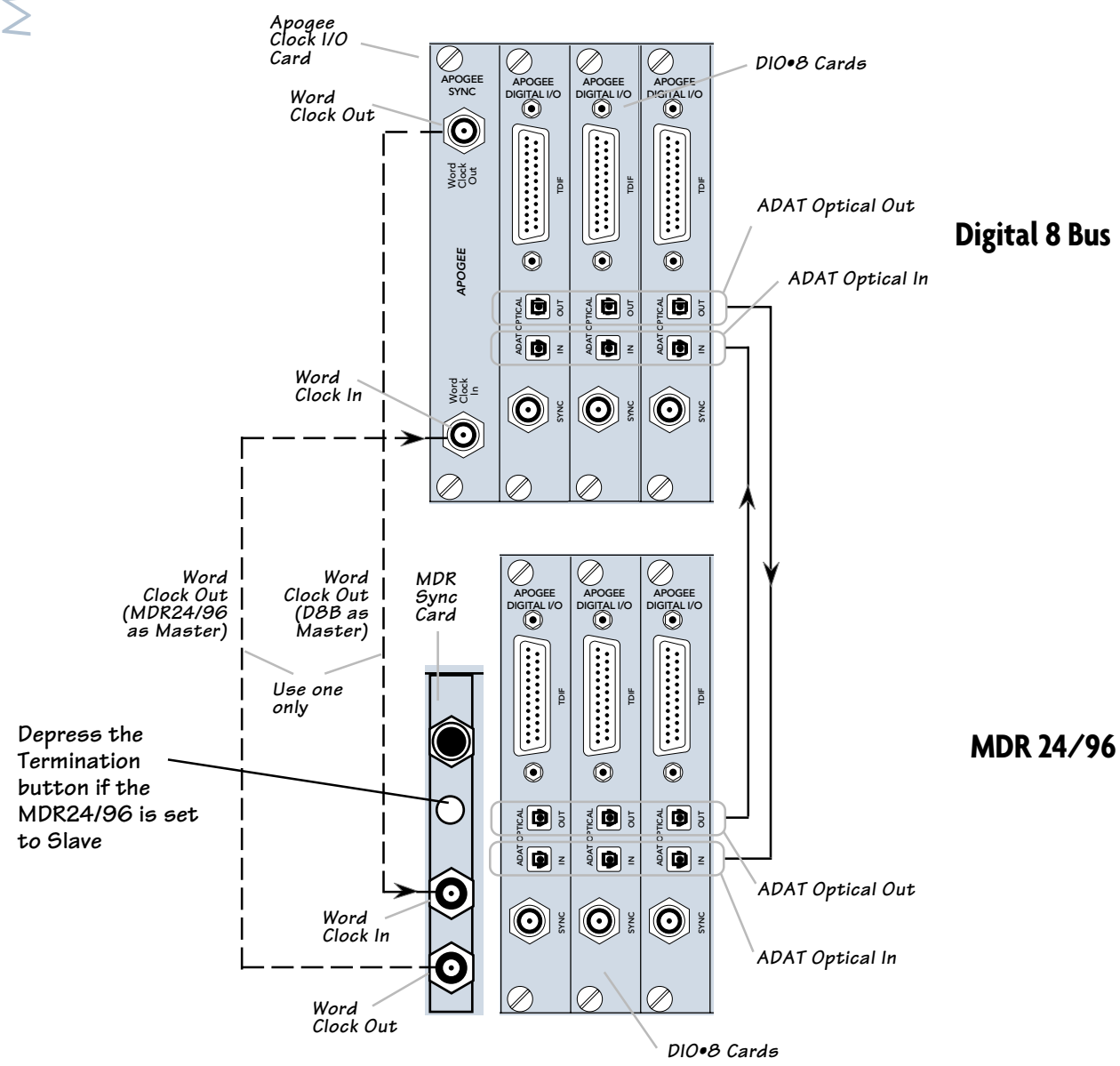


Figure 2

ADAT Optical Hookup with OPT•8

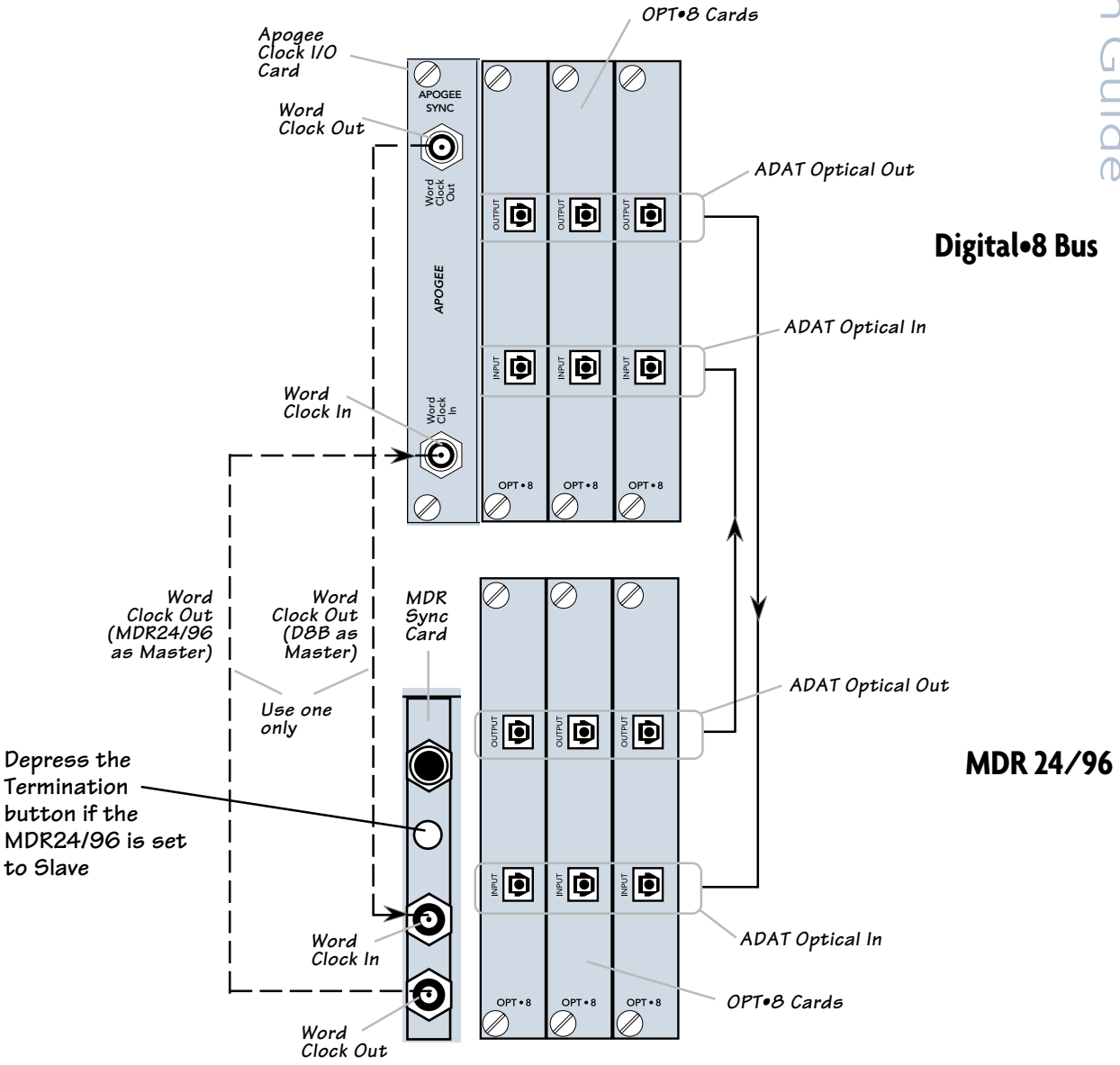


Figure 3

AES/EBU Hookup (PDI•8)

Cables & Hardware

(3) PDI•8 cards for MDR24/96
(3) PDI•8 cards for D8B
(1) Clock I/O card for D8B
(3) DB25 to DB25 AES/EBU snakes
(1) 75Ω BNC word clock cable

Hookup

Note: Determining which unit in *Figure 4* provides master clock depends on your application.

1. Connect the three AES/EBU cables between the corresponding AES/EBU connectors on the MDR24/96 and D8B.

2. When AES/EBU is used, the D8B must have a Clock I/O card installed. To make the D8B the clock master, connect its Word Clock Out to the MDR24/96 Word Clock In. To make the MDR24/96 the master, connect its Word Clock Out to the D8B Word Clock In.

MDR24/96 Settings

1. If the MDR24/96 is the clock master, set the **Sample Clock** to **Internal**; if it is a clock slave, set the **Sample Clock** to **Word Clock** and depress the 75Ω termination switch on the Sync card.

2. Set the **Sample Rate** to **44.1 kHz** or **48 kHz** according to your preference.

Console Settings

1. If the D8B is the clock master, set the **Sample Clock** to either **44.1 k Internal** or **48 k Internal**; if it is a clock slave, set the **Sample Clock** to either **44.1 kHz** or **48 kHz**. Set the sample rate to match the sample rate selected on the MDR24/96.

OK, so we fibbed a little. You can use PDI•8 cards in the D8B without a Clock I/O card installed, but doing so requires that you enable sample rate conversion on both the D8B and the MDR24/96 in lieu of word clock synchronization. Sample rate conversion results in a 4-bit loss in sample resolution that may degrade the quality of the sound slightly. So, the moral of the story is that unless you just blew your wad on a new guitar and are eating peanut butter sandwiches until your next paycheck, go buy a Clock I/O card.

AES/EBU Hookup with PDI•8

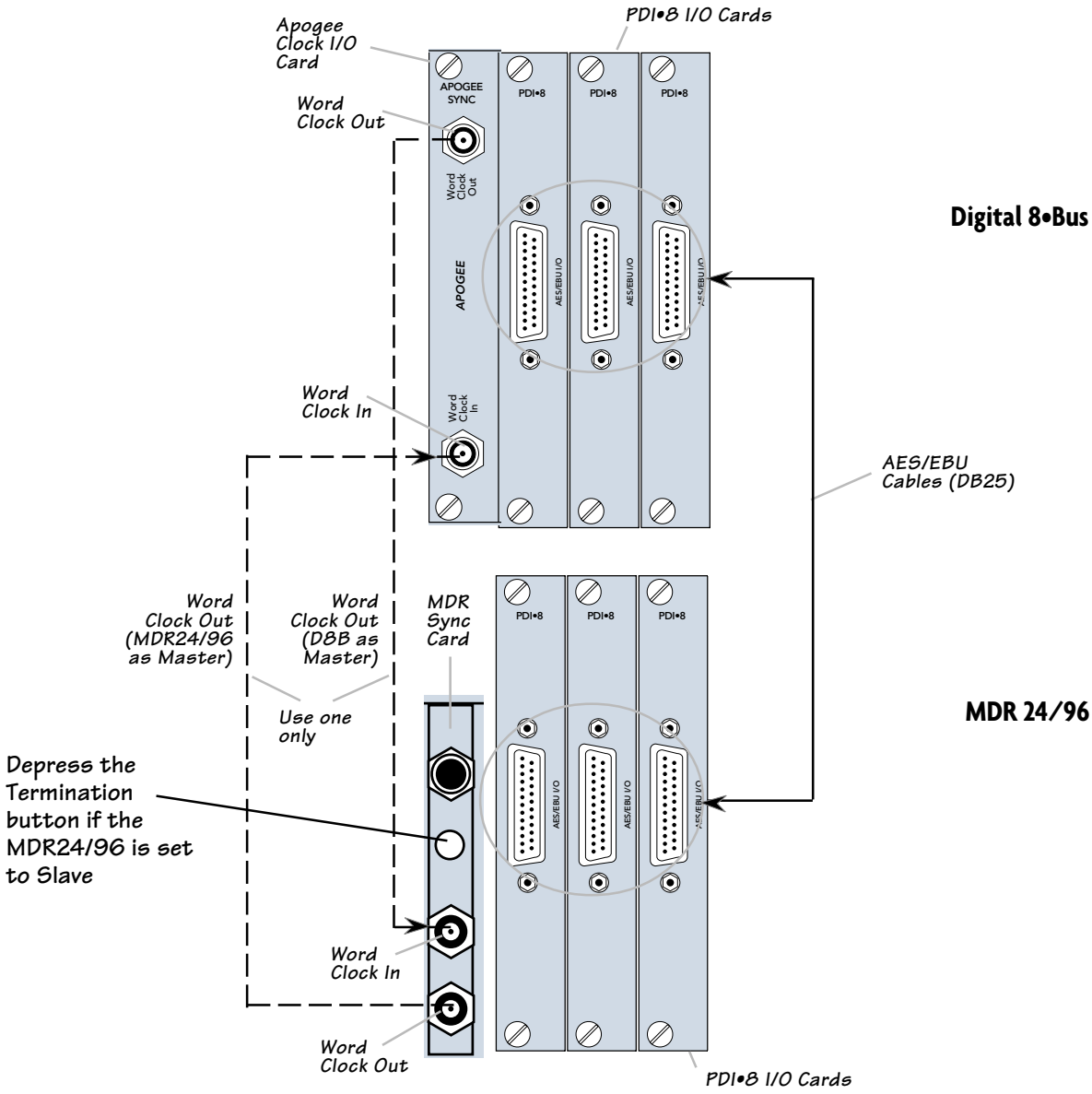


Figure 4

MDR24/96 Operation

Note: The front panel display blanks after several minutes of being idle. Pressing any button below the display will turn it back on.

Now that you've finished installing and configuring the MDR24/96, you're almost ready to start your first Project. We still want you to read this entire guide, but we already hear some of you shuffling and muttering. Okay, okay, okay... for the terminally impatient, read this chapter, then you can go out and play with your friends.

This section explains all you need to know to run a basic recording session: opening and creating Projects, operating the Transport, setting levels, and recording and overdubbing tracks. After you're done recording, you will learn how to back up your project to Mackie Media M•90 and Mackie Media PROJECT drives.

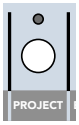
Project Management

Creating Projects

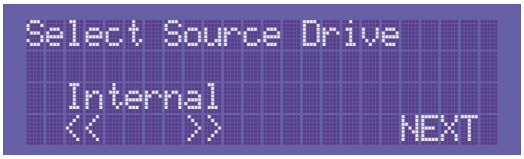
Now that you have a few basics down, you're ready to start recording. First, you'll need to create a new Project. Typically a Project is a song, radio spot, or sound effects stem for a 10-minute film reel, but it could also be a live concert or an entire symphony.

To create a new Project:

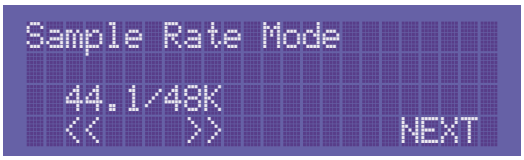
1. Press **PROJECT**, then select **New**. The MDR24/96 asks if you want to save the currently open Project. Press **No** to discard the changes you may have made to the demo Project.



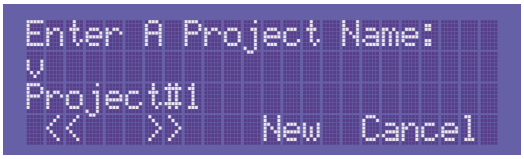
2. Choose the drive you want to create the Project on by selecting either **Internal** or **External** from the Select Destination Drive screen using the **(–)Dec** / **(+)Inc** or **<< / >>** buttons. The selection defaults to the drive containing the currently open Project. Press **NEXT**.



3. Select either **44.1/48K** or **88.2/96K** from the Sample Rate Mode screen using the **(–)Dec** / **(+)Inc** or **<< / >>** buttons. The Sample Rate mode determines whether your project will be a 24-track Project at 44.1 or 48 kHz, or a 12-track Project at 88.2 or 96 kHz. Once a Project is created the Sample Rate mode cannot be changed. Press **NEXT**.



4. The name "**Project#1**" appears on the left side of the LCD screen. A pointer ("**v**") appears above the first character of the name to indicate that you can change that character.



Press the **(–)Dec** / **(+)Inc** buttons to select the character you want in that position. Select the >> button to move the pointer to the next character.

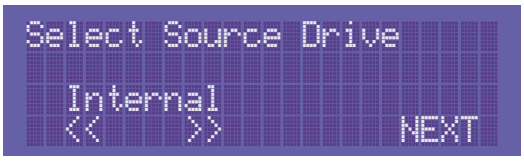
Opening Projects

The MDR24/96 organizes audio files and session information into folders called Projects. When the MDR24/96 boots up, it automatically opens the last Project you worked on. We've included two demonstration Projects, *Ode to Masters* and *Little Bit of Love,* to help you get familiar with the MDR24/96 right out of the box. At this point, you should see the name of the demo Project in the LCD display.

To open a Project:

1. Press **PROJECT**. In the **PROJECT MENU**, select **Open**.

2. Choose the drive you want to open the Project on by selecting either **Internal** or **External** from the Select Source Drive screen using the **(–)Dec** / **(+)Inc** or << / >> buttons. The selection defaults to the drive containing the currently open Project. Press **NEXT**.



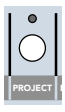
3. Use the **(–)Dec** / **(+)Inc** or the << / >> buttons to select the desired Project, then select **Open**.

Saving Projects

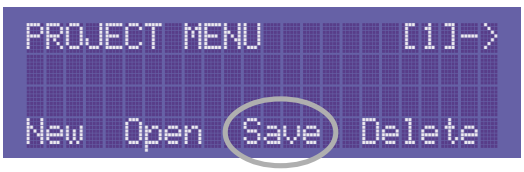
Every time you record new audio, the audio data and Project information is automatically saved to disk. However, if you make other changes to the Project (setting Locates, editing etc.) without recording new audio, you must save the Project for these changes to be remembered. In other words, if you quit without saving, no audio is lost, but your changes are. So once you start editing, save often.

To save the current Project:

1. Press the **PROJECT** button.



2. From the **PROJECT MENU**, select **Save**.

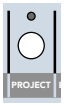


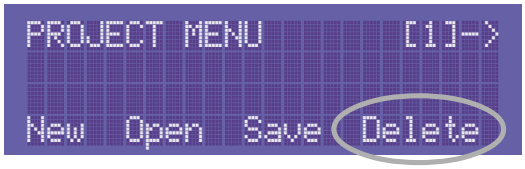
3. Press the **PROJECT** or Page Left (<) button again to exit.

Deleting Projects

First and foremost, backup your projects daily on an external drive, either the Mackie M90 hard drive or the Mackie Project Drive. When you have finished a project and no longer need the project on the internal drive, perform a final backup and remove it from the internal drive. First, backup the project to an external drive as described on the next page, "Project Backup/Restore." The project you wish to delete cannot be the active project. The MDR24/96 will warn you if you try to do this, so be sure to open a different project first. Then delete the project.

To delete a project from the internal or external drive:





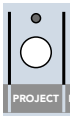
1. Press the **PROJECT** button.
2. Press the **Delete** select button.
3. Using the **(–) DEC / (+) INC** or the **<< / >> SELECT** buttons, choose the Internal or External drive and press the **Next** select button. In this scenario you would choose **Internal**.
4. Choose the project you wish to delete with the **(–) Dec / (+) Inc** or the **<< / >>** buttons. Press the **Del** select button to delete the project.
5. You will see a prompt to confirm that you wish to permanently delete the project from the drive. Choose **OK** to delete the project.

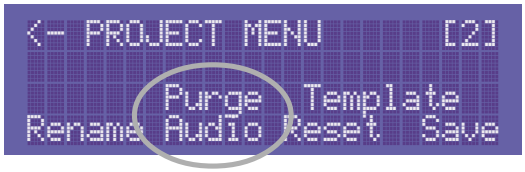
Purge Audio

Another way to reclaim disk space is to use the Purge Audio command. This command will completely remove any audio from the hard drive that is no longer in use. What does this mean? Audio that you can hear is in use. Audio that is on a virtual track is in use as well. Audio that has been recorded over completely is not in use. Audio that has been completely pasted on top of is also no longer in use. The MDR24/96 will not purge any files that are partially in use. If you paste a section of audio on top of the first ten seconds of an eight minute audio file, the MDR24/96 will consider the whole 8 minute file as in use and will not delete it. See the Virtual track description for further information on how audio files are handled.

Normally, the purge audio command is something you do at the very end of a project. Perform the purge just before you back up for the last time. This will ensure that you don't remove something that may decide you need later.

To purge unused audio files:





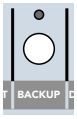
1. Press the **PROJECT** button.
2. Press the Right Arrow button to move to page two of the **PROJECT MENU**.
3. Press the **Purge Audio** select button.
4. You will see a prompt reminding you that this command cannot be undone and asking you to confirm the purge command. Press the **OK** select button to purge unused audio or the **Cancel** select button to exit.

Project Backup/Restore

With Mackie Media drives, you can back up your Projects on removable media that you can hand to the client or store in your tape library. Backing up and restoring Projects is as simple as copying the Projects between the internal and the Mackie Media drives.

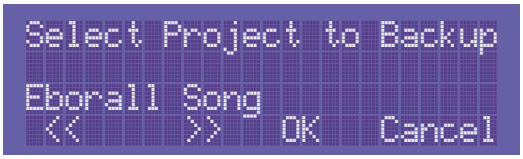
To copy Projects between the internal and Mackie Media drives:

1. Press the **BACKUP** button.



2. Using the **(–) Dec / (+) Inc** or the **<< / >>** buttons, select **Set Source** to set the drive the Project will be copied from, and **Set Dest** to set the drive the Project will be copied to. Since a Project can't be copied onto itself, the source and destination drives must be different.

3. Select **OK** to return to the Backup menu, then select **Backup**. Choose the desired Project using the **(–) Dec / (+) Inc** or the **<< / >>** buttons.



4. Press **OK**. When the backup is completed, either select another Project to back up or press the **BACKUP** button to exit.

It is **extremely** important that you make backup copies of your projects at the end of each session. While digital recording technology is highly reliable and hard disk media is durable, sometimes stuff just happens. To reduce your risk of catastrophic data loss (and the possible loss of $$ and clients), back up your projects on two media before deleting them from your working drive(s).

There…. now you know better. So, don't wait until disaster strikes to get backup religion, and don't complain to Mackie when your pet Rottweiler discovers that the only copy of your client's $20,000 project makes a superb chew toy and buries the drive in the garden.

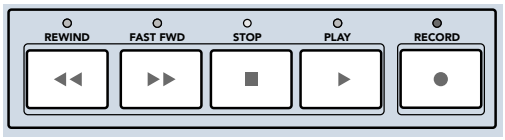
Basic Transport Operations

The MDR24/96 transport and recording controls are similar to those on most multitrack tape recorders.

Play

PLAY puts the MDR24/96 into play from any state (as if you didn't know). Play also punches out of record and cancels master record standby while leaving the Transport in play.

To put the Transport into play:



- Press **PLAY**.

Fast Wind

REWIND and **FAST FWD** put the MDR24/96 into fast wind mode from any state. They behave just like those on a large multitrack recorder – when pressed from stop, the "tape" rolls slowly at first, then accelerates to 20X speed in a few seconds. Pressing either button a second or third time increases the winding speed still further.

To put the Transport into fast wind:

- Press **REWIND** or **FAST FWD** one, two, or three times.

Stop

STOP brings the "tape" to an immediate halt. Stop also punches out of record and cancels master record standby.

To stop the Transport:

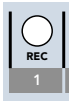
- Press **STOP**.

Record

All recording in the MDR24/96 is non-destructive. When you record over existing audio, the old audio is not "erased" as it with magnetic tape; rather, new audio files are created in addition to the existing files.

Recording can only take place on tracks that are "armed" for recording.

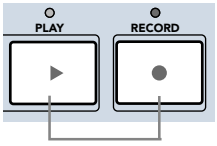
To arm tracks for recording:



1. Press a track's **REC** (Record Ready) button.
2. Press it again to disarm the track.

The Record Ready LED blinks when a track is armed and ready to record, and glows when the track is recording.

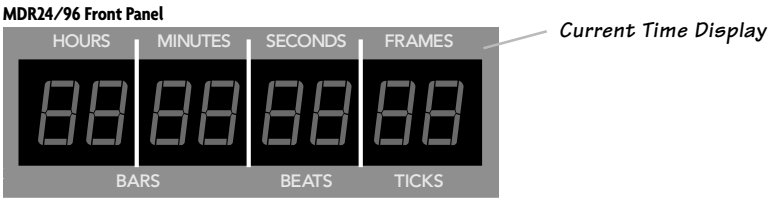
To record:



1. Arm one or more tracks.
2. Press **PLAY** and **RECORD** simultaneously.
3. Press any Transport button other than **RECORD** to stop recording.

The Record LED glows when the MDR24/96 is recording and blinks when **RECORD** is engaged with no tracks armed (master record standby mode).

Time Display



The Current Time display shows the exact position of the MDR24/96's "playback head." Current Time is displayed in SMPTE time (HH:MM:SS:FRAMES).

To change the Current Time:

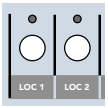
- Use the Transport **PLAY**, **REWIND**, **FAST FWD** or **LOC** buttons.

Locate Points and Looping

Locate points provide fast access to frequently used locations in your Project. The MDR24/96 has two numbered Locates (two additional numbered Locates are available when using the Remote 24 or Remote 48). Storing a Locate point saves the Current Time (Transport position) to the Locate button. Recalling a Locate causes the Transport to jump to the stored time.

To recall a Locate point:

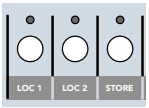
- Press **LOC 1** or **LOC 2** to jump to that point.



To store numbered Locate points:

Locate points can be stored either on the fly or when stopped.

1. Press **STORE**. The store light will blink to indicate that the MDR24/96 is ready to save a Locate point.
2. Press **LOC 1** or **LOC 2** when the Transport is at the desired time; the store light will go out, indicating that the point has been stored.



Locates 1 and 2 double as start and end points for looped playback. When looping is enabled, playback cycles between the Loop Start and Loop End points. The order of the Loop points does not matter. If Current Time is outside the Loop points when playback starts, the transport jumps to the Loop Start point; if it is between the Loop points, playback starts from Current Time.

To enable Looping:

1. Press **LOOP 1-2** to enable looping.
2. Press **PLAY** to start loop playback.

Locates 3 and 4 serve as punch-in and punch-out points when **PUNCH** is selected from a remote control. Punch is an automatic recording feature that switches a record-armed track (or tracks) into Record mode at a specified punch-in point (**LOC 3**), and takes it out of Record at the specified punch-out point (**LOC 4**). See "Auto Punch" on page 42 for more details.

Recording

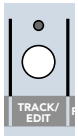
Saying the MDR24/96 is just a 24-track recorder is like saying a Ferrari 550 is just a car. It's true, but it misses the point entirely. The MDR24/96 has many features that place it above an ordinary 24-track recorder.

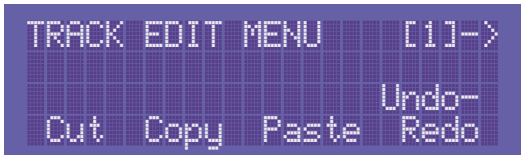
Virtual Tracks

One difference between the MDR24/96 and some other recorders is the virtual tracks. Each of the 24 tracks on the MDR24/96 is actually one of eight virtual tracks. These virtual tracks give you places to hold onto old takes, just in case they turn out to be gems. Virtual tracks can also be used as a scratch pad to try out different edits. First let's learn how to access the virtual tracks and later we will present you with a few examples on how you can use them most effectively.

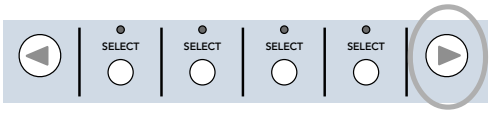
To access the virtual tracks selection menu:

1. First press the **TRACK/EDIT** button.





2. Press the Right Arrow button to move to the second page of the **TRACK EDIT MENU**.

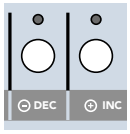


3. Then choose the **Set Virtual** select button.

You will be presented with a screen containing two rows of numbers. The top row displays the track numbers from 1-24 without the tens digit. The first 1-9 represents tracks 1-9, the next 0-9 represents tracks 10-19, and the final 0-4 represents tracks 20-24. The next row of numbers is the current virtual track number for the track listed above it. Here is an example of what you might see in the Virtual Track menu:

This display shows that tracks 1-4 are playing back virtual track 1, tracks 5-9 are playing virtual track 2, tracks 10-21 are playing virtual track 8, and tracks 22-24 are playing virtual track 4. By default the entire second row should display all ones. This means that to begin with all the tracks are playing back their first virtual track.

4. Use the << and >> **SELECT** buttons to select a track number from the top line; the selected track number will appear as an "_" instead of its number. Now press the **(–) DEC** / **(+) INC** buttons to change the virtual track on the selected channels. This screen allows you to manually set any track to any of its eight virtual tracks.



It is often convenient to display the virtual track window while tracking so you are always aware of which virtual track you are recording onto for any given track.

Track Mutes

The MDR24/96 allows you to mute the playback of any track. This can be useful to mute certain tracks while editing without having to reach for your mixer board. Also, if you have an automated mix set up on your digital mixer, you can mute tracks from the MDR24/96 without disrupting the mixing console. Finally, when editing instruments spanning multiple tracks such as a drum kit, it may benefit you to listen to just a particular part of the drum set to fine tune your edit points. With track mutes, you can easily mute everything but the desired tracks and edit to your hearts content.

To mute a track:

1. First press the **TRACK/EDIT** button.

2. Press the Right Arrow button to move to the second page of the **TRACK EDIT MENU**.

3. Press the **Mute** select button.

The dialog window will tell you to press the track arm buttons to toggle the mute status on a track. If the Record Ready LED is lit while the mute screen is displayed, the track will be muted, and if the Record Ready is not lit, the track will play normally.

4. Use the Record Arm buttons to mute and unmute tracks. Press the **OK** select button to leave the Track Mute menu.

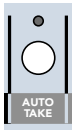
The Record Ready LEDs change to their previous state, but any muted tracks will remain muted until you return to the mute screen to change their status. The meters continue to show playback on muted tracks, but the outputs will not pass audio.

Record Safe

Record Safe locks out all Record Ready and Master Record switches. Any tracks that are armed become disarmed when Record Safe is activated. If the transport is running in Master Record mode (whether actually recording or not), the record operation is canceled.

You'll find the **REC SAFE** button above the floppy disk drive.

Auto Take



Sometimes you may want to record multiple passes, each on a different Virtual Track. Instead of forcing you to manually change virtual takes after each record pass, we have included the handy **AUTO TAKE** button to automate this for you. With the **AUTO TAKE** button engaged, the MDR24/96 will step through virtual tracks on each record pass for all Record Ready tracks. For example, if you are recording vocals on track 12, your first take may be on virtual track one. With the **Auto Take** button engaged, the next time you press record, the virtual track on track 12 will be incremented to virtual track 2. This will continue all the way through virtual track 8. If you press record again, it will change back to virtual track 1 and continue the cycle again. This is very handy with the **LOOP** button enabled to automatically record a section of a song, and do eight passes on the eight different virtual tracks.

Monitoring

The Monitor Mode buttons determine what you hear from the MDR24/96 Tape Outputs. The MDR24/96 offers several familiar monitoring modes to facilitate rehearsal, tracking, and overdubbing.

All Input

All Input is used for rehearsal and level setting. When All Input is on, both armed and unarmed tracks monitor their inputs, and the Auto Input setting has no effect.

To enable All Input:

- Press the **ALL INPUT** button. The LED above the button lights when All Input is on.

Auto Input

Auto Input is used for recording. Auto Input affects only tracks that are in Record Ready (“armed”). Tracks that are not armed only monitor the playback of previously recorded audio. All Input overrides Auto Input. To use Auto Input, All Input must be turned off.

When Auto Input is On, armed tracks monitor their inputs in Stop, Fast Forward, Rewind, and Record. In Play, you hear only what’s already recorded on the tracks. This mode is used primarily for tracking and overdubbing, where you want to hear what’s been previously recorded on the track before the punch-in and after the punch-out. During the punch, you hear what is presently being recorded. Auto Input On is the default mode when you power up the MDR24/96.

When Auto Input is Off, armed tracks always monitor their inputs. This mode is used primarily for rehearsal and tracking, where you want to always hear what you’re playing rather than what’s already recorded on that track.

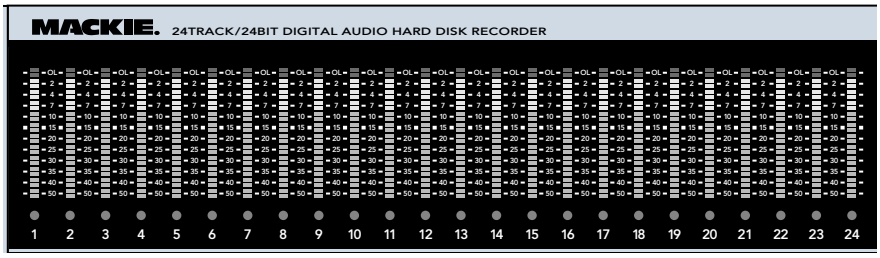
To enable Auto Input:

- Press the **AUTO INPUT** button. The glowing LED above the button indicates that it’s ON.

Metering and Setting Record Levels

A professional analog recorder has meters that indicate 0 VU at a +4 dBu nominal signal level. Generally you can record peaks 10 to 15 dB above that before distortion becomes objectionable. This 10-15 dB range above the nominal level is called “headroom”. The overload indicators on the MDR24/96 light when the signal level reaches –1 dBFS.

On digital recorder meters, zero represents the full-scale digital signal level, 0 dBFS for short. 0 dBFS is the hottest signal that a digital device can handle, with no headroom to spare. When a digital signal reaches 0 dBFS for more than a sample or two, the resulting distortion is uglier than scraping your fingernails across a chalkboard.



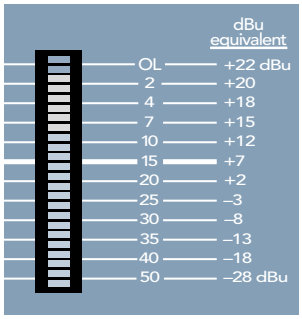
Remember, audio levels must NEVER reach 0 dBFS... never, ever, ever. Digital clipping is an extremely nasty sound that could only pass for music if you like what those crazy kids listen to over and over at all hours of the night including weekdays.

To get the best sound from the MDR24/96:

1. Turn **ALL INPUT** on. 

2. Ask the talent to play or sing as loud as they will be performing during the session. While watching the MDR24/96 meters, adjust the console’s tape outputs so that the signal peaks cause the red overload indicators to come on occasionally. Then, back off the tape output level slightly. This insures the best fidelity and the widest dynamic range in the recorded signal and leaves you a little headroom to accommodate the talent’s enthusiasm. Keep the signal levels as high as possible without overload, because recording at lower levels reduces resolution and dynamic range. Nonetheless it is always better to be conservative and avoid the risk of overload than to try squeezing the last ounce of dynamic range from the signal.
3. Alternately, if you have a tone generator or a sound source with a constant volume (you can hold down a key on a synth), turn All Input on and send the tone to all 24 tracks of the console. Adjust the output levels to read 0 VU on analog consoles, or around –20 dBFS on digital consoles. If the MDR24/96 meters read –15 to –20, you’re in good shape. This leaves enough headroom for most popular music, but if you’re recording acoustic music, jazz, classical, or narration, you may want to leave a little more. When the talent starts to play you may have to make some final tweaks to get everything just right.

4. After adjusting the tape output levels for each console channel, follow your console manufacturer's instructions for setting the console tape return levels.



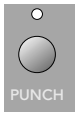
With analog I/O, a +22 dBu signal at the MDR24/96 inputs and outputs corresponds to 0 dBFS inside the MDR24/96. So, if your console has a nominal output level (0 VU) of +4 dBu, there is 18 dB of headroom before you hit the maximum record level on the MDR24/96. It also means that your console must be capable of putting out at least +22 dBu without distortion so the console doesn't clip while the recorder is still within its working range. Most professional consoles can output +22 dBu without breaking a sweat (like the Mackie Analog and Digital 8•Bus consoles). But beware that semi-pro consoles often operate at a nominal output level of –10 dBV and will run out of steam before reaching a level that can take advantage of the recorder's full resolution.

Auto Punch

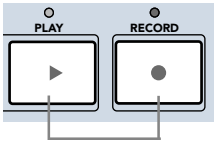
The Auto Punch function automatically starts and stops recording on armed tracks at preset punch-in and punch-out times, just as if you had pressed the appropriate buttons. Auto Punch is frequently used in combination with the Loop (page 37) and Auto Take (page 40) functions. This feature is only accessible from either the Remote 24 or Remote 48.

Typically this feature is used when you want to re-record a portion of a track. By setting up auto-punch points, you can be assured of punching in and out at the same spots on every pass, protecting yourself from accidentally recording over a good section of the track. By setting Loop points surrounding the Punch points, you can continuously repeat a punch until you get it right or decide you need to practice the part some more.

The Punch markers share duties as **LOC 3** and **LOC 4** points (page 37). While it's logical to set **LOC 3** to the punch-in time and **LOC 4** to the punch-out time, recording always starts at the earliest of the two times, and stops at the later time.



In order to perform an automatic punch, **PUNCH** must be enabled from the remote, the track on which you're punching must be in record-ready, and the recorder must be running in the Master Record mode. When in the Punch mode, the MDR24/96 will actually record only between the two Punch markers. Pressing the **RECORD** button when outside the markers will have no effect other than arming for auto-punching. Within the Punch region, you can stop recording by pressing either the **STOP** or **PLAY** button, and you can use the **RECORD** + **PLAY** buttons to punch in and out anywhere within the Punch region.



Automatic punching can only be set up, enabled, and disabled from the remote controllers. Once the punch-in and -out points are set, you can use the front panel or remote controllers to control recording in the Punch mode. Punch must be disengaged on the remote in order to manually control recording operations outside of the Punch area.

Rehearse

Rehearse (only available on the remote control) is a tool that you can use to determine if a punch-in at your chosen point will work, without committing a recording pass to disk. In the Rehearse mode, upon entering Record (track enabled and the Master Record button pressed), monitoring switches from playback to input, just as in the Auto Input On monitor mode. The difference is that no audio is recorded. This is a carry-over from the days of destructive punch-ins, when you might want to check to see if the punch will transition smoothly before erasing the old track.

Some people may never use this function because it's always possible to undo a recording pass if you make a bad punch. After all, why risk losing a take when it can be undone? But Rehearse is handy for setting auto-punch start and end points without wearing out the talent or recording blank space.

Rehearse mode can be accessed from a remote controller by pressing the **REHEARSE** button.

Footswitch Operation

The MDR24/96 can be set up to perform key functions simply by stepping on a footswitch. Simply connect a normally open footswitch to the **FOOT SWITCH** jack on the back of the MDR24/96. You can also connect a second footswitch with a different function assignment to the Footswitch input of a Remote 24 or Remote 48 Pro. The footswitch is extremely handy when you want to use your hands for other tasks, like playing your instrument, working the console, or eating pizza. Punching in and out is probably the most common use of the footswitch, but it can do other tricks as well.

Punch: The Punch function is used to punch in and out of record on selected tracks. Simply press the record arm buttons on the tracks you wish to punch in on and start the MDR24/96 playing before the punch point. When you reach the point that you want to begin recording, hit the footswitch. When you are finished with the punch, hit the footswitch again. Recording stops but playback continues.

When punching, the input monitoring mode is important. If Auto Input Monitor is selected, you will hear track playback on the record-armed tracks until you punch in. At that point you will begin to hear the incoming audio being recorded. When you hit the footswitch again to punch out, you will again hear the track playback. If you do not have Auto Input monitoring selected, you will always hear the incoming audio on the record-ready tracks. If you have All Input monitoring selected, you will not hear any track playback at all; this is not normally used when punching.

One final word about punching: it is a good idea to plan ahead with your punch and find a second or two of silence at which to punch in and out. This will ensure that you have no audible glitches at the punch points.

Stop/Play: The Stop/Play footswitch function does just what it says—it allows you to start and stop the transport with your foot. If the transport is stopped, press the footswitch to start it. If the transport is playing, press the footswitch to stop it. Rinse and repeat. It's just that easy!

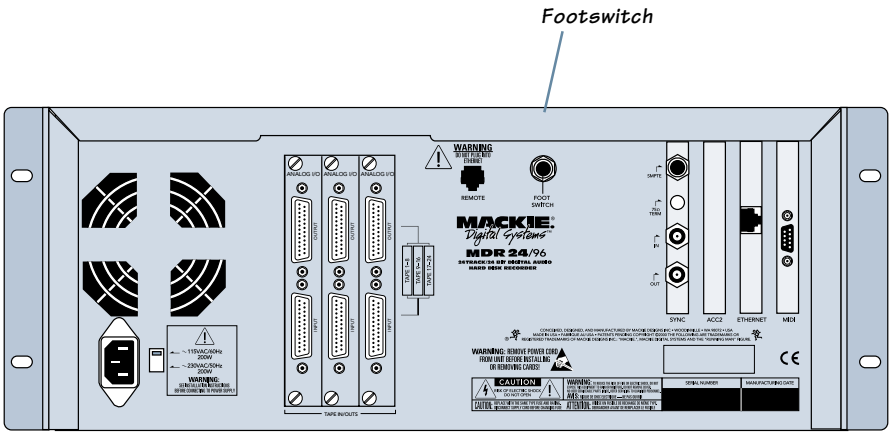
Cycle Cue: This function is not currently implemented on the MDR24/96.

New Cue: This function is not currently implemented on the MDR24/96.

Solo (Remote Only): This choice is available for the Remote Footswitch but not for the MDR24/96 Footswitch. Although you cannot solo a track on the MDR directly, it can be soloed with a footswitch attached to a Remote 24. The footswitch solos the channel displayed in the Track Number window on the Remote 24. The meters on the MDR24/96 will continue to display signal on all of the tracks with audio, but the MDR24/96 will output audio from only the soloed track. Press the footswitch again with the same track selected to disengage the solo function and to return the MDR24/96 to regular operation. You can also select a different channel on the Remote 24 and press the footswitch to solo that channel instead.

To change footswitch function for the MDR24/96 or a Mackie Remote:

1. Press the front panel **SYSTEM** button.
2. Press the Right Arrow button to move to the second page.
3. Now press either the **Footswitch MDR** or the **Footswitch Remote** select button.
4. Use the **<<** and **>>** select buttons to change the assignment of the selected footswitch. Press the **OK** select button to choose a setting. The MDR 24/96 has four functions that can be assigned to the footswitch; the remote adds a fifth.



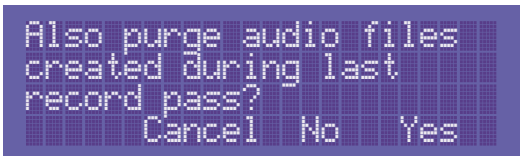
Editing

Delete Last

One way to save disk space is to use the **DELETE LAST** button after a bad recording pass. One of the benefits of digital recording with the MDR24/96 is that you can keep every take and decide later which one to use. But sometimes you know right off that the last take will never see the light of day. In these instances you can quickly reclaim disk space by deleting the last record pass. Keep in mind that this command will delete audio from all tracks recorded on the last pass. If the vocal was great but the guitar was junk, re-record the guitar but do not perform the Delete Last Command; you don't want to lose the vocal too.

To delete the last recording pass:

1. Press the **DELETE LAST** button.



2. "**Purge audio files created during the last recording pass?**" appears in the display.

Choose **Yes** to delete the pass and the audio files to reclaim disk space. This is normally what you will choose. The track reverts back to any audio that was previously recorded onto it.

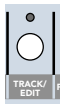
Choose **No** to delete the take but to leave the audio file on the hard drive. The take will no longer play but the audio file will remain on the hard drive. This is useful if you want to back up every single take, even the bad ones. The track reverts back to any audio that was previously recorded onto it.

Choose **Cancel** if you decide that you do not want to delete the last take.

3. If you chose **Yes**, you will see a readout describing the progress of the delete function. When it reaches 100%, the Delete Last function is finished, and the main project returns to the display.

Alternate method:

1. Press the **TRACK/ EDIT** button and select **Undo-Redo**.



2. From the Undo-Redo menu, select **Undo.**

Track Edit

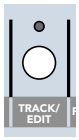
The **TRACK/EDIT** button gives you access to the set of non-destructive editing tools on the MDR24/96. The MDR24/96 allows you to cut or copy a piece of audio from any track and paste it onto any other track. You can, for example, move a vocal from the first chorus of a song and paste it over a take in the second chorus. You are also able to cut or copy from multiple tracks at once and paste them onto a different group of tracks. If you need to replace the background vocals from a chorus, you could copy from the multiple backing tracks from the first chorus and paste them in the second. One final example to whet your appetite: if you have a few different vocal takes on virtual tracks, you can easily copy them from one virtual track to another to create a perfect composite vocal take. Now that we have described the possibilities, let's explain how to do all this.

When audio data is cut or copied from a track it is placed on a virtual clipboard where it is held until you decide to put it somewhere. Data will also be removed from the clipboard when you replace the contents with something else. This means that you can copy a guitar line from one track then, record a bass part, drink some coffee, play your project a few thousand times, and finally decide to paste the guitar line and everything will be perfect. It also means that if you are not careful, you can accidentally lose audio. You might cut a bass drum kick, but if you decide to then copy a vocal and forget to paste the bass drum first, the bass drum will be replaced by the vocal on the clipboard. Since you cut the bass drum from its original position, it will no longer be on the track and because you did not paste it, it will be gone from the project. This is why it is always a good idea to paste audio right after you cut it. But remember that editing on the MDR24/96 is non-destructive so you can cut and copy all you like knowing that your audio is safe and sound. When you perform edits, the MDR24/96 is not actually moving the audio. Instead you are just reorganizing the order in which the MDR24/96 plays the audio files. All editing commands are remembered in a 999-level history list so that every edit can be undone and redone until you are satisfied (see Undo-Redo later in this manual).

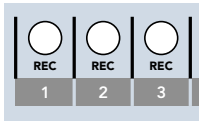
To perform an edit you must tell the MDR24/96 three things: what type of an edit you would like to perform, what tracks to perform the edit on, and the audio range that you would like the edit to cover.

To perform an edit:

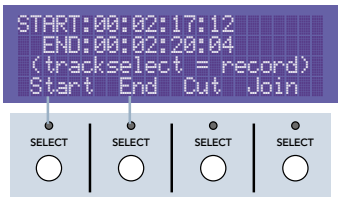
1. First press the **TRACK/EDIT** button to enter the **TRACK EDIT MENU**. Press either the **Cut** or **Copy** select buttons to enter a menu for placing audio data from a track onto the clipboard. Press the **Paste** select button to enter a menu allowing you to return clipboard data to an audio track. These buttons do not perform the operation but take you to a specific menu for that command.



2. You will now be in a menu for the specific operation chosen. You may notice that the Record Ready lights have all gone out, even if you had some tracks in Record Ready mode. This is normal; the Record Ready lights have many duties on the MDR24/96. In an edit menu, they are used to choose which tracks to perform an edit to. Press the **REC** (Record Ready) button on the track you wish to edit. If the red Record Ready light for a track is lit, the edit will be performed on that track. As mentioned previously, you can select multiple tracks simultaneously to edit them all at once. Read on for more detailed information about each edit type.



3. Look at the screen and you will see a Start time and End time (you will not see an End time if you have chosen Paste as the edit function). These numbers signify the time range to perform the edit between. The Start time is where you want the edit to begin and the End time is where you want the edit to end. First, enter the end time by moving the transport to the desired position by using the transport buttons. When you see the desired End time on the time display, press the **End** select button. Now position the transport to the desired Start time and press the **Start** select button.

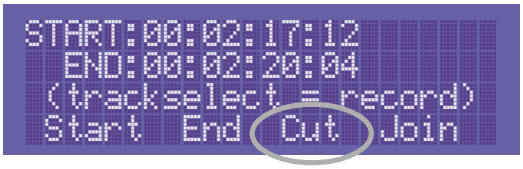


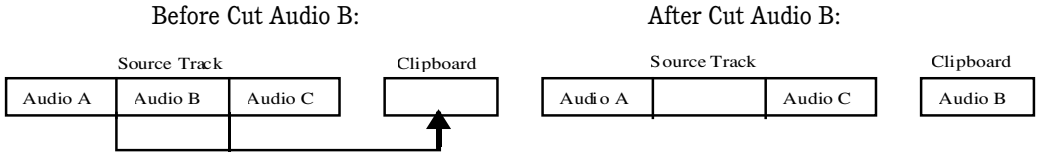
4. Press the **Edit** select button to perform the operation.

There are five edit operations on the MDR24/96. Three are different ways to place audio onto the clipboard, and two are different ways to return audio from the clipboard to the selected track(s).

Cut

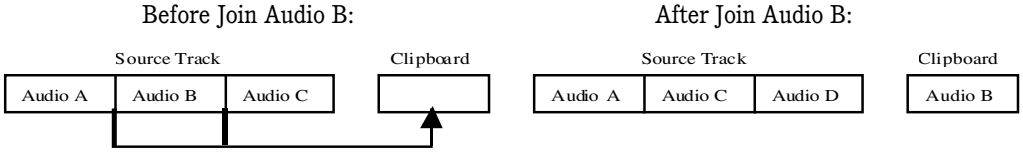
Access the Cut command by first pressing the **TRACK/EDIT** button, then pressing the **Cut** select button, and then choosing **Cut** when you are ready to perform the operation. Cut removes the audio between the Start and End points on the selected tracks and places it onto the clipboard. In its place on the original track will be blank space, silence. Use the Cut command if you want to remove a section from a track because you don't like it or because you want to move it someplace else. Cut should be used if you would like everything else on the track to remain in the same position.





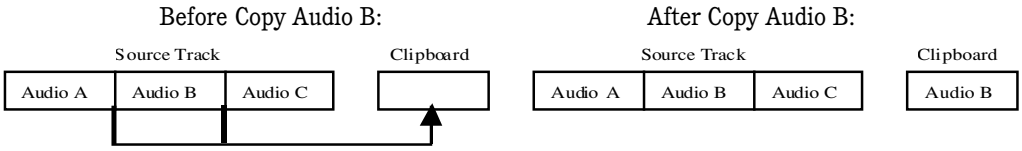
Join

Access the Join command by first pressing **TRACK/EDIT**, then pressing the **Cut** select button, and then choosing **Join** when you are ready to perform the operation. Join is similar to Cut in that it removes the selected audio from the track and places it onto the clipboard. The difference is that a blank space is not left behind. Instead, any data on the selected tracks following the edit selection will be slid back in time to join with the audio preceding the edit selection. This is analogous to removing a section of analog tape and splicing the ends back together; the cut section is thrown out and the remaining tape will now reach the play head earlier in time. The difference is that this can be done with just the selected tracks as opposed to all 24 tracks as is the case with analog tape. The Join command is useful for removing a section of silence from a live set or to fix phasing problems between two microphones on the same source by removing a very small amount at the beginning of one of the tracks.

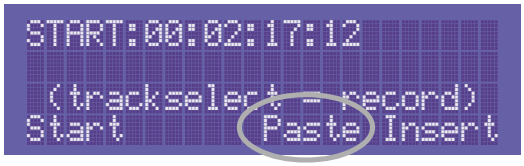


Copy

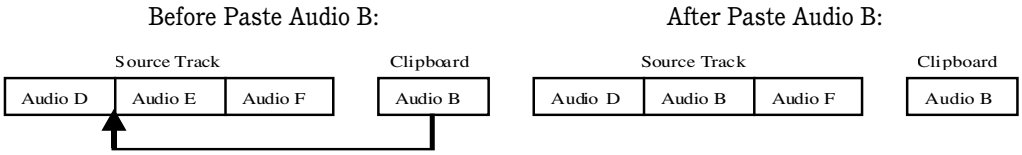
Access the Copy command by first pressing **TRACK/EDIT**, then pressing the **Copy** select button, and then choosing **Copy** when you are ready to perform the operation. The copy command places the selected audio onto the clipboard but it does not remove it from the original tracks; these are unaffected by the copy function. Copying audio is often used to replace bad sections of audio with a good section that came before it. For example, if a singer nailed the take for the first chorus but didn't have the required energy for the second, you can then easily copy her first chorus and paste it into the second.



Paste

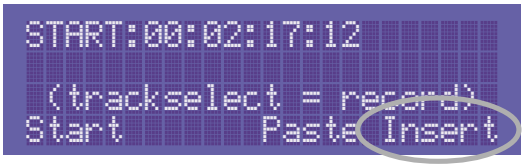


Access the Paste command by first pressing **TRACK/EDIT**, then pressing the **Paste** select button, and then choosing **Paste** when you are ready to perform the operation. The Paste command copies the contents of the Clipboard onto the selected audio track. This replaces any audio on the track with the audio on the clipboard. In the Paste Menu you only specify the Start point, not the end point. The length of audio on the clipboard determines the end point. This means that you must be sure that the audio on the clipboard is not longer than you think; if it is it may replace something that it shouldn't. But, if the selection on the clipboard has a section with no information where nothing was recorded into the original track, then the section being pasted over will not be replaced.

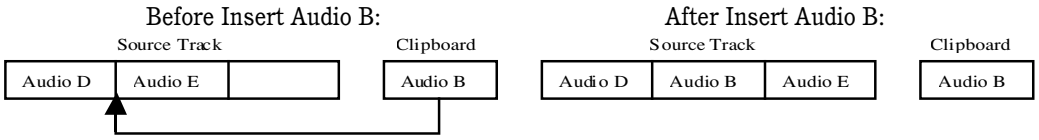


The MDR24/96 pastes multiple tracks based on the lowest track arm light that is lit when in the Paste Menu. It remembers the arrangement of tracks on the clipboard and will paste them accordingly. If we copy audio from tracks 12, 15, 16, and 17 and paste them starting on track 12, the MDR24/96 will paste the tracks in the same tracks they were copied from. If we instead paste these with the track 1 record ready light lit, the tracks will be pasted onto tracks 1, 4, 5 and 6. If multiple track arm lights are illuminated when pasting, the tracks will be pasted starting on the lowest one; the rest of the record ready lights are irrelevant. If a single track is pasted with multiple lights illuminated, the same will be true. The track will only be pasted on the lowest track, nothing will happen to the rest of the armed tracks.

Insert



Access the Paste command by first pressing **TRACK/EDIT**, then pressing the **Paste** select button, and then choosing **Insert** when you are ready to perform the operation. This editing function is another digital emulation of analog tape editing. When you perform an Insert, the data on the clipboard is placed onto the track specified. Instead of replacing existing data as would happen with the Paste function, audio is moved to make room for the clipboard contents. This is similar to analog tape editing: you could cut the tape in two pieces, insert the piece of tape you wish to add between the two ends, and tape all three together. The previous data will be shifted later in time to make room for the new audio. Again, with the MDR24/96 you can perform an Insert onto just the selected tracks instead of all of them. Insert can be useful when you need to increase the length of a verse by copying the exiting portion and inserting it again to double the length. It can also be useful to insert some silence at the beginning of a track.

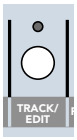


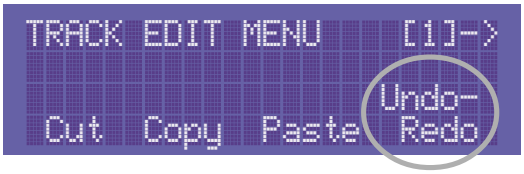
Undo/Redo

The Undo/Redo operation allows you to revert to any stage in your editing process. You can experiment with different edits and then compare the results with the original to decide if you want to keep an edit or not. You can also use the Undo-Redo to correct a bad recording pass. The MDR24/96 keeps a record of the last 999 commands you performed on the current project since the last time the project was opened. These are stored in what is called a History List. Think of the History List as a record of every command executed from the beginning of the session to the present state of the MDR24/96. This means that you can perform 999 edits, and undo back to the very beginning of the editing session. Because you can redo edits as well, you can go back and forth until you are satisfied. The MDR24/96 does not remember the History list forever. If you open a new session you must either save the current state of the MDR24/96 or choose not to save, thus reverting the project to the last saved state. When you open the project again, the history list will be cleared. If you turn off the MDR, the history list will also be forgotten.

To go to the Undo-Redo menu:

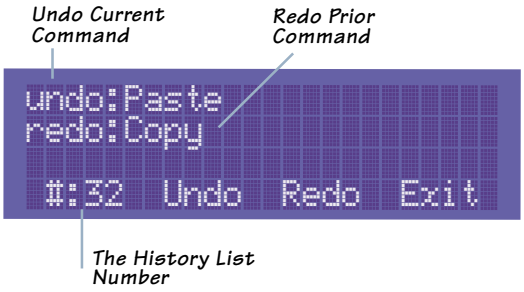
1. First press the **TRACK/EDIT** button.
2. Press the **Undo-Redo** select button.





You will now be in the Undo-Redo menu. On the top line of the display, you will see a listing of the command or function that can be undone listed after the word Undo. On the second line you will see the command or edit that can be redone listed after the word Redo. You might see the words Record Pass, Cut, or Paste listed to name a few. The bottom left corner of the screen shows which History

List item number you are currently on. As you undo or redo items you will see this number decrease or increase. Keep note of this number when you find something you like or write it down before you perform a series of edits so that you can quickly navigate to this history point again.



3. Press the **Undo** select button to undo the command listed. This will reduce the history list number by one.

-or-

3. Press the **Redo** select button to redo the command listed. This will increase the history list number by one.

If no items can be undone, **None** will be displayed as the undo command. Pressing the **Undo** select button will have no effect. Similarly, if no items can be redone, **None** will be displayed as the redo command. Pressing **Redo** will have no effect as well.

Editing Examples

The following are examples of specific applications of the MDR24/96 editing commands. These illustrate how the commands can be effectively used. Use these as jumping off points and apply these techniques to other situations. We will not describe every button to press; refer to the above sections for details.

Replacing a Multiple Track Chorus

In this example, we would like to move a copy of the first chorus and replace the second chorus with it. What makes it seem tricky is that we need to move the Lead Vocal, as well as three tracks of background vocals. The MDR24/96 can handle this task easily.

Navigate to the Copy Menu by pressing the Copy button on the first page of the Track/Edit Menu. Press the **REC** (Record Ready) buttons on the tracks containing the vocals, in this example press **REC** on track 12 for the lead vocal, and tracks 15, 16, and 17, which contain the backup singers. Use the transport and the End and Start buttons to mark the ending and beginning of the chorus you wish to copy. Be sure that the section is identical in length to the chorus you wish to replace. If the selection you copy is too long, it may replace the beginning of the vocals following the chorus, which would be undesirable. When you have identified the start and end points, press the **Copy** select button and the contents of the four selected tracks are placed onto the clipboard. Now use the transport to find the spot just before the second chorus where you would like to paste the clipboard.

Go to the Paste Menu and press the **Start** select button to mark the current locator position as the point you would like to start the paste. Be sure that the track 12 Record Ready light is lit; this tells the MDR24/96 that track 12 is the first track we wish to paste onto. Since we copied multiple tracks, the MDR24/96 will paste the first copied track onto track 12, and the rest will be in the proper order on the correct tracks. Press the **Paste** select button. The contents of the clipboard will be placed on tracks 12, 15, 16, and 17, replacing the bad take of the second chorus with the good take from the first. You may need to fine-tune your placement by undoing this operation and changing the location with the transport controls slightly to place it at the exact point. If so, press the **Undo/Redo** select button from the Track/Edit Menu, and then choose **Undo**. This will undo the paste. Adjust the locator position, go to the Paste Menu to mark the Start point, and choose **Paste** again. Repeat this until the chorus is placed perfectly.

Deleting a Section of Audio

The MDR24/96 has no edit command to simply delete a section of audio. This is because this can easily be done by simply cutting the section, and not pasting it anywhere. It won't be permanently deleted unless you later Purge Audio and the MDR24/96 determines that the audio file is not in use anywhere else. At that point the audio will be permanently removed.

Find the section you wish to delete and Press the **TRACK/EDIT** button and then the **Cut** select button. Press the **REC** (Record Ready) button on the track containing the audio you wish to delete. Use the transport and the **End** and **Start** select buttons to mark the ending and beginning of the section you wish to delete. Choose **Cut** when you are ready to delete the section. Now, go about the rest of your editing without pasting the audio. When you cut or copy the next section of audio, the previous contents of the clipboard will be removed and essentially deleted.

If you wish to permanently delete this file, press the **Purge Audio** select button found on the second page of the Project menu. If no part of this file appears elsewhere in your project, it will be purged, permanently removing it from your hard drive (see "Purge Audio" on page 34).

Making a Vocal Comp

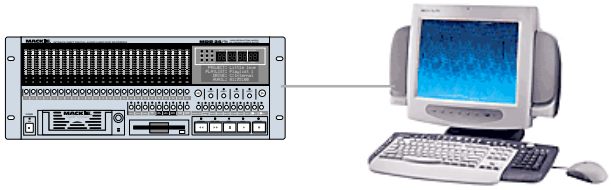
When recording vocals, it is often necessary to record multiple takes and combine them into a perfect vocal composite or comp. This can easily be done with the MDR24/96 virtual tracks. When recording, use the Auto Take function to record seven good vocal takes on the first seven virtual tracks of your vocal track. Do this by pressing the **AUTO TAKE** button. Let's record the vocal on track 11; record a take, return to the beginning and record again. The Auto Take function will increment track 11 to the second virtual track. Repeat this until you have seven good takes. If along the way you have a take that you know is not a keeper, press the **DELETE LAST** button to remove it from the hard drive and press **RECORD** and **PLAY** buttons to record the virtual track again. When you perform the Delete Last function in Auto Take mode, the MDR24/96 realizes that the last take was thrown out and will not increment to the next virtual track until the current virtual track is filled with an acceptable take. When all seven are finished, press the **AUTO TAKE** button again to turn the function off.

We must now edit the seven virtual tracks into one master comp. We will place the comp on Virtual Track 8. We will not cut any data from the first seven virtual tracks; we will only copy it. This way, our first seven virtual tracks will remain intact as we recorded them, in case we ever need them again. We must first listen to all seven virtual tracks to determine which are our keepers. To begin, press the **TRACK/EDIT** button, then press the **Virtual Track** select button. Listen through all seven takes of track 11 by manually changing the virtual track for the vocal. For this example, we will do a simple comp, we will use the first verse from virtual track 2 and the first chorus from virtual track 7. Select virtual track 2 and leave this menu.

Now choose **Copy** in the Track/Edit menu. Press the **REC** (Record Ready) button on track 11 to tell the MDR24/96 that we wish to edit this track. Find a blank space after the first verse and mark this as the out point of our edit by selecting **End**. Now use the transport to find a blank spot just before the beginning of the first verse and mark this as the Start point. Now press the **Copy** select button. We have now copied the first verse to the clipboard. Return to the Virtual Tracks menu and change the virtual track for track 11 to virtual track 8, our comp track. Navigate back to the Paste menu. Be sure the track 11 Record Ready light is still lit. Because we have not advanced the transport since we last marked the start point for the copy, the locator will read the exact same point where we want to perform the paste. Press the **Start** button to mark this as the paste point and press **Paste**. Our first verse has now been copied from the source track and pasted on the comp track. We can now copy the chorus in the same way. Change the virtual track to number 7, the source track for our first chorus. Go to the Copy menu, select track 11, mark the end point and then the start point. Change the virtual track back to number 8, go to the Paste menu, select track 11, mark the start point, which again should be exactly where we want it already, and press **Paste** select button. We have now successfully created a vocal comp.

The key to this example is that we marked the End point of the copy first, and the Start point second. After we mark the start point, the transport is already at the exact position we want to start the paste. So if we simply do not change the transport, we can perform the paste on whichever track we wish, on whichever virtual track we wish, without moving in time whatsoever. This is how you can move a track, or section of a track, from one track to another. This is why in most situations it is a good idea to mark the end point of a copy or cut first, and the start point second.

Editing on a Computer



The MDR24/96 allows you to transfer a file to your computer for editing, and then transfer it back to the project on the MDR24/96 for final mixdown. Set up the MDR and your computer as described in "Appendix F: Networking (FTP) Setup." Run the FTP server on the MDR24/96 and use the FTP Client on your computer to locate the files on the MDR24/96 that you wish to edit. There is a Master projects folder that holds all of the projects and inside will be a folder for each project. Inside any particular project folder will be one and possibly more Audio Files folders where the individual audio files are held. The MDR24/96 names the files based on the track they were recorded onto and then sequentially adds a take number for each recording pass made on the track. For example, the second recording pass on track 24 will be called Track24_tk2.wav. Use the FTP Client to transfer the desired files to your computer. It is a good idea to backup a copy of these files before you begin to edit them because you will be doing destructive operations. Open the files in your audio editor of choice.

First, let's say a few words about edits that work and those that don't. The edited files will be transferred back to the MDR24/96 and will replace the corresponding unedited versions. This means that they will start at the exact same point and must not change length in order for the files to stay in sync. You may be tempted to delete some noise before a vocal; do not do this. Instead you could replace this noise with silence or lower the volume of the noise, but you should not change the length of the file. Feel free to perform any other operations: compress a bass, EQ a guitar, distort a vocal. All of these will yield great results.

Once the files are edited to your liking, save them under the same name (this is why we backed them up earlier). Use the FTP Client to transfer them back to the MDR24/96. Find the audio files folder containing the old versions of the files you have just edited. Using the FTP Client, delete these versions on the MDR 24/96 and then transfer the edited versions into the folder. When you next open this project, the new files will have replaced the old ones.

Disk Management

Formatting Drives

Formatting a drive erases the drive contents and prepares the file system for use with the MDR24/96. All media must be formatted before it can be used with the MDR24/96. Normally you'll format media with the MDR24/96, but you can format backup media on another system. Only media formatted by the MDR24/96 can be used for recording and playback. Mackie Media PROJECT disks use the FAT16 file system, and Mackie Media M•90 drives use the FAT32 file system.

The MDR24/96 only allows you to format an External drive. This is for safety, since the recorder's operating system resides on the Internal drive, as well as any Project files you may have created. Should you feel the need to reformat the Internal drive, please contact Mackie Technical Support first.

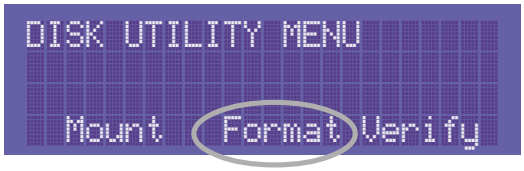
Mackie Media M•90 drives come pre-formatted and ready to use, as do Mackie Media PROJECT disks (be sure to buy IBM formatted ORB disks). However, off-the-shelf UDMA IDE drives from the computer store do not come preformatted. If you decide to buy your own drives and install them into Mackie Media Trays, then you will need to format them, either on the MDR24/96 or off line. You can format PROJECT disks with any PC that has Windows 95, 98, 98 SE, NT 4.0, Millenium,

or 2000 on it, or with any Mac that has File Exchange or PC Exchange installed (Mac OS 7 or later). You can format your own UDMA IDE drives with any PC that has Windows 98 SE, Millenium, or 2000 on it, or with any Mac that has OS 10 installed.

Mackie Media drives can also be read by any system that can Format them. So, for example, you can insert a Mackie Media PROJECT disk into your Macintosh SCSI or IDE ORB drive and copy your Projects' Recorded (WAV) and Rendered (WAV or AIFF) files directly onto your Mac's hard drive.

To format and verify media performance from the MDR24/96:

1. Press the **DISK UTIL** button.
2. Now select **Format**. The LCD displays a message asking you to verify the drive speed for recording and playback.



3. Select **OK**. When the format operation has completed, another message appears asking you to verify the drive speed for recording and playback.
4. If a UDMA drive is installed, select **OK**. After the performance verification is completed, select **Continue**. If a Mackie Media PROJECT drive is installed, select **Cancel**; they are too slow to be used for recording and playback.
5. Press **DISK UTIL** to exit.

Verify Drive Performance

Verify Drive Performance tests the read/write speed and overall transfer rate of the external drive under simulated worst-case scenarios to determine whether it can sustain 24 tracks of recording and playback. Although any IDE drive can be used for backup, only UDMA IDE drives that pass the performance verification test can be used for recording and playback.

When a drive passes the performance verification test, it is designated as a real-time drive. Formatting erases this designation, so each time you Format a real-time drive you must re-run the test. If a drive fails the test, that drive can be used for backup, but not recording. Drives tagged for backup-only service will be designated as External* (with the asterisk) in the front panel menus.

After a Format operation, the MDR24/96 automatically prompts you to run the performance verification test. The test should be run only on UDMA IDE drives. Don't run the test on Mackie Media PROJECT drives – the cows will come home before the test finishes.

To Verify the Performance of external media:

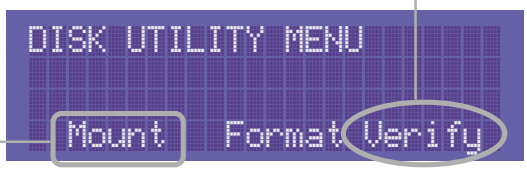
1. Press the **DISK UTIL** button. If the Active Drive is the Internal drive, then select **Set**.

2. From the Set Active Drive menu, Select **External**, then select **OK**.

3. Select **Verify**. When the message appears asking you to confirm the operation, select **OK**. After a couple of minutes, the result of the test will be reported in the front panel display.

4. After the performance verification is completed, select **Continue**.

Mount/Refresh Drives



The Mount/Refresh drives command updates the MDR24/96 Project file lists to reflect the current status of both the internal and external drives. Use this command to mount a new Mackie Media PROJECT disk, or to view the size of files in a Project file list.

To Mount drives:

1. Press the **DISK UTIL** button. Select **Mount**.

2. Press the **DISK UTIL** button again to exit after the mounting operation is complete.

Appendix A: Troubleshooting and Service

Additional information and troubleshooting tips can be found in the HDR24/96 Technical Reference Guide. Technical support is available by contacting your Mackie dealer, calling Mackie Designs at (800) 258-6883 (8:00 AM to 5:00 PM Pacific Time), or visiting Mackie's website at www.mackie.com.

Please read the included warranty information, then complete and return the included Warranty Registration card. You can also register online at www.mackie.com.

Appendix B: Specifications

Physical

Dimensions:	7" x 19" x 13.25" (17.8 cm x 48.3 cm x 33.7 cm)
Shipping Weight:	35.1 lb. (15.9 kg)
Rack Space Height:	4 RU (Rack Units)

Electrical

Operating Voltage:	100/120 Vac & 220/240 Vac, 50/60Hz
Power Consumption:	50W, max.

Motherboard/CPU

CPU:	Intel Celeron 433 MHz w/ 128k internal L2 cache
Internal RAM:	128 MB SDRAM
CPU I/O	
Networking:	100 Base-T Ethernet, CAT-5 w/ RJ-45
MIDI:	MIDI In/Out, 5-pin DIN through 15-pin D-sub adapter
Accessory Slots:	PCI (x2) for future expansion

Hard Drive

Drive Size:	20.4 MB UDMA IDE Standard
Recording Capacity:	Greater than 90 minutes @ 24 tracks / 24-bit / 48kHz (Internal & Mackie Media M•90)
Supported Drive Sizes:	Up to 32 GB

Analog (with AIO•8 cards)

Frequency Response:	< ± 0.25 dB, 5 Hz – 22 kHz.
Dynamic Range:	101 dB
Conversion:	24-bit, 128x oversampling
Reference Level:	0 dBFS = +22 dBm

I/O Options

AIO•8 Analog
DIO•8 TDIF & ADAT Optical
OPT•8 ADAT optical
OPT•24 ADAT optical
PDI•8 AES/EBU (w/ input sample rate conversion)

Synchronization

Time Code Frame Rates:	24, 25, 29.97, 29.97 Drop, 30, 30 Drop
Time Code Formats:	SMPTE In or SMPTE Out on 1/4" TRS jack MTC In and Out on DB9 MIDI connector
SMPTE Levels:	+4 dBu, –10 dBV (default), software selectable
Sample Rates:	44.1 kHz / 48 kHz / 96 kHz (w/ PDI•8 card)
External Clock Rates:	43.6 kHz to 50.6 kHz @ 48 kHz setting 40.1 kHz to 48.9 kHz @ 44.1 kHz setting
Word Clock Input:	TTL, 2-5 Vp-p, 75 Ohms terminated, 3.3k Ohms (bridging)
Word Clock Output:	CMOS, 0-5 Vp-p, <30 Ohms

Appendix C: Upgrading the System Software

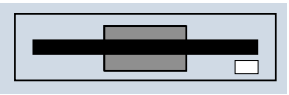
You may be wondering about the two disks included with the MDR24/96? These disks are installation disks for the MDR24/96 software. If you ever have a problem, Mackie Digital Tech Support may advise you to reinstall the operating system. This will not delete any projects on either drive, but it is always a good idea to back up any important projects before doing a reinstallation of the operating system. You should notice that the MDR24/96 OS fits on just two floppy disks! This small size is an indication of the efficiency of the operating system and is one reason why the MDR24/96 runs so smoothly.

Mackie may release updated versions of the operating system on our website: www.mackie.com. The file can easily be downloaded from the MDR24/96 section of the site. Be sure to follow the instructions listed to correctly make the floppy disks. We get many calls to our tech support complaining of bad installations that are caused by the user not making the disks correctly.

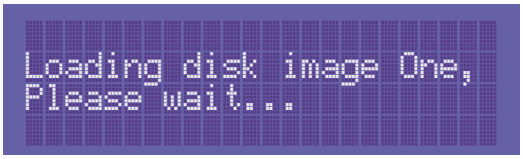
Once you have the most recent version of the installer disks, you are ready to reinstall or update the operating system. Be sure everything important is backed up and power off the MDR24/96.

To upgrade system software:

1. Insert the first disk into the floppy drive and turn on the MDR24/96.



You will see the display telling you that it is "Loading, Please Wait…" It then reads from the floppy drive; this is indicated by the green light on the front of the drive. The display then flashes a screen that lists the installer and the version number, and then quickly changes over to a screen saying "Loading disk Image One, Please Wait…" When disk image one is loaded, it will ask you to "Please insert disk 2."



2. Eject the first disk, insert the second, and press the **Continue** select button. It then loads the second disk image. When this is finished, it will display "**This will install MDR ___ Build ___. Are you sure?**"

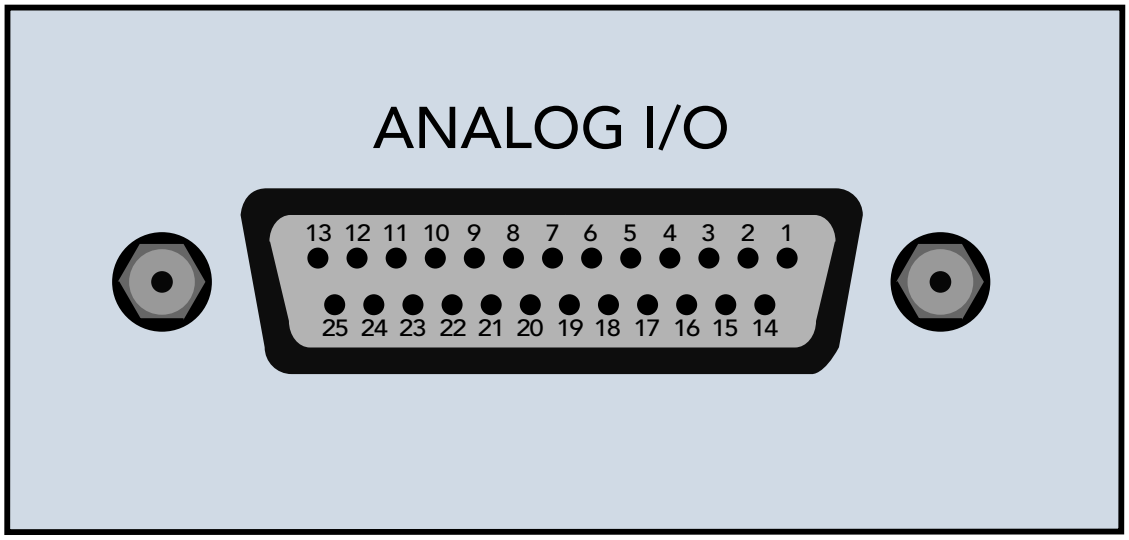
The blanks display the version number and the build number. Each version may have several builds associated with it. A new build may make some small changes or add some new features, but it is not a full-fledged new version.

3. Choose **OK** to install the software or **Cancel** to quit. If you choose **Cancel** you can simply power cycle the MDR24/96 and everything will be as it was before. After you choose **OK**, it will quickly expand all the files and tell you that the installation was successful.

4. Press the **OK** button, eject the disk, turn off the MDR24/96, and after a few seconds, turn it back on. It will boot with the new OS successfully installed.

Appendix D: Analog I/O Pinout

	Signal Description	I/O 1-8	I/O 9-16	I/O 17-24		Signal Description	I/O 1-8	I/O 9-16	I/O 17-24
Pin 1	+	Ch 8	Ch16	Ch24	Pin 14	–	Ch 8	Ch16	Ch24
Pin 2	shield	Ch 8	Ch16	Ch24	Pin 15	+	Ch 7	Ch15	Ch23
Pin 3	–	Ch 7	Ch15	Ch23	Pin 16	shield	Ch 7	Ch15	Ch23
Pin 4	+	Ch 6	Ch14	Ch22	Pin 17	–	Ch 6	Ch14	Ch22
Pin 5	shield	Ch 6	Ch14	Ch22	Pin 18	+	Ch 5	Ch13	Ch21
Pin 6	–	Ch 5	Ch13	Ch21	Pin 19	shield	Ch 5	Ch13	Ch21
Pin 7	+	Ch 4	Ch12	Ch20	Pin 20	–	Ch 4	Ch12	Ch20
Pin 8	shield	Ch 4	Ch12	Ch20	Pin 21	+	Ch 3	Ch11	Ch19
Pin 9	–	Ch 3	Ch11	Ch19	Pin 22	shield	Ch 3	Ch11	Ch19
Pin 10	+	Ch 2	Ch10	Ch18	Pin 23	–	Ch 2	Ch10	Ch18
Pin 11	shield	Ch 2	Ch10	Ch18	Pin 24	+	Ch 1	Ch 9	Ch17
Pin 12	–	Ch 1	Ch 9	Ch17	Pin 25	shield	Ch 1	Ch 9	Ch17
Pin 13	N/C								



Appendix E: Compatible Cables

Analog and Digital Multitrack Cables

The following companies supply analog and digital multitrack cables for use with the MDR24/96 I/O cards:

Horizon Music, Inc.

P.O. Box 1988, Cape Girardeau MO 63702-1988
Tel: (800) 255-9822; Fax: (800) 455-3460
http://www.horizonmusic.com

AIO•8 Analog Interface Cables

HDA8 Series	DB25 to [specify connector]
Connector options:	8 male XLR, 8 female XLR, or 8 1/4" TRS
Standard lengths:	5, 10, 15, 20, 25 feet

DIO•8 TDIF Interface Cables

TDIF Series	DB25 to DB25
Standard lengths:	5, 10, 15 feet

PDI•8 AES/EBU Interface Cables

HD44 Series	DB25 to [specify connector]
Connector options:	4 male + 4 female XLR, or DB25
Standard lengths:	5, 10, 15, 20, 25 feet

Hosa Technology, Inc.

6920 Hermosa Circle, Buena Park CA 90620
Tel: (714) 736-9270; Fax (714) 522-4540
http://www.hosatech.com

AIO•8 Analog Interface Cables

DTP Series	DB25 to 8 1/4" TRS
DTF Series	DB25 to 8 female XLR's
DTM Series	DB25 to 8 male XLR's
Standard lengths:	3, 4, 5, 7 meters

DIO•8 TDIF Interface Cables

DBK Series	DB25 to DB25
Standard lengths:	3, 15 feet

OPT•8 / DIO•8 ADAT Optical Interface Cables

OPT Series	Standard ADAT Optical cables
OPM Series	Jacketed ADAT Optical cables w/ metal headshell
OPT lengths:	2, 3, 6, 10, 13, 17, 30, 50 feet
OPM lengths:	3, 5, 10, 15, 20, 30, 50 feet

PDI•8 AES/EBU Interface Cables

DBK Series	DB25 to 4 male, 4 female XLR's
Standard length:	8 meters only

Marshall Electronics

PO Box 2027, Culver City, CA 90231
Tel: (800) 800-6608; Fax: (310) 391-8926
http://www.mars-cam.com/cable.html

AIO•8 Analog Interface Cables

DC-DAXM Series	DB25 to 8 male XLR's
DC-DAXF Series	DB25 to 8 female XLR's
DC-DAS Series	DB25 to 8 1/4" TRS connectors
Standard lengths:	3, 5, 10, 15, 20, 25 feet

DIO•8 TDIF Interface Cables

DCD-88D Series	DB25 to DB25.
Standard lengths:	1, 3, 6, 12, 15, 20, 25, 33 feet.

PDI•8 AES/EBU Interface Cables

DC-SYX Series	DB25 to 4 male, 4 female XLR's
DC-DUB Series	DB25 to DB25
Standard lengths:	3, 5, 10, 15, 20, 25 feet

Pro Co Sound, Inc.

135 E. Kalamazoo Ave., Kalamazoo, MI 49007
Tel: (800) 253-7360; Fax: (616) 388-9681
http://ww.procosound.com

AIO•8 Analog Interface Cables

DA-88 XM Series	DB25 to 8 male XLR's
DA-88 XF Series	DB25 to 8 female XLR's
DA-88 BQ Series	DB25 to 8 1/4" TRS connectors
Standard lengths:	5, 10, 15, 20 feet

Other Cables

In addition to the companies listed above, the following companies supply individual 110Ω AES/EBU and/or 75Ω word clock and video cables:

Apogee Electronics Corporation

3145 Donald Douglas Loop South
Santa Monica, CA 90405-3210
Tel: (310) 915-1000; Fax: (310) 391-6262
http://www.apogeedigital.com

Canare

531 5th Street, Unit A, San Fernando, CA 91340
Tel: (818) 365-2446; Fax: (818) 365-0479
http://www.canare.com

Whirlwind

99 Ling Rd., Rochester, NY 14612
Tel: (888) 733-4396; Fax: (716) 865-8930
http://www.whirlwindusa.com

Appendix F: Networking (FTP) Setup

The MDR24/96 comes to you with a handy 10/100 Base-T local area network (LAN) card built in. The main purpose of networking the MDR24/96 using Ethernet is to share or back up project files to a computer, network server/router, or other device with an Ethernet connection and common protocol. It can also be used to transfer files to a computer for editing.

The topic of computer networking can get very complex and we can't give you a complete course here. This appendix covers the basics for configuring a small, directly connected peer-to-peer network consisting only of one MDR24/96 and one computer, with some side notes about integrating with a small local area network. If you're connecting to a larger network, for instance in a corporate workgroup environment, you probably have a network administrator who can integrate your MDR24/96 using the information presented here.

VERY IMPORTANT: You really CAN connect your MDR24/96 to the Internet. This means that others who discover your recorder's address can access, add, and even delete files on your recorder. Hackers have programs that search systems on The Net for audio files in hopes of finding a pre-release copy of the Next Big Hit. You may not want that much free publicity. If you want to use the Internet to share files with a production partner or client, be aware of the risks.

Disclaimer: Sorry, Mackie Designs cannot offer the service or knowledge that you might personally need on the broad and seemingly complex issue of networking security. Please seek guidance from professional computer service types.

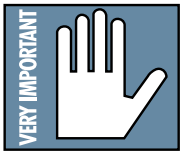
The two most popular methods of networking in the PC environment are:

- **Peer To Peer** – Usually used when only two computers are connected together. This configuration is described in detail here.
- **Server/Router Network** – One or more computers connected to a network server or router with a connection hub. You may need to consult other references in order to integrate your MDR24/96 in a larger network, using the information provided here.

Peer-to-Peer Networking

Required Cables and Hardware

- A peer-to-peer network consists of two computers. One computer is the MDR24/96, referred to as **System #1**.
- The other computer, **System #2**, is the one with which you wish to share files, most likely an audio workstation in your studio.
- The MDR24/96 is equipped with a 100 Base-T Ethernet interface. System #2 must have a 100 Base-T network card installed.
- The two Ethernet interfaces are connected using industry standard CAT-5 Ethernet cable and connectors.



IMPORTANT: A CROSSOVER cable is required. Since we're connecting two Ethernet ports together directly with no intervening network interfacing or routing devices, a standard Ethernet cable will not work!

When cable shopping, look for one marked "Crossover" or "Reversed". This is a special cable wired with input and output connections crossed over from one end to the other, so data sent by one system appears at the receiver input of the other.

Hardware Interconnection

For the simple network described here, simply plug one end of the cable into the Ethernet port on the network card installed in the computer. Connect the other end of the cable to the Ethernet port on the MDR24/96. Either end of the cable can go to either device.

Computer Software Required

- Windows 95, 98, NT, 2000, ME, XP for the PC or Macintosh 8.6 or higher.
- TCP/IP protocol stack (usually included with the operating system)
- An FTP (File Transfer Protocol) client program.

At Mackie, we've tested the MDR24/96 with two inexpensive FTP client programs for Windows, CuteFTP from Globalscape and WS_FTP from Ipswitch Software, as well as Fetch from Dartmouth Software Development for the Macintosh. There are several others available. Trial versions of these programs are available for download at:

http://www.globalscape.com/products/cuteftp
http://www.ipswitch.com/
http://www.dartmouth.edu/netsoftware/

Windows 2000, ME, and XP also have an integrated FTP client as part of the OS. This can be used instead of a dedicated FTP Client program. By creating a new network place for the MDR24/96 from the My Network Places window, the hard drive on the MDR can be accessed as if it was just another local drive. Consult Window's help for details.

Network Configuration

When computers are connected to one another each must have a unique address. Because we are connecting peer-to-peer (no server/router and hub), we will assume there are no direct connections to the internet (WAN-Wide Area Network), only between two Ethernet devices. This being the case, address assignments can be somewhat arbitrary. However, if there is a direct connection to the Internet (WAN), a specific gateway address must be assigned by your network administrator or Internet service provider. All Ethernet devices on your network (LAN – Local Area Network) will share this assigned gateway address.

Using typical Class-C peer-to-peer number assignments with no gateway, the MDR24/96 address could be, for example, 10.10.28.20 (the factory default) and the system #2 (computer) address could be 10.10.28.10. In this instance, the MDR24/96 is host number 20 and the computer is host number 10.

In a simple network, the last number in the address of the client (computer) can be anything, as long as it's not the same as the MDR24/96's address. In a larger network, there are some higher levels of addressing which must be consistent within the network.

System #1 Settings (MDR24/96)

Most computers with standard (default) operating system installations are configured to have a dynamically assigned IP address, that is, they do not have a fixed IP address. If this is the case with your computer, you probably need to assign the computer a static IP address. You must assure that the computer and MDR are not set up for the same address so they don't collide on the network. In a simple network, the IP addresses should be identical except for the last field. In general you can change the settings on the computer or the MDR24/96 to match the other.

If your computer is connected to the Internet through a cable modem or DSL line, it may have been assigned an IP address and Subnet Mask. In this situation, leave these computer settings intact and change the MDR's address.

Configuring the MDR24/96 FTP Server

1. Press the **SYSTEM** button.

2. Select **Setup TCP**.

3. Select **IP**. Note the IP address displayed. The factory default is 10.10.28.20. You need to know the MDR 24/96 IP address to set up your FTP client software.

4. For a computer set with a fixed IP address, using the **<<** and **>>** select and **(–)DEC** and **(+)INC** buttons, set the first three fields of the MDR24/96 IP address to match your computer's address, and set the last field to something different. Be sure you don't set it to the address of another device that you have on your network. When the IP address has been set, select **OK**. (You could also change the computer's address to match the MDR; see below.)

5. Select **Sub** in the **Setup TCP** window. Use the default number 255.255.255.0 unless your network requires a subnet mask setting. Select **OK**. Be sure both the MDR24/96 and your computer have the same subnet.

6. Select **Gate** and input a value if required by your network or client software. You might be able to leave this blank if no gateway is being used. Select **OK**.

7. Select **Exit** to close the **Setup TCP** menu.

8. Select **FTP Turbo** and use the **<<** and **>>** select buttons or **(–)DEC** and **(+)INC** buttons to choose between **Turbo FTP** and **Normal FTP**. If your computer has a 100 Base-T Ethernet card installed, choose **Turbo FTP**. If it only has a 10 Base-T Ethernet card installed, choose **Normal FTP**.

9. Select **Exit** to close the **Turbo FTP** menu.

10. Press the **SYSTEM** button to exit the **Setup TCP** menu.

11. To run the MDR FTP server, press the **SYSTEM** button.

12. Select **Run FTP**.

A message appears telling you the FTP server is running. It also displays the IP address for the MDR for your reference. When you are completely finished with all file transfers, press the **Continue** button.

System #2 Settings (second computer or other Ethernet device)

Windows 95/98

Configuring TCP/IP:

Note: We have only included specific instructions to set up a PC computer with Windows 95 or 98 installed and a Macintosh with OS 9.2.1. Sorry, we would end up with a novel if we covered every platform and operating system but you should be able to apply these instructions most operating systems.

From the Windows Start button, select Settings. From the pop-up menu, select Control Panel. You can also get to the Control Panel from the My Computer icon if you have one on your desktop. Work your way down through the Control Panel menus as follows:

Network | Configuration | TCP/IP | IP Address

If you don't see TCP/IP as a choice in the Configuration window (unusual for standard installations), you'll need to install it from the Windows installation disk. See "TCP/IP Is Not Listed" below.

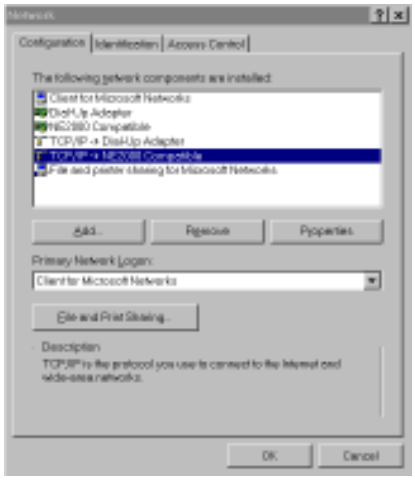
You may or may not have to make changes to the TCP/IP settings, depending on how your computer is set up. If you use the computer in a network presently, or if you use it to connect to the Internet, providing those are functioning normally, it is best to record your current settings and set the MDR24/96 accordingly. Changing network settings may cause problems with your existing networking.

If the "Specify an IP Address" button is checked and there is an address and subnet mask displayed, jot those numbers down. You'll need them to match up the MDR24/96 with your computer.

If the "Obtain an IP Address Dynamically" button is checked, or if the "Specify" button is checked but no IP address is displayed, you'll have to make a change. If the computer is not on a local area network and you aren't planning to use it to connect to the Internet, the simplest thing to do is check the "Specify" button and enter an IP address and subnet mask. Use the same subnet mask as the MDR. Enter the same IP address as the MDR except change the last field to something different than the MDR.

TCP/IP Is Not Listed

If the TCP/IP networking software is not installed, install it as follows:



1. Click the **Add** button.
2. Click **Protocol** and then click **Add**.
3. In the Manufacturer's window, click **Microsoft**.
4. In the Network Protocols window, click **TCP/IP**, and then click **OK**.
5. Return to the Configuration window. You should now see TCP/IP listed.
6. Click the TCP/IP entry, then click **Properties**.

Macintosh OS 9.2.1

1. From the Apple menu choose **Control Panels** and select **TCP/IP**.

2. From the **File** menu choose **Configurations…** Select the Default Configuration and click the **Duplicate…** button.

3. Name the duplicate configuration MDR24/96 and click **OK**. This allows you to have a network setting for normal use and one for the MDR specifically. This way you won't have to remember your settings, you can just choose the correct one for the task at hand.

4. Click the **Make Active** button with the MDR24/96 configuration highlighted.

5. From the TCP/IP setup for the MDR24/96, make the following settings: for the Connect Via box, choose **Ethernet** (it may say Ethernet Built In) and for the Configure box, choose **Manually**. If you see an IP address and subnet listed, leave them as is and change the settings on the MDR24/96. If the fields are blank, we must assign an IP address and subnet to the Mac.

7. Set the IP address to be identical to that of the MDR24/96 except for the last field. For example, the default IP address on the MDR24/96 is 10.10.28.20. Set the IP address on the computer to 10.10.28.10 where the last 10 is an arbitrary number that is not 20.

8. Set the Subnet mask to match identically that of the MDR24/96. The default setting on the MDR24/96 is 255.255.0.0, so you should set the Subnet mask in the Mac to be the same.

9. Leave the Router address, Name server address, and Search domains blank.

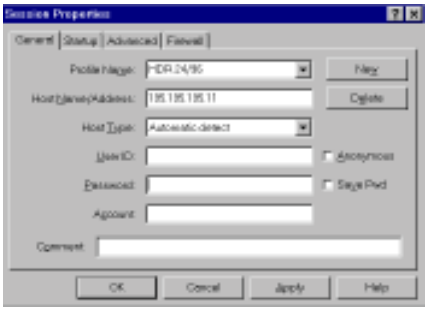
10. From the **File** menu, choose **Quit**. It should prompt you to save; do so now.

12. Your Macintosh should now be configured properly to see the MDR24/96. Run the FTP server on the MDR24/96 and open the FTP Client on your computer to transfer files.

FTP Client Configuration

There are a number of FTP clients available for both PC and Macintosh platforms. This generic example may not exactly reflect the settings for your particular FTP client software, but it should be close enough to get you on the right track if you're having difficulty.

Note: A folder named "System," and files entitled "mackieos.EXE" and "PME.SYS", normally hidden on the MDR 24/96 file management listings, will be visible on the FTP listing of the C: drive. These are part of the operating system and should be left intact. Do not delete any of these files from the MDR 24/96 hard drive!



1. Create a new account for connecting to the MDR24/96.
2. If there is a "Profile" or "Account" name setting, choose a name like MDR.
3. For "Host" (Name/Address), use the MDR IP address you decided on earlier. In the default case the MDR IP address is 10.10.28.20.
4. If you must choose a "Host Type," select "Anonymous Login".
5. If there is a "Password" setting, you can leave it blank. The anonymous setting will automatically send something that the MDR will ignore.
6. If there is a "Directory" setting, set it to "C" for the internal drive, or "E" for the external.
7. The Subnet setting on your computer should be set the same as the MDR24/96.
8. You should now be able to engage the "Connect" command and see the contents of the MDR24/96's hard drive. The internal hard drive is C: and the external hard drive is E:.
9. Now you can copy files from the MDR24/96 to your computer, or from your computer to the MDR24/96. Refer to your FTP client program for details.

Troubleshooting

If you feel your settings are correct, but the computer just won't see the MDR24/96, try a different FTP program. There are many available and sometimes one just won't work with a particular configuration of computer and Ethernet card. Using a different program may be the only solution.

Networking Glossary

Here you will find a short description of some of the features (and acronyms, of course) of the Network setup:

TCP/IP

TCP/IP is the acronym for Transport Control Protocol/Internet Protocol. These combined protocols provide the language and guidelines for computers communicating on a network. Transport Control Protocol might be considered the method by which computers talk and the Internet Protocol is the assigned number system by which computers are distinguished. An IP address is a numeric identifier in the format 123.456.789.000. Each computer that is attached to the Internet (WAN/Wide Area Network) must have a unique IP address so it may be identified. Likewise, in a closed networking environment (LAN or Local Area Network), a unique IP address must be assigned to each computer that communicates on the network.

Although LAN computers may connect to a WAN, such practice is typically achieved by the use of a "Gateway" or "Firewall/Router or Proxy Server." A gateway acts as a conduit for networking traffic, and computers that communicate through the gateway assume the IP address of the gateway. In other words, if your personal computer, which is connected to your LAN, has an IP address of 10.1.1.1 and it is connected to the Internet through a gateway computer with an IP address of 123.456.789.123, other computers outside your LAN will recognize your computer as having the same IP address as the gateway computer. Multiple LAN computers may be connected to a WAN by this method and every computer communicating from behind the gateway will appear to the WAN as the gateway computer. The gateway will convert the IP addresses of the LAN computers to its own IP address for both inbound and outbound traffic.

A firewall/router or proxy server is a hardware and/or software device that allows definable filtering of specific information, file types, and network access. It is often used for security purposes—if your hard drive and console are networked, you might want to carefully research the need for firewall/proxy protection.

FTP

FTP is the acronym for File Transfer Protocol. FTP communicates over TCP/IP and is one of the languages/methods that the Transport Control Protocol accommodates. As its name implies, FTP was designed to transfer files over a network. Some of the unique capabilities of FTP are the recognition of transmission loss and file integrity checking. If a file transfer is interrupted during an FTP session, the FTP "client" will perform an integrity check and attempt to re-establish connection and transfer. Most FTP servers and clients employ a user name and password scheme for authorization purposes. The MDR24/96 FTP implementation sets the client account to anonymous status, thereby allowing any fully functional FTP client to connect to the internal file system of the recorder. Because it's possible that an unknown computer may connect to the MDR24/96 and add or delete files, care should be taken when connecting the MDR to a publicly available network (WAN).

IP Address

Without detailing the intricacies of network security and firewalls, you should be aware that configuring the MDR24/96 with a publicly available IP address on a publicly available network may make the recorder's hard drive and functions visible to network traffic, i.e., the Internet. When connecting two Ethernet devices directly, without including an outside network, this is a non-issue. Certain IP address ranges have been set aside by key Internet standards bodies for use in private networking applications. Those ranges are as follows:

Class A 10.0.0.0—10.255.255.255
Class B 172.16.0.0—172.31.255.255
Class C 192.168.0.0—192.168.255.255

If your MDR24/96 is connected to a network that never "touches" another network, i.e., not publicly available outside of your network, you may use any IP address range you choose. However, research and consideration in this matter should be conducted to prevent any unwanted breaches of security and IP address conflicts. For further details, you are encouraged to seek additional information from the following organization:

Internet Assigned Numbers Authority
http://www.iana.org

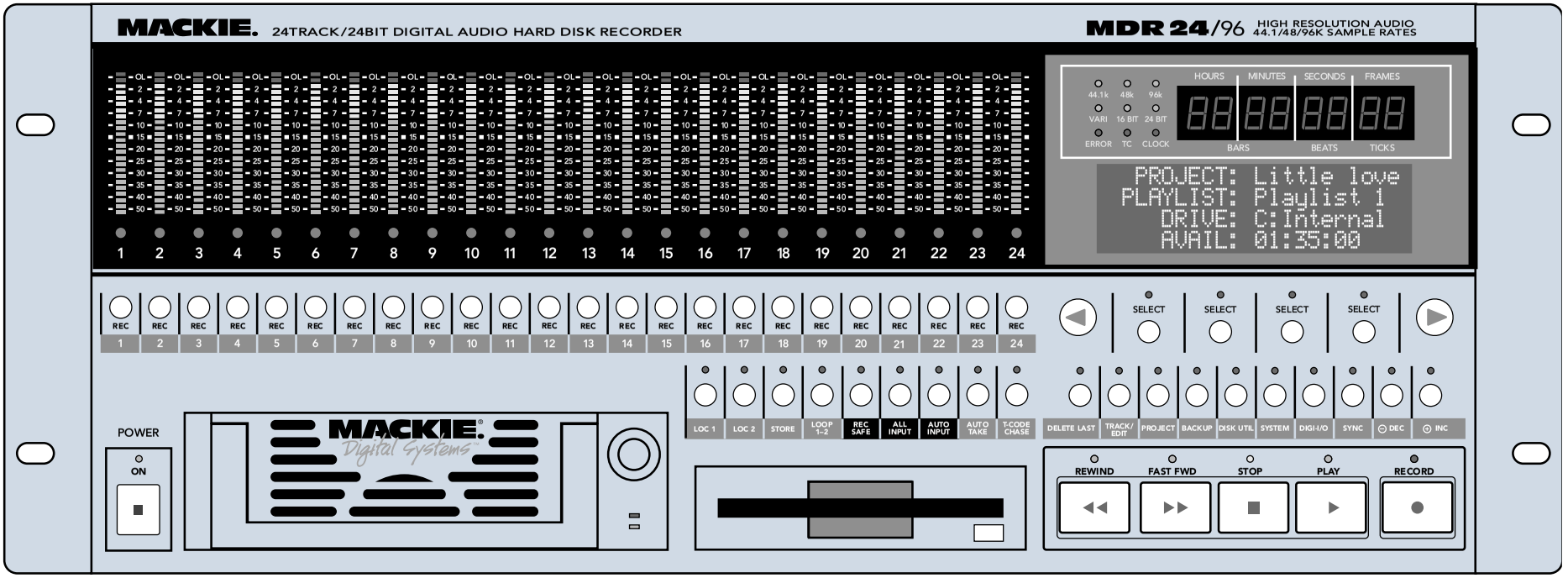
Hub

A Hub is an active device that is designed to connect several Ethernet devices in a “star” network. Each device connects to the hub, and the hub routes communication among the devices by sorting out destination IP addresses. If you already have a network, you probably have a hub. If you wish to connect the MDR24/96 to a computer that is already connected to a network or that you regularly use to connect to the Internet, a hub would be a worthwhile addition to your system, allowing you to have all the cables connected all the time.

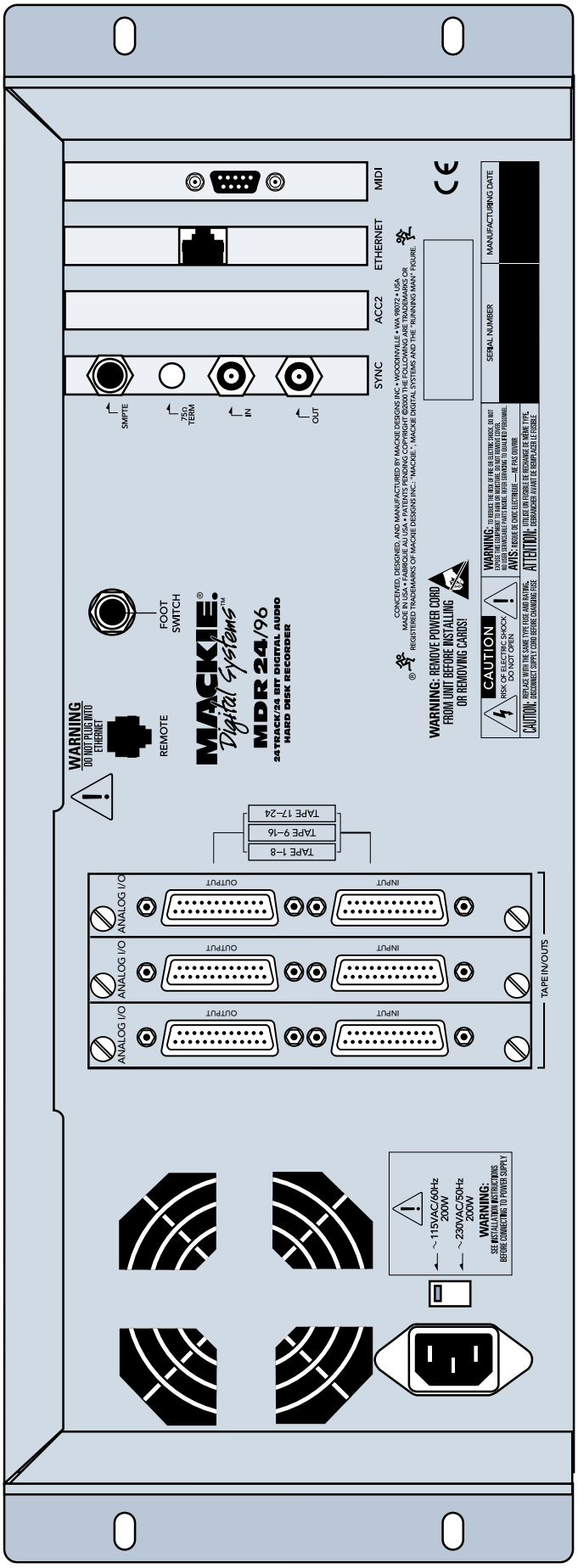
Important: When connecting through a hub, do not use a Crossover cable. Hubs are designed to use standard cables.

10 Base-T vs. 100 Base-T

The recorder’s Ethernet card is hardware configured to operate at 100 Mbps. If you wish to connect an MDR24/96 to an existing Ethernet network that is configured for 10 Mbps transmission rates, it is necessary to use a 10/100 autosensing hub and/or a rate converter. Most hubs today are autosensing.



Operation Guide


MIDI
ETHERNET
ACC2
SYNC
SMPTE
75Ω TERM
IN
OUT
SERIAL NUMBER
MANUFACTURING DATE
CAUTION
RISK OF ELECTRIC SHOCK DO NOT OPEN
WARNING: REMOVE POWER CORD FROM UNIT BEFORE INSTALLING OR REMOVING CARDS!
FOOT SWITCH
REMOTE
WARNING DO NOT PLUG INTO ETHERNET
MACKIE Digital Systems
MDR 24/96
24TRACK/24 BIT DIGITAL AUDIO HARD DISK RECORDER
TAPE 17–24
TAPE 9–16
TAPE 1–8
ANALOG I/O
INPUT
OUTPUT
TAPE IN/OUTS
~115VAC/60Hz 200W
~230VAC/50Hz 200W
WARNING:

Colophon

Operation Guide text composed by Dana Bourke, Benjamin Olswang and Tony Baird, based on a ballet by Jeff Gilbert. It was made possible by the teachings and donations of the MDR24/96 Design Team, most notably Brian McCully and Bob Tudor. Graphics and layout were performed by Tony Baird with technical support from Dave Franzwa, Steve Eborall and Frank "Weasel Boy" Heller. Cover art courtesy of Bryan Tiller. Long-winded explanations, editing, and last minute updates from Mike Rivers, with proofreading and final blessing by Jeff Gilbert. Proofreading and additional editing by Linn Compton. Scott Garside was a pain the whole time.

Demo Music Credits

Ode to Masters

Written by:	Jay Roberts and Rick Reid
Published By:	Nigel Nose Music
Electric Guitar:	Jay Roberts
Classical Guitar:	Rick Reid
Bass:	Dan Dean
Drums:	Brendan Scanlan
Hammond B3:	Joey DeFrancesco
Trumpet:	Joey DeFrancesco

Little Bit of Love

Written by:	Claude Gaudette & Alan Roy Scott BMI #877477
Published by:	KYUSHU BOY MUSIC BMI #231306319
Artist:	Shirley Meyers
Production Company:	Leggett Music Inc. Nashville Tn.
Produced by:	Keith Olsen
Arranged by:	Claude Gaudette and Keith Olsen
Keyboards:	Claude Gaudette, Richard Baker
Guitars:	Tim Pierce
Engineered by:	Keith Olsen and Peter Love

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