

# TASCAM

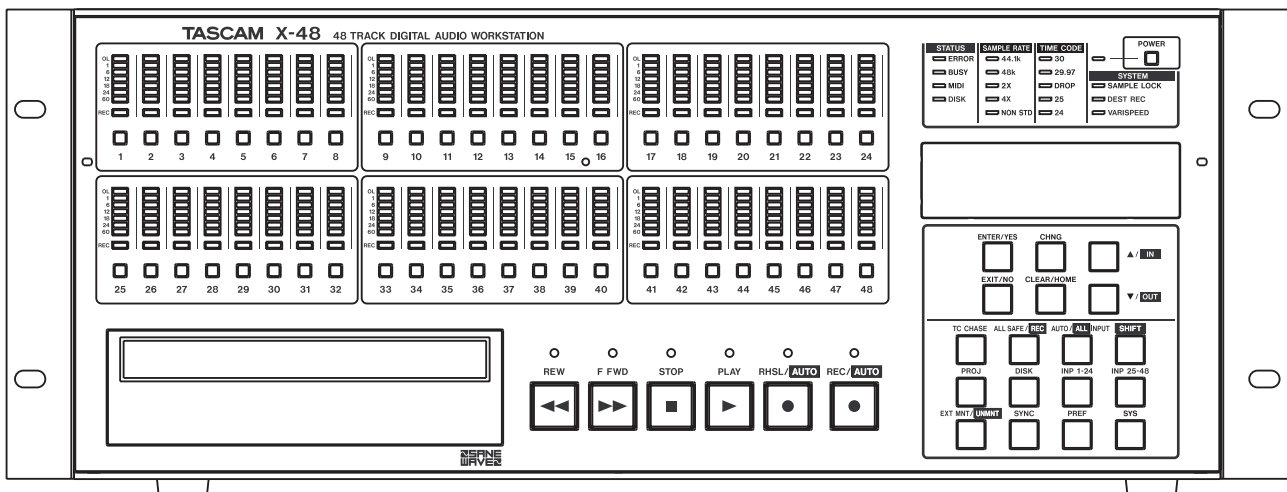
TEAC Professional Division

D00871101A

# X-48

## 48 Track Digital Audio Workstation

### OWNER'S MANUAL



# IMPORTANT SAFETY PRECAUTIONS



CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



The lightning flash with arrowhead symbol, within 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.



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

This appliance has a serial number located on the rear panel. Please record the model number and serial number and retain them for your records.  
Model number \_\_\_\_\_  
Serial number \_\_\_\_\_

**WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.**

For U.S.A.

## TO THE USER

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### CAUTION

Changes or modifications to this equipment not expressly approved by TEAC CORPORATION for compliance could void the user's authority to operate this equipment.

## For the customers in Europe

### WARNING

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

## Pour les utilisateurs en Europe

### AVERTISSEMENT

Il s'agit d'un produit de Classe A. Dans un environnement domestique, cet appareil peut provoquer des interférences radio, dans ce cas l'utilisateur peut être amené à prendre des mesures appropriées.

## Für Kunden in Europa

### Warnung

Dies ist eine Einrichtung, welche die Funk-Entstörung nach Klasse A besitzt. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen.

## CE Marking Information

- a) Applicable electromagnetic environment: E4
- b) Peak inrush current: 20 A

# IMPORTANT SAFETY INSTRUCTIONS

- 1 Read these instructions.
  - 2 Keep these instructions.
  - 3 Heed all warnings.
  - 4 Follow all instructions.
  - 5 Do not use this apparatus near water.
  - 6 Clean only with dry cloth.
  - 7 Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
  - 8 Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
  - 9 Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
  - 10 Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
  - 11 Only use attachments/accessories specified by the manufacturer.
  - 12 Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
- Do not expose this apparatus to drips or splashes.
  - Do not place any objects filled with liquids, such as vases, on the apparatus.
  - Do not install this apparatus in a confined space such as a book case or similar unit.
  - The apparatus should be located close enough to the AC outlet so that you can easily grasp the power cord plug at any time.
  - An apparatus with Class I construction shall be connected to an AC outlet with a protective grounding connection.
  - Batteries (battery pack or batteries installed) should not be exposed to excessive heat such as sunshine, fire or the like.
  - Excessive sound pressure from earphones and headphones can cause hearing loss.
  - The apparatus draws nominal non-operating power from the AC outlet with its STANDBY/ON in the Standby position.



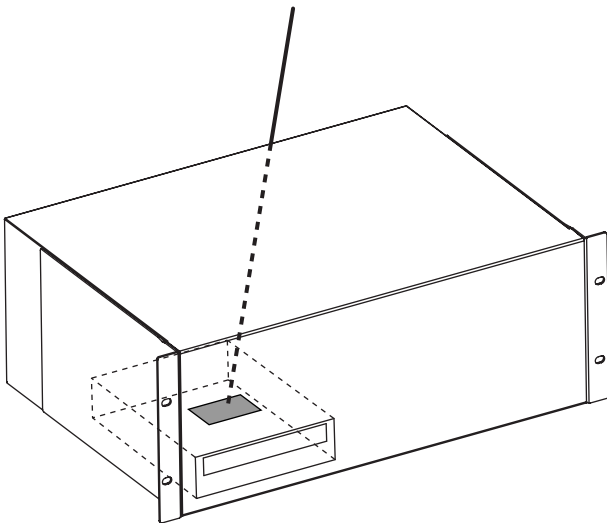
- 13 Unplug this apparatus during lightning storms or when unused for long periods of time.
- 14 Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

# Safety Information

This product has been designed and manufactured according to FDA regulations "title 21, CFR, chapter 1, subchapter J, based on the Radiation Control for Health and Safety Act of 1968", and is classified as a class 1 laser product. There is no hazardous invisible laser radiation during operation because invisible laser radiation emitted inside of this product is completely confined in the protective housings. The label required in this regulation is shown at ①.

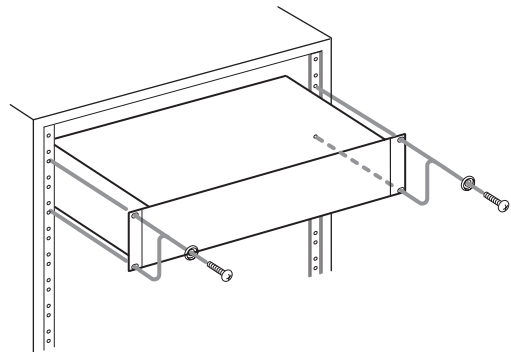


For U.S.A.



## Rack-mounting the Unit

Use the supplied rack-mounting kit to mount the unit in a standard 19-inch rack, as shown below. Remove the feet of the unit before mounting.



## NOTE

- Leave 1U of space above the unit for ventilation.
- Allow at least 10 cm (4 in) at the rear of the unit for ventilation.

## CAUTION

- DO NOT REMOVE THE PROTECTIVE HOUSING USING A SCREWDRIVER.
- USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.
- IF THIS PRODUCT DEVELOPS TROUBLE, CONTACT YOUR NEAREST QUALIFIED SERVICE PERSONNEL, AND DO NOT USE THE PRODUCT IN ITS DAMAGED STATE.

### Optical pickup:

Type: SF-DS10L  
Manufacturer: SANYO  
Laser output: 108 mW max (CD), 66 mW max (DVD)  
Wavelength: 782 nm (CD), 658nm (DVD)







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# Setup

## Setup

### Introduction

#### Introduction

Thank you for purchasing the TASCAM X-48 Digital Audio Workstation. You will find it a powerful addition to your audio recording workflow. With normal use and attention to the available documentation, the X-48 will provide many years of service. Enjoy!

#### Unpacking

The X-48 has been packed to ensure its safety during shipment. Inspect the unit for damage immediately upon unpacking and contact the shipper or retailer if damage is discovered or items appear to be missing. Please keep all boxes and packing material in case your X-48 needs to be shipped in the future. Inside the shipping carton, you will find the following:

- This Owner's Manual
- Quick Reference Guide
- X-48 Unit
- Power Cable specific to the country you purchased it in
- System Restore CD
- Documentation CD
- Two white plastic spacers & screws for installation of digital cards(IF-AE24/IF-AD24)

#### Read & Surf

We know you're eager to start recording right away. While you may get going by simply reading the Quick Start Guide, it is strongly recommended that you read this Owner's Manual and check <http://www.tascam.com> for any software updates. Doing these two simple things will go a long way towards making your experience with the X-48 an enjoyable one.

#### Manual Conventions

The following typefaces will be used in this Owner's Manual as indicated:

**Bold is used for front panel controls**

*Italic is used for VGA controls*

A Courier font is used for LCD display items

The following icons will be used in this Owner's Manual as indicated:



*This icon is for instructions that must be followed to avoid data loss or poor performance.*



*This icon indicates a hint or tip on using the X-48.*

# Setup



*This icon indicates instructions related to using the keyboard, mouse & monitor interface.*



*This icon indicates instructions related to using the front panel of the X-48.*

## Required Equipment

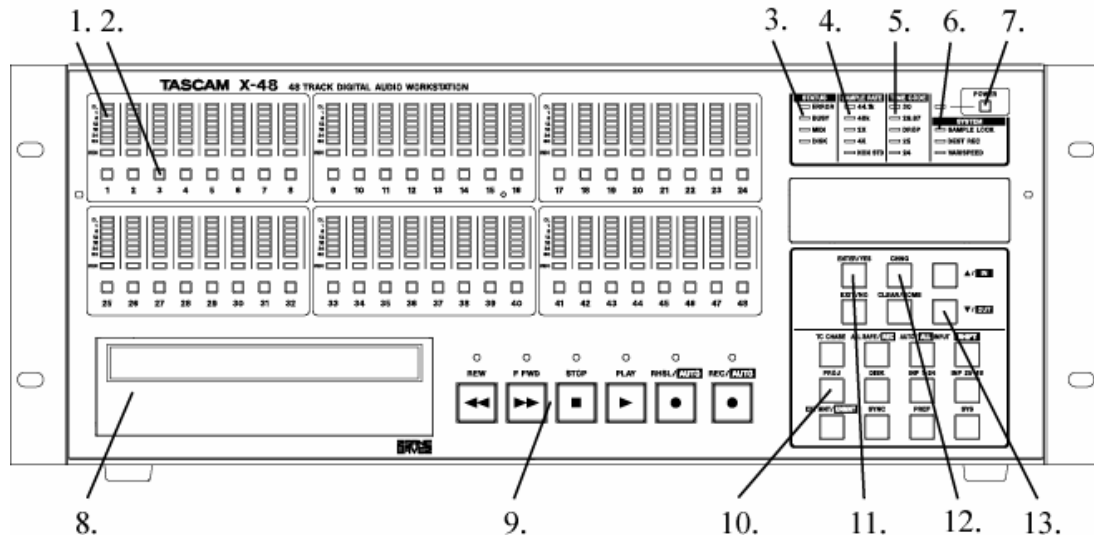
While the X-48 is a comprehensive piece of professional audio gear, there are other things you may need to take full advantage of its capabilities:

- A console with a minimum of 8 outputs (at least 24 is recommended) and enough inputs to handle your expected track count.
- An optional IF-AN24X analog I/O card if connecting the X-48 to an analog console. The IF-AN24X provides the X-48 with 24 analog inputs and 24 analog outputs.
- An optional digital I/O card (IF-AD24(X) or IF-AE24(X)) if connecting your X-48 to a digital console so equipped. These cards provide the X-48 with 24 digital inputs and 24 digital outputs per card.
- Analog or digital cables appropriate to your console and choice of I/O format.
- In order to use the X-48's editing, DSP and mixing capabilities, you will need a VGA monitor (1024 x 768 minimum resolution), a two-button PC mouse (PS/2 or USB) and a PC keyboard (PS/2 or USB).

# Setup

## Guided Tour

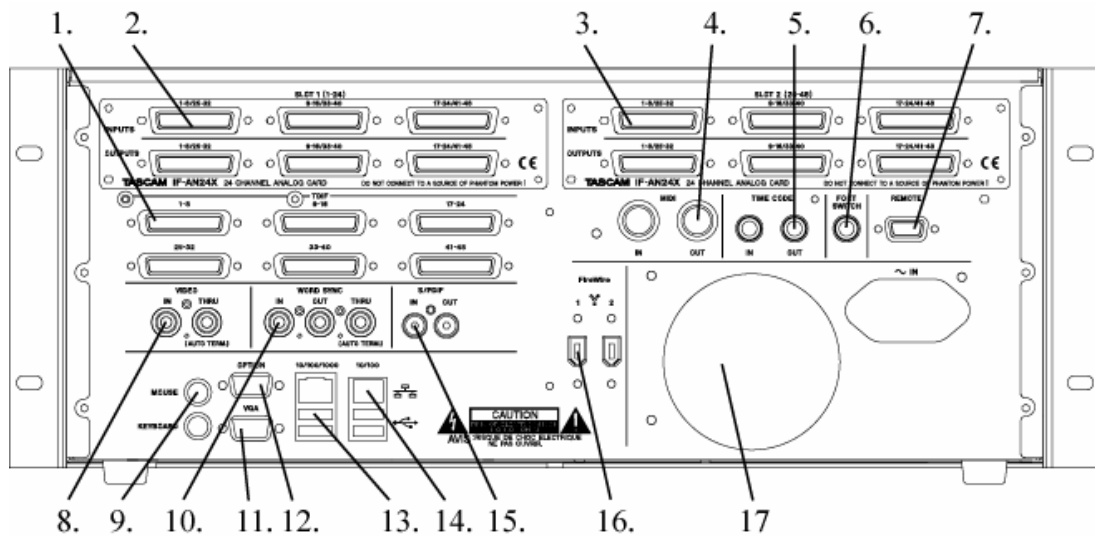
Here is an overview of the front panel. Refer to this diagram if the manual refers to a control you can't locate:



1. Track meter – displays signal level from -60dBfs to -1dBfs and overload.
2. Track record arming button – puts that track into record ready unless "All Safe" is turned on. Record Ready status is reported by a flashing red light directly above that track's record arming button.
3. Status Lights – These lights flash when the X-48 is accessing the hard drive, busy with a task, has MIDI input or encounters an error.
4. Sample Rate – these lights report the current sample rate. If the X-48 is set to 96kHz, the "48kHz" and "2X" lights will be lit. If it isn't set to one of these standard rates (i.e. 47952 Hz/48k pulldown), the "Non Std." light will turn on.
5. Timecode Rate indicator – Displays the current frame rate.
6. System Lights – Indicates sample lock to an external source, when destructive recording mode is enabled and when varispeed is enabled.
7. Power – Turns the unit on and off. A system prompt will confirm shutdown. Holding the button down for several seconds will shut the unit off without a confirmation.
8. Optical drive – the internal DVD optical drive for backup, import and export of files.
9. Transport buttons – See the Recorder chapter if you're unsure how to use these.
10. Menu buttons – These access menu groups like Project, Sync, Preferences, etc. You can also change the input status, unmount a disk and more.
11. Enter button – Confirms menu selections. The Exit button is directly below it to cancel a menu option.
12. Change button – Use this key to change a menu item in the Project, Sync, etc. menus.
13. Up/Down buttons – Use these to scroll through menus and change their settings.

Now let's walk through the rear panel:

# Setup



1. TDIF Inputs and Outputs – Each of these jacks transmits 8 channels of TDIF-format digital audio input and output at up to 96kHz/24-bit. NOTE: to get all 8 channels of audio input and output at 96kHz, the equipment connected to the X-48 must have the latest TDIF capabilities, such as TASCAM’s DM-3200 and DM-4800 digital mixers.
2. Option card slot 1 – This card slots adds an additional I/O format for channels 1-24. It’s compatible with an interface card such as the IF-AN24X analog card, IF-AD24 ADAT optical card or IF-AE24 AES/EBU card (sold separately).
3. Option card slot 2 – Adds an additional I/O format for channels 25-48. Cards 1 and 2 do not need to be the same, you can mix and match Analog and AES for example.
4. MIDI Input and Output – Used to generate and receive MIDI Timecode. Also used to receive MIDI Machine Control commands.
5. Timecode Input and Output – Generates and receives SMPTE LTC timecode through balanced 1/4" jacks.
6. Footswitch jack – Compatible with a momentary footswitch like the TASCAM RC-30P for punch in/punch out. NOTE: To operate correctly, as footswitch must be connected before the X-48 is powered on.
7. Remote – Compatible with RS-422 / Sony 9-pin edit controllers for machine control
8. Video clock in/thru – Attach blackburst video reference to this BNC jack. There’s also an auto-terminating thru jack.
9. Mouse/Keyboard – PS/2-compatible mouse and keyboard inputs. You can also use a USB mouse and keyboard if preferred.
10. Word Sync In/Out/Thru – Compatible with BNC word clock generators.
11. VGA output – Your monitor should be capable displaying a resolution of at least 1024x768 pixels at a refresh rate of at least 60 Hz. The maximum resolution of the X-48’s display output is 2048x1536 pixels.
12. Option – This jack doesn’t do anything and never will. Just pretend it doesn’t exist.
13. USB – Four USB 2.0 jacks for connecting a keyboard, mouse, flash drive or hard drive.
14. Ethernet – There are two ethernet jacks. One is 10/100/1000 (Gigabit compatible) and the other is 10/100. The Gigabit port is fully configurable while the 10/100 port is set to DHCP. See the section on Networking for more information.
15. S/PDIF – Stereo coaxial digital input and output.
16. Firewire – A pair of FireWire connectors for connecting external hard drives

# Setup

17. Cooling fan – make sure that this fan is not blocked off in a rack to prevent overheating the system.

## ***I/O Card Installation***

I/O cards of different types may be installed in the X-48 simultaneously. For example, an X-48 may have one analog card and one digital card installed, with independent I/O routing. Each X-48 option card provides 24 channels of input and output.

- You will need a medium size Philips screwdriver.
- Power off and unplug the X-48 to avoid shock hazard.
- If rack mounted, remove the X-48 from the rack to gain access to the top panel.

### **Analog Card**

1. Remove the six screws holding on the top panel (there is one on the rear).
2. Remove the top panel and set it aside. You will see two black connectors, one labeled **SLOT1** and one labeled **SLOT2**. On the back of the X-48, there are two blank panels, one labeled **SLOT1 (1-24)** and one labeled **SLOT2 (25-48)**.
3. Remove the blank panel corresponding to the black connector where the I/O card will be connected. For example, if you are installing an analog card for channels 1-24, remove the blank panel for **SLOT1**.
4. Continue with this section to install an analog card. Otherwise skip to the next section to install a digital card.
5. Connect the flat gray cable provided with the analog card to the appropriate slot connector in the X-48.
6. Slide the analog card into the slot from the rear of the X-48. Near the black connector on the card, you will see a screw hole. With the card slid all the way in, under that hole is a chassis screw that must be removed then used to hold the rear of the analog card in place.
7. Secure the analog card's connector plate to the rear panel of the X-48 using the screws you removed in Step 6.
8. Connect the other end of the flat gray cable to the black connector on the card.
9. Just behind the front panel you will find yellow/black/red cables with white connectors. These are power cables for the analog card. Connect one of these to the matching white connector on the analog card.
10. Replace the top panel.

### **Digital Card**

1. Remove the six screws holding on the top panel (there is one on the rear).
2. Remove the top panel and set it aside. You will see two black connectors, one labeled **SLOT1** and one labeled **SLOT2**. On the back of the X-48, there are two blank panels, one labeled **SLOT1 (1-24)** and one labeled **SLOT2 (25-48)**.
3. Remove the blank panel corresponding to the black connector where the I/O card will be connected. For example, if you are installing an analog card for channels 1-24, remove the blank panel for **SLOT1**.
4. Connect the flat gray cable provided with the digital card to the appropriate slot connector in the X-48.
5. Slide the digital card into the slot from the rear of the X-48.

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6. Secure the digital card's connector plate to the rear panel of the X-48 using the screws you removed in Step 2.
7. Secure rear of the digital card to the metal plate below it using a white plastic spacer and screw originally provided with your X-48.
8. Connect the other end of the flat gray cable to the black connector on the card.
9. Replace the top panel.

## Making Connections

You may not use all the connections provided on the rear of the X-48, but they are there if you need them. Just skip over the sections below that don't apply to your setup. For further information on routing to & from these connectors, please refer to Section 'I/O Settings' (page 23).

### TDIF

The X-48 comes standard with six DB25 connectors, each one capable of carrying eight channels of I/O at normal sample rates (44.1k, 48k) or double speed sample rates (88.2k, 96k).

**NOTE:** Eight channels of double speed sample rate I/O on a single TDIF connection is a new development for TASCAM recorders and mixers. Please ensure that the equipment you are connecting the X-48 to will support this by contacting the manufacturer of that equipment.



Note: Use only cables that are specified by the manufacturer as "TDIF" cables. Using incorrect cables can damage your equipment.

### S/PDIF

The X-48 comes standard with two RCA jacks for S/PDIF I/O at both normal and double speed sample rates.



Note: To ensure clean data transmission, use only cables specified by the manufacturer as "S/PDIF" cables.

### AES/EBU

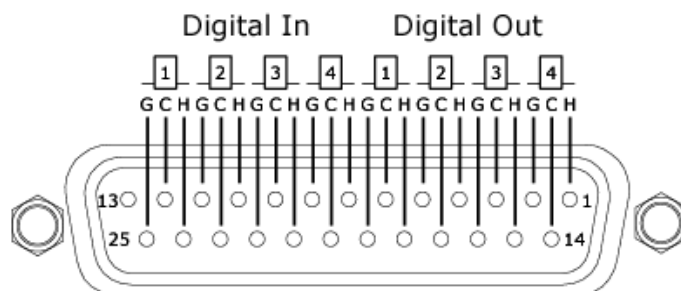
When installed into an X-48 Slot, an AES/EBU digital I/O card will provide 24 channels of I/O at normal sample rates (44.1k, 48k) or double speed sample rates (88.2k, 96k).



Note: Use only DB25 cables specified by the manufacturer as "AES/EBU" cables. Many cables look the same on the outside.

The AES/EBU DB-25 pinout is pictured :

# Setup



## ADAT

When installed into an X-48 Slot, an ADAT digital I/O card will provide 24 channels of I/O at normal sample rates (44.1k, 48k).

## Digital Audio Clock

Any time multiple digital audio devices are connected together, or multiple digital audio connections are used simultaneously on a single device, all the digital audio clock rates of the connected devices must be locked together. If this is not done, or if it is done incorrectly, clicks, distortion, or muted audio may result. The X-48 may act as the master clock to other devices in a system, or it can lock its clock to an external device.

This section will only deal with the physical connections to achieve clock lock. For system configuration, please refer to Section 'Digital Audio Clock'(Page 22). Note that all digital audio clock related connections may be connected simultaneously, with the needed one selected in the user interface.

If the X-48 is digitally connected to only one other device, the clocks may be locked via that connection, requiring no other connection be made.

## Word Clock

If the X-48 is digitally connected within a system of more than two digital devices, it is recommended to use Word Clock from one master source, distributed to all devices. The X-48's rear panel BNC Word Clock connectors have the following uses:

**IN** – This connector receives word clock from another device. When used, the X-48 should be configured to lock to Word Clock.

**OUT** – This connector transmits word clock to other devices. When used, the X-48 should be configured to Internal Clock.

**THRU** – This connector passes the Word Clock signal present at the Word Clock IN through without adding any delay. This allows three devices to be locked in a daisy-chain fashion in configurations where there is no way to directly distribute clock from a single source.

## Analog Audio

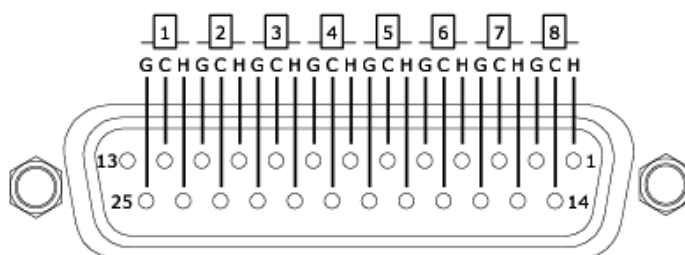
The IF-AN24X provides 24 channels of balanced analog inputs and 24 channels of balanced analog outputs. The X-48 can be configured to one of five possible operating reference levels by applying the appropriate software settings. Please refer to Section 'Analog I/O Operating Level'(page 24) for details.

# Setup



Note: Use only DB25 cables specified by the manufacturer as "Analog" cables. Many cables look the same on the outside.

The analog DB-25 pinout is pictured below:



## Synchronization and Control

This section will deal with the physical connections needed in various synchronized applications. For details about the appropriate software settings, please refer to Section 'Synchronization'(page 45).

## MIDI

There are two MIDI connectors on the rear of the X-48. These are used for MIDI Machine Control (MMC) and MIDI Time Code (MTC).

**IN** – This connector receives MTC, which the X-48 can chase, or MMC, which the X-48 can respond to. The front panel MIDI LED will illuminate when valid MIDI signals are present at this connector.

**OUT** – This connector outputs MTC any time the transport is in motion. That MTC output follows the frame rate and output options set for LTC output.

## Time Code

There are two ¼" TRS connectors on the rear of the X-48, used for sending & receiving time code (LTC). These connectors are balanced to allow for long cable runs with minimal interference. Please refer to page 48-52 for details on time code options.

## Footswitch

A normally-open, momentary footswitch may be connected to this ¼" TS connector for hands free transport and recording operation. NOTE: To operate correctly, as footswitch must be connected before the X-48 is powered on.

## Remote (Sony 9-Pin)

This is also known as "P2" or "Sony P2" or "RS-422". Various recording consoles and video controllers support this protocol for transport control and track record enable. This



# Setup

requires a specifically constructed cable. If in doubt, pre-made RS-422 cables are readily available.

1 : GND	6 : GNC
2 : TX-	7 : TX+
3 : RX+	8 : TX-
4 : GND	9 : FGND
5 : NC	

## Video Reference (Tri Level Sync)

**IN** – When the X-48 is used in a film/video post production environment, it may be necessary to resolve a consistent sample range with the time code edge. A video reference (blackburst) signal applied to this connector makes this possible. Please refer to page 48 for details on configuring the use of signals present at this connector.

*Tri Level Sync* is the video reference signal used for High Definition Video. This connector automatically senses the type of signal present.

**THRU** – The video reference signal present at the IN connector is passed through out this connector without additional processing delay. This allows for daisy-chaining another device, after the X-48, which requires a video reference signal.

## Keyboard, Mouse & Monitor

A standard PC keyboard & mouse (or trackball) may be connected to the P/S2 or USB ports on the rear of the X-48. To take full advantage of these peripherals, it is recommended that a full keyboard with numerical keypad and a scrolling wheel mouse be used.

NOTE: The extra controls present on some multi-media keyboards, such as media player transport controls, are not supported by the X-48. Similarly, a mouse or trackball that depends on the installation of custom driver software is not supported by the X-48.

Your monitor should be capable displaying a resolution of at least 1024x768 pixels at a refresh rate of at least 60 Hz. The maximum resolution of the X-48's display output is 2048x1536 pixels.

## Network

The X-48 is equipped with two separate Network connectors on the rear panel. One is a 10/100 port and the other is a 10/100/1000 (Gigabit) port. The 10/100 port is pre-configured as a DHCP port. The Gigabit port may be configured by the user in the X-48's software. Network cable used for these ports should be minimally CAT-5. While network hubs and switches can be used with the X-48, such devices may reduce network throughput, particularly on a network with much traffic.

When using the pre-installed MX-View software to control MX-2424 machines, the Gigabit port must be used and configured to the correct IP address to communicate with the MX-2424s.

# Setup

For more details about software configurations to use the X-48 within a networked environment, please refer to Section 'Networking'(page 26).

## External Drives

External hard drives may be connected to the FireWire or USB 2.0 ports on the rear of the X-48 to be used as record destination or copy destination drives.



When recording to any external drive, it is strongly recommended to run the Drive Benchmarking utility to ensure the drive is fast enough for the desired number of record tracks. For example, while FireWire itself is fast enough for high track counts, the actual drive inside an external FireWire enclosure may be a low RPM drive, not capable of high track counts.

USB Flash Drives, “Thumb Drives”, may be connected to an X-48’s USB port. Such drives can be useful as source drives for copying material onto the X-48’s drive, copy destination drives for moving material off an X-48, or for software updating. It is not recommended to record directly to such a drive due to their slow write speeds.

External optical drives (DVD, CDR, CDR/W) drives are not supported.

## Powering On / Off

Now that things are connected, it’s time to plug in the X-48 and power it on.

The X-48 is equipped with a universal power supply that is compatible with any country’s voltage and frequency. It is not necessary to change any power settings when traveling internationally with your X-48, though you may have to obtain an adapter to the local plug configuration.

Momentarily press the POWER button on the front panel and the X-48 will boot up. The boot process takes about 1 ¼ minutes to complete. When ready, the X-48 will display its track screen on a connected VGA monitor and the currently loaded project with time code on the front panel LCD display.

To power off the X-48, either select Shutdown from the File menu in the VGA UI or momentarily press the front panel POWER button. In either case, you will be prompted to save the currently loaded project then confirm the shutdown.

## External Applications



*While the X-48 is based on PC/Windows architecture, it is not configured for general PC use. The Windows Embedded operating system used on the X-48 does not include general use components. We strongly advise you not to install non-qualified software on the X-48. Doing so could lead to undesirable results, including X-48 malfunction, requiring you to use the X-48 System Restore CD to restore it to its original factory configuration.*

# Setup

## **MX-View**

Pre-installed on the X-48 is MX-View Version 1.40, for control of any existing MX-2424 machines you may have. For MX-View operational instructions, please refer to the MX-View Manual.

## **TASCAM Mixer Companion**

Pre-installed on the X-48 is TASCAM Mixer Companion Version 1.30. This allows the X-48 to act as the host computer for TMC when connected via USB to a TASCAM DM-3200 or DM-4800 digital mixer.

TMC updates may be installed by running the TMC update installer by selecting Launch External Application from the X-48's File menu. The TMC update installer would have to be on a piece of media that the X-48 has access to, such as a CD or USB flash drive.



*Only Version 1.20 or higher (Windows version) is designed to operate on the X-48. Earlier versions of TMC should not be installed on the X-48.*

## **VST Plug-ins**

At the time of this writing, the following plug-ins have been qualified for installation & use on the X-48. Please check the TASCAM web site for updates.

- Waves 5 (using the iLok key)
- Antares Auto Tune 4

## **Using the X-48 System Restore CD**

In the event it becomes necessary to use the X-48 System Restore CD to restore your X-48 to its original factory configuration, following the steps below will ensure a smooth restore process:

1. Back up all audio data. This should already be done as part of a regular workflow.
2. Ensure you have backups of any X-48 software installers or patch updates you may have downloaded from the TASCAM web site.
3. With the X-48 powered on, insert the System Restore CD then restart the X-48. The VGA UI doesn't have to be displayed, all that is required is power to open the drive tray. If necessary, the X-48 can be forced to shut down by holding the front panel power button for a few seconds.
4. The X-48 will automatically boot from the System Restore CD and run the X-48 Installer. Please follow the steps in the X-48 Installer screens.

# Configuration

## Configuration

### Configuration

This section helps you with the software settings you'll need to make in order for the X-48 to work smoothly in your application.

### Display Settings



#### Mouse/Keyboard Operation

Your monitor should be capable displaying a resolution of at least 1024x768 pixels at a refresh rate of at least 60 Hz. The maximum resolution of the X-48's display output is 2048x1536 pixels.

You change the display resolution from the Windows menu:

- Click the Windows menu and select *Display Settings...*
- Move the slider to change the display resolution (the minimum resolution is 1024 x 768) and press *Apply*.

### Navigating the LCD Interface



#### Front Panel Operation

To access menus and settings from the X-48 front panel, use the six buttons directly below the LCD display:

- Press one of the seven menus on the bottom right corner of the unit: **PROJ**, **DISK**, **I/O 1-24**, **I/O 25-48**, **SYNC**, **PREF** or **SYS**. See below for an explanation of each of these menus.
- Press the **Up/Down** buttons to scroll through menus.
- When you find a setting you want to edit, press **CHNG** (Change).
- Press the **Up/Down** buttons to choose a setting.
- When you're finished, press **ENTER** to save or **EXIT** to cancel your edit.
- At any time, you can press **HOME** to get out of the menu system and back to the main screen.

The seven menu keys are used to access the following functions:

- **PROJ**: Goes directly to the list of project management functions such as New, Open, Save, Save As, Delete and Copy.
- **DISK**: Goes directly to the list of hard drive management functions such as a Free Space display and disk formatting utility.
- **INP 1-24**: Goes directly to input routing menus for inputs 1 through 24. In most cases, these will be left at their default settings since much output routing can be done from a recording console. The choices presented in this menu allows the use of consoles with less than 48 outputs.

# Configuration

- **INP 24-48:** Goes directly to input routing menus for inputs 25 through 48. In most cases, these will be left at their default settings since much output routing can be done from a recording console. The choices presented in this menu allows the use of consoles with less than 48 outputs.
- **SYNC:** Goes directly to the list of synchronization settings & functions such as time code frame rate, digital audio clock settings and time code chase options.
- **PREF:** Goes directly to a list of general operating preferences for the X-48 such as transport options, pre/post roll options, front panel UI options and external control options.
- **SYS:** Goes directly to a list of system settings such as save/load of user configurations and network settings.

## Sample Rates

The X-48 supports the base sample rates of 44.1k, 48k, 88.2k and 96k. The sample rate for your project should be set immediately after creating the project and before recording any audio. New projects will be created at the currently set sample rate by default. A project's sample rate is stored as part of the project.

If a project's sample rate is changed after recording audio into that project, a confirmation dialog will be presented. Proceeding with the sample rate change will cause the project to play back faster or slower than it was originally recorded.

You will notice many other sample rates in the list besides the four noted above. Those are "pull up" and "pull down" rates for use in film and video applications. This will be covered in Section 'Synchronization'(page 45).

To set the sample rate:



### *Mouse/Keyboard Operation*

- Click on the Windows menu and choose *Settings...*
- Click on the *Sync* tab.
- Click on the *Rate* pull-down menu under *Sample Clock*.
- You will see the currently selected sample rate with a check mark. Select another sample rate by clicking on it.



### *Front Panel Operation*

- Press **SYNC**
- Use the Up or Down Arrow key until you see *Sample Rate*
- Press **CHNG**
- Use the Up or Down Arrow key until you see your desired sample rate
- Press **ENTER/YES**

# Configuration

## Digital Audio Clock

When digitally connected, two or more pieces of audio equipment must be running at exactly the same digital audio clock rate and have their sample exactly lined up. If this is not done, audio artifacts like clicking and popping or completely muted audio will result.

The X-48 provides the ability to operate in many digital audio clock scenarios. Each available setting is shown below along with an example of why it may be used. These settings are made on the Sync tab of the Settings window.

**Internal** – When selected, the X-48’s digital audio clock is running on its own at the selected sample rate. Choose this when the X-48 is connected to an analog mixer or when the X-48 is the clock master for other pieces of digital audio equipment.

**Varispeed** – The term “varispeed” refers to a recorder’s ability to run faster or slower than a base rate. This may be used to record off speed for later playback at normal speed for a special effect. It can also be used to slightly alter the pitch of a recording for tuning purposes. Varispeed is only available when the X-48 is set to Internal clock. When clocked externally, the X-48 must follow the rate of that external clock.

**Word Clock** – When selected, the X-48’s digital audio clock will be locked to any word clock signal present at its BNC Word Clock input. If this is selected, but no word clock signal is present, the sample rate indication in the GUI and the Sample Lock LED on the front panel will flash indicating no clock lock.

Word clock is commonly used when many pieces of digital audio gear are connected together in a system and clock is correctly distributed from a central clock generator or one of the connected devices.

**Invert Word Out Polarity** – Some manufacturers of digital audio equipment lock to the rising edge of a clock signal while others use the falling edge. This setting allows the X-48 to operate as a clock master with either type of equipment. This may not be documented by all manufacturers, so if your clock configuration appears correct but you are still hearing artifacts such as clicks, try changing the value of this setting.

**Clock Rate Multipliers** – Some older word clock generators only support base clock rates (44.1k, 48k). For scenarios where such a clock generator is used in a system running at higher clock rates, the X-48 provides the ability to lock to, and output, word clock rates that are exact multiples of its operating rate. For example, a system may be running at 96k, but the clock generator’s maximum output rate is 48k.

**ADAT Card/AES Card(1, 2)** – When selected, the X-48’s digital audio clock will be locked to the digital audio signal present at the first group of eight inputs of a digital I/O card installed in the specified slot. This would typically be used when the X-48 is digitally connected via one of its slots to one other piece of equipment such a mixer or another recorder.

**S/PDIF** – When selected, the X-48’s digital audio clock will be locked to the digital audio signal present at the rear panel S/PDIF input. This would typically be used when the X-48 is

# Configuration

digitally connected to the S/PDIF output of a piece of equipment when transferring stereo audio into the X-48.

**TDIF Port 1** – When selected, the X-48's digital audio clock will be locked to the digital audio signal present at the first TDIF port (1-8). This would typically be used when the X-48 is digitally connected via TDIF to one other piece of equipment such a mixer or another recorder.

**Resolve to Video In** – When checked, the X-48 will align the frame edge of its timecode with the edge of the video reference signal. This is not used as a sample clock source. Check this box when the X-48 is synchronized via time code to devices such as video recorders, cameras, or edit controllers and all devices are locked to the same video reference signal (a.k.a. Blackburst). For more information on synchronization and working with film or video, please see the section in Chapter 3, "Video Clock Frame-Edge Resolve."

## I/O Settings

This section explains how to configure the optional I/O cards for the X-48:



### *Mouse/Keyboard Operation*

Choose *Settings* from the Windows menu and click on the *I/O* tab:

**I/O Cards** – At the top of the display, you'll see a list of installed optional I/O cards (if any)

**I/O Setup** – Using the I/O Card Select menus, you can select Input and Output types in groups of eight from the selection pull down menus. (They are all set to TDIF by default.) The Input Routing pull down menus set track input sources in groups of eight. They can be used to configure the recorder inputs for a console that has less than 48 routing outputs.

For example, a console with 24 TDIF outputs could be connected to the X-48 this way:

- Connect console TDIF outs 1-24 to X-48 TDIF in 1-24
- Set *Input Routing* for channels 1-8 and 25-32 as *Input Group 1 1-8*
- Set *Input Routing* for channels 9-16 and 33-40 as *Input Group 2 9-16*
- Set *Input Routing* for channels 17-24 and 41-48 as *Input Group 3 17-24*

This allows all 48 tracks to receive signal without physical re-patching. Console out 1 will feed track 1 and 25, console out 2 will feed tracks 2 and 26, etc. There is a track-by-track input selection pull down menu in the *Edit/Track* screen which over-rides the selection made in the Settings window.

You can also select the I/O operating level from the pulldown menu at the bottom of the window. See the next section for more information.

**S/PDIF** – A checkbox at the bottom of the window enables sample rate conversion on the S/PDIF input

# Configuration



## Front Panel Operation

To configure the I/O cards from the front panel:

- Press the **INP 1-24** or **INP 25-48** key
- Use the Up/Down buttons to select a bank of 8 inputs and outputs, i.e. "IO Card Select 1-8" and press **CHNG.**
- Select either TDIF 1-8 or Slot1 (1-8) and press **ENTER.**
- Press the **EXIT** button when you are finished changing physical I/O types

To send a different bank of inputs to tracks, for example send inputs 1-24 to 25-48 (see example above):

- Press the **INP 1-24** or **INP 25-48** key
- Use the Up/Down buttons to select routing for a bank of tracks, such as "Input Routing 25-32" and press **CHNG.**
- Select a bank of inputs, i.e. Input Grp1 1-8 and press **ENTER.**
- Press the **EXIT** button when you are finished changing input groups

## Analog I/O Operating Level

You can set the Analog Operating level from the Settings menu. Choose *Settings* from the Window menu, click the *I/O* tab and click the *I/O Operating Level* from the pull-down menu. Your choices are -9, -14, -16, -18 or -20dBfs.

## Control Mode

The X-48 has four options for transport control:

**Internal** – The default is local control from the transport, mouse and keyboard

**SMPTE** – When enabled and the front panel TC CHASE key is enabled, the X-48 chases the SMPTE timecode from its input jack.

**MIDI (MTC)** – In this mode with the front panel TC CHASE key enabled, the X-48 chases incoming MIDI timecode from its MIDI input.

**Theater Play** – This is a special playback mode similar to Auto Cue on a CD Player. Please refer to Page 49 for details on the use of this mode.

## MIDI Device ID

When working with MIDI Machine Control, you can set a MIDI device ID so that other devices don't intercept commands for the X-48 (and vice-versa). To set the MIDI device ID:



## Mouse/Keyboard Operation

- Click the Windows menu, select *Settings* and click the *System* tab
- Click the *MIDI Device ID* pulldown
- Select a device ID from the list



# Configuration



## Front Panel Operation

- Press the **SYS** button
- Press the Up/Down buttons to select **Midi Device ID** and press **CHNG**
- Select an ID from the list and press **ENTER**

## Sony 9-Pin

This section explains how to control the X-48 using Sony 9-pin, also called P2 or RS-422. To access these settings:



## Mouse/Keyboard Operation

- Click the **Windows** menu and select *Settings*
- Click the *Prefs* tab
- There are three settings under the *Sony 9-pin* heading: *Track Arm*, *Punch Delay* and *Chase Control*, explained below.



## Front Panel Operation

- Press the **PREF** button
- Press the Up/Down buttons to select **P2 Track Arm**, **P2 Punch Delay** or **P2 Chase Control** and press **CHNG**

**Track Arm** – Setting it to *Digital/Console* allows you to arm tracks over 9-pin. Set this to *Local* if you don't want to arm tracks this way.

**Punch Delay** – You can set the punch-in delay from off to 6 frames. This is used when it is necessary for the X-48 to emulate an older video deck to match what is expected by the controller.

**Chase Control** – Choose **LTC (SMPTE)** or **MTC (MIDI)** here, or it can be disabled.

## Video Reference

When working in video, use video blackburst to align your audio playback and time code to exactly a frame edge. To switch on video reference:



## Mouse/Keyboard Operation

- Click the **Windows** menu and choose *Settings*
- Select the *Sync* tab
- Check the box labeled **Resolve to Video In**



## Front Panel Operation

- Press the **SYNC** button

# Configuration

- Press the Up/Down buttons to select **Resolve to Video In** and press **CHNG**
- Use the Up/Down buttons to select **On** and press **ENTER**

The Video Clock input supports Tri-Level Sync for High Definition Video. If the blackburst input is Tri-Level, the X-48 automatically enables this feature. See *Chapter 3, Recording* for more on sample clock and video sync.

## Pull Up/Pull Down Sample Rates

The X-48 supports pull-up and pull-down sample rates for use in film and video post-production. When you select the sample rate for the new session, be sure to consider the final delivery format and set your sample rate accordingly. See *Chapter 3, Recording* for more on sample rates.

## Networking

The X-48 can be connected to a computer using the fast Gigabit Ethernet connection. You need an Ethernet crossover cable to connect your computer to the X-48, unless you know that your computer's Ethernet connector is "auto-sensing" (such as most modern Apple computers). Once the ethernet cable is connected, you need to configure both the X-48 and your PC for networking:

To configure the X-48 for networking:



### *Mouse/Keyboard Operation*

- View the "Settings" window, "System" tab.
- Press the "Configure..." button.
- Select "Use the following IP address".
- Set "IP address" to be 192.168.1.1. If this address is already in use by your router, choose a different number for the last digit.
- Set "Subnet mask" to be 255.255.255.0.
- Leave the "Default gateway" blank.
- "Use the following DNS server addresses:" should be already selected.
- "Preferred DNS server" and "Alternate DNS server" should be blank.
- Press OK.
- Begin sharing the X-48's hard drive by selecting "Drive Sharing..." from the File menu.

To configure your Windows XP computer for networking to the X-48:

- Select Start->Control Panel->Network Connections.
- You should see a list of network connections, with one called "Local Area Connection".
- Right-click on "Local Area Connection" and select "Properties".
- Click on "Internet Protocol (TCP/IP)" so that it is highlighted. (Its check box must remain checked.)
- Press the "Properties" button.
- Select "Use the following IP address".

# Configuration

- Set "IP address" to **192.168.1.2**. (Note: This is different from the X-48's IP address.) If this IP address is already in use on your network, pick a different number for the last digit.
- Set "Subnet mask" to be **255.255.255.0**.
- Leave the "Default gateway" blank.
- "Use the following DNS server addresses:" should be already selected.
- "Preferred DNS server" and "Alternate DNS server" should be blank. Press OK.
- Close the "Local Area Connection Properties" window.
- Select Start->My Network Places.
- On the left side of the "My Network Places" window is a list of "Network Tasks".
- Select "View workgroup computers". If this left side display is not visible, enable it by going to Tools > Folder Options > General tab and click "Show common tasks in folders". Alternatively, you could double click "Entire Network" then "Microsoft Windows Network" to see the available workgroups. Inside the workgroup named "Workgroup" will be the X-48. If your computer and X-48 workgroup names are different, navigate one level up to see all the workgroups present on the network and look inside WORKGROUP to find the X-48.
- Your X-48 will show up similar to this: "X48-uo0t97er5vk". (It is possible that you may need to wait a minute or so for the X-48 to show up in this list.)
- Note that the X-48's workgroup name is fixed as "WORKGROUP". Your PC's network name may not be WORKGROUP. For example, Windows XP Home has a default network name of "MSHOME". To find the workgroup name of your computer go to Control Panels > System > Computer Name tab.
- Double click on the icon that represents the connected X-48.
- You should be prompted to enter a user name and password.
- The user name is "**administrator**" and the password is "**admin**".
- Now when you double click on the icon, you should be able to see the X-48's internal hard drive. It is called "X48 Data Drive".
- Double-click on "X48 Data Drive" to see its contents.
- Look in the "XProjects" directory for projects.

To configure your Mac OS X computer for networking to the X-48:

- Click on *System Preferences...* under the Apple menu and choose *Network*.
- (Optional:) You may want to make a new Location under the *Location* pull-down menu.
- Double-click on *Built-In Ethernet*
- Click the *Configure IPv4* pull-down menu and choose *Manually*.
- Set *IP Address* to **192.168.1.2**. (Note: This is different from the X-48's IP address.) If this IP address is already in use on your network, pick a different number for the last digit.
- Set *Subnet Mask* to be **255.255.255.0**.
- Leave *Router*, *DNS Servers* and *Search Domains* blank.
- Click *Apply Now* and close the window.
- Open a new Finder window and click the *Network* globe on the left side of the window.
- Your X-48 will show up similar to this: "X48-uo0t97er5vk". (It is possible that you may need to wait a minute or so for the X-48 to show up in this list.)
- Double click on the icon that represents the connected X-48.

# Configuration

- You should be prompted to enter a user name and password. The user name is "**administrator**" and the password is "**admin**".
- The Finder will ask you which drive you want to mount. There is only one choice, "X48 Data Drive". Click OK.
- Double-click on "X48 Data Drive" to see its contents.
- Look in the "XProjects" directory for projects.

If you're having trouble getting things to work, you should be able to "ping" the X-48 from the PC. Open an MS-DOS window (Windows) or the Terminal in Applications/Utilities (Mac OS X) and type "ping 192.168.1.1". Note that this example uses the IP address specified in the above steps. If the X-48 does not respond then you something is not connected or configured correctly.

## Checking Free Hard Drive Space

Prior to beginning a recording project, you'll probably want to check your available hard drive space:



### *Front Panel Operation*

- Press the **DISK** button
- Use the Up/Down buttons to select **Free Space**
- Press the Up/Down buttons to see the free space on each of your drives.
- Press **HOME** when you're finished.

## Drive Benchmarking Utility

The X-48 includes a utility that you can use to test any connected drive before using it. The recorder runs a series of write/read tests and then reports how many tracks it can record to that drive at 48kHz and at 96kHz. You should run this when you attach a new hard drive to the system, especially an external FireWire hard drive with an unknown drive inside it. To run the Drive Benchmarking Tool:



### *Mouse/Keyboard Operation (only)*

- Click the File menu and choose *Drive Benchmarking...*
- Choose your hard drive from the pull-down menu.
- Click OK to start the test. In about a minute, the X-48 will report how many tracks you can record to this drive at 48kHz and at 96kHz.

## Formatting a New Drive

A new hard drive needs to be formatted before recording on the X-48. To do this:



### *Mouse/Keyboard Operation*

- Click the File menu and choose *Disk Management...*

# Configuration

- The X-48 warns you that it will shut down after running this application. Click Yes (or No) to save your project first.
- The next prompt warns you that you can do some serious damage by misusing the Disk Management tool, such as modifying the C: drive. Click OK when you're ready to begin.
- The Disk Management tool opens. Disk0 should be the startup disk, partitioned into the C: drive (your operating system and program files), and the D: drive (the Data partition you can write to).
- If you've connected a FireWire drive, you should see it mounted as Disk1. To format this disk, right-click the bar on the right and select "Format."
- Give the disk a name and click OK twice.
- When you're finished, click the Close box in the top right corner. The X-48 will shut down. Restart the recorder to begin using your drive.



## Front Panel Operation

- Press the **DISK** button
- Use the Up/Down buttons to select `Quick Format` and press **CHNG.**
- Select a drive using the Up/Down buttons and press **ENTER.**
- The display will ask you if you want to format the drive. Press **ENTER/YES.**

## Factory Defaults

This section tells you how to restore the X-48 to factory defaults:



## Mouse/Keyboard Operation

- Open the Windows menu and select *Settings*
- Click the *System* tab
- Click the *System Settings Reset* button. The recorder will ask you if you want to restore the X-48 to factory settings, click OK.



## Front Panel Operation

- Press the **SYS** button
- Press the Up/Down buttons until you select `Settings` and press **CHNG.**
- Select `Recall Defaults` using the Up/Down buttons and press **CHNG.**
- The display will ask, `Reset settings to factory defaults?` Press **ENTER/YES.**

## Store/Recall User Settings

You can store your own settings for later recall. You might do this if you do multiple types of sessions that require different configurations:

# Configuration



## Mouse/Keyboard Operation

- Open the Windows menu and select *Settings*
- Click the *System* tab
- Click the *System Settings Store* button. Type a name for the settings and click **OK**.
- To restore the system settings you've saved, click the *Recall* button and find your backup.



## Front Panel Operation

- Press the **SYS** button
- Press the Up/Down buttons until you select *Settings* and press **CHNG**.
- Select *Store . . .* using the Up/Down buttons and press **CHNG**.
- Give your settings a name using the Up/Down buttons and the **CHNG** button to cursor forward, then press **ENTER/YES**.
- To recall your settings, select *Recall . . .* from the previous menu and locate your backup file.

## Mixer Bypass

Bypassing the mixer section improves input to output delay and reduces CPU usage by keeping the mixer EQ, level, etc. settings disabled when using the X-48 strictly as a recorder. Mixer Bypass is switched on by default, so you'll need to disable it before using the mixer section. To access this setting:



## Mouse/Keyboard Operation (only)

- Open the Windows menu and select *Settings*
- Select the *System* tab
- Check or uncheck the *Mixer Bypass* checkbox.

## Make a Default Project

You can define a default project which has all of the routing and sync presets you typically use. To do this:



## Mouse/Keyboard Operation (only)

- Open the File menu and select *Save Project As...*
- Navigate to `D:\XProjects\Startup\`
- Name your project "Startup". Click **OK** to replace the old file.

## Install VST Plug-Ins

See Chapter 'Mixing' for information on using Third-Party Plug-Ins.

# Recorder

## Recorder

### *Working With Projects*

#### Creating a New Project



##### Mouse/Keyboard Operation

- Click on the File menu and select *New Project...* or press Control-N on the keyboard.
- The display will ask you if you wish to save changes to the current the current project. Click on Yes or No.
- The display prompts you for the following information:

Name: Type a name for the project using the keyboard

Drive: Select which drive to record to

Mode: Either Non-Destructive or Destructive. See next section for explanation.

Sample Rate: The sample rate for the session. Most users will choose either 44.1k (CD-standard), 48k (DAT-standard), 88.2k (2x CD) or 96k (2x DAT). A number of other sample rates are provided for post production use. See Section 'Sample Rates'(page 46) for more information on when to use these sample rates.

Bit Depth: Choices of 16-bit, 24-bit, or 32-bit Floating Point are provided.

- Click OK when complete.



##### Front Panel Operation

- On the front panel of the X-48, press the **PROJ** button, press the Up/Down arrows to select New and press **CHNG**.
- Press the **Yes** or **No** button to save the current project.
- Choose a drive to record to with the up/down buttons and press **ENTER**.
- Select the bit depth – either 16-bit, 24-bit or 32-bit floating point – and press Enter.
- Give the project a name using the Up/Down buttons to change letters, the Change button to select the next letter. Press Enter to create the project or **EXIT** to cancel.



##### Destructive versus Non-Destructive Recording

The X-48 provides two methods for recording, Non-Destructive (the default) and Destructive.

When **Non-Destructive recording** is selected, new recordings are written to the hard drive as new WAVE files. With this method, you can return to an old take of a recording using *Undo* or by editing the previous take. The disadvantage to this method is that your hard drive is filled with Wave files. If you imported all of these files into a digital workstation,

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you may not be able to tell which was the final approved recording unless you had exported an AAF file as well.

Using **Destructive recording** is just like using a multitrack tape, and is often referred to as "tape mode." If you look at the hard drive after recording this way, you will see one long WAVE file for every track that you recorded to. Film re-recording mixers use destructive recording to record their final mixes. As they punch in and out of their mix recorder all day, they only want one master file of the approved mix to encode into Dolby Digital or however it's being processed for release. Destructive recording also has the advantage that it uses less hard drive space, since old takes aren't kept. But just like the multitrack tape it emulates, when you record over something it's gone forever. There's no *undo* in destructive recording mode.

## Opening a Project



### Mouse/Keyboard Operation

- Click on the File menu and select *Open Project...* or press Control-O on the keyboard.
- The display will ask you if you wish to save changes to the current the current project. Click on Yes or No.
- The Open Project window appears. At the top of this window, click the *Up* button to navigate up a level on your hard drive, or all the way up to see all drives connected to the system.
- Double-click on the folder containing your project. You should see a project with the filename you chose ending in a ".ndr" extension. Double-click on this file to open the project.



### Front Panel Operation

- On the front panel of the X-48, press the **PROJ** button, press the Up/Down arrows to select Open and press **CHNG**.
- Press the **Yes** or **No** button to save the current project.
- Choose a drive
- Select the file to open using the Up/Down buttons and press **ENTER**, or **EXIT** to cancel.

## Saving a Project



### Mouse/Keyboard Operation

- Click on the File menu and select *Save Project...* or press Control-S on the keyboard.



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## Front Panel Operation

- On the front panel of the X-48, press the **PROJ** button, press the Up/Down arrows to select **Save** and press **CHNG**.



## Saving Your Work

How often do you need to save? The X-48 writes data to the drive during recording. You should periodically save during recording, and whenever you change something in the mixer. You may also want to switch on Auto Save, described below. However, if the X-48 loses power during a long recording, the Wave files can be re-imported when you switch it back on. For best results and piece of mind, save early and often.

## Auto-Saving Projects

You may want to enable auto-save so that your recordings and mixes are saved in the event of a power outage.



## Mouse/Keyboard Operation

- Click on the *Windows* menu and select *Settings*, or press Shift-F8 on the keyboard.
- Select the *Prefs* tab.
- Click the *Auto-save Projects* checkbox. You can specify how often the machine saves, from every 1 to 120 minutes.



## Front Panel Operation

- On the front panel of the X-48, press the **PREF** button.
- Press the Up/Down arrows until you select **Auto Save** and press **CHNG**.
- Press the Up/Down buttons to select **On** and press **ENTER**.
- Press the **PREF** button again, press the Up button once to select **Auto Save Time** and press **CHNG**.
- Change the Auto-save interval time (10 minutes is the default) and press **ENTER**.

## Importing a Project

The X-48 can import an Open TL project. This function can only be accessed from the mouse and keyboard – it's not possible to import a file using the front panel LCD.



## Mouse/Keyboard Operation (only)

- To open this project, select *Import Project...* from the File menu.
- The recorder will prompt you to save your project, click either *Yes* or *No*.

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- Select a project to import using the window interface. You can navigate up to select another drive. Click *Open* or *Cancel* to select a project.

## Exporting a Project

The X-48 can export the recording project as either an AAF file (Advanced Authoring Format) or an Open TL file. AAF files are supported by most digital audio workstations, including Pro Tools, Logic and Nuendo. You may need additional software to import an AAF file, such as DigiTranslator for Pro Tools. Consult your workstations documentation or support website for more information. This function can only be accessed form the mouse and keyboard – it's not possible to import a file using the front panel LCD.



Mouse/Keyboard Operation (only)

- To open this project, select *Export Project...* from the File menu.
- Using the *Filter* control at the bottom of the window, select either AAF or Open TL as your output format.
- You can navigate up to select another drive. Click *Save* to export the project.

## Copying a Project

You can make a copy of a project with the X-48, for instance as a backup to another drive. This copies the project and all of its wave recordings, unlike "Save As..." which only copies the project file.



Mouse/Keyboard Operation

- Click on the File menu and select *File Manager* or press Control-F on the keyboard.
- You should see the File Manager window with two panes on the left and right. In the left hand pane, navigate to the project folder you want to copy (containing the .ndr file and Audio folder). Click on this folder so it's highlighted.
- Using the controls on the right side, navigate to where you want to copy the project to, i.e. a removable FireWire hard drive.
- When you're ready to begin copying, press the >> button under the word *Copy* between the two panes.



Front Panel Operation

- On the front panel of the X-48, press the **PROJ** button, press the Up/Down arrows to select **Copy** and press **CHNG**.
- Press the Up/Down arrows until you select a source project folder and press ENTER.
- Press the Up/Down arrows and select a project file(.ndr file) and press ENTER.
- Press the Up/Down arrows and select a destination drive and press ENTER.
- Enter a destination project name by using Up/Down arrows and CHNG button, and press ENTER.

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## Backing Up a Project to CD/DVD

There are three destinations for backing up a project: to the built-in DVD drive, to a network, or to another hard drive. To back up to another hard drive, see the "Copying a Project" instructions above. To copy a project to a connected network, see page 26 in the chapter on Networking. This section explains how to back up to the built-in DVD recorder.



### Mouse/Keyboard Operation (only)

- Click on the File menu and select *File Manager* or press Control-F on the keyboard.
- You should see the File Manager window with two panes on the left and right. In the left hand pane, navigate to the project folder you want to back up (containing the .ndr file and Audio folder). Click on this folder so it's highlighted.
- In the center pane, click the *Backup* button.
- The *Burn Options* window should appear. It will tell you how large the project folder you selected is, and will give you the option to burn the project to a 650MB CD , 700MB CD or 4.7GB DVD. You can also click a checkbox to verify the disk after it has been burned.

## Deleting a Project



### Mouse/Keyboard Operation

- Click on the File menu and select *File Manager* or press Control-F on the keyboard.
- You should see the File Manager window with two panes on the left and right. In the left hand pane, navigate to the project folder you want to back up (containing the .ndr file and Audio folder). Click on this folder so it's highlighted.
- In the center pane, click the *Delete* button.
- In the *Confirm Delete* window that opens, click OK.



### Front Panel Operation

- On the front panel of the X-48, press the **PROJ** button, press the Up/Down arrows to select **Delete** and press **CHNG**.
- Press the Up/Down arrows to select a project folder and press **ENTER**.
- Press the Up/Down arrows and select a project file(.ndr file) and press **ENTER**.
- A confirmation message appears. Press **YES/NO** to execute/cancel the delete operation.

## Load Last Project

The X-48 can default to loading the last project used at startup. This is useful for working on long-term projects, or when the X-48 is used as a playback device for live or theater use.

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## Mouse/Keyboard Operation

- Click on the Windows menu and select *Settings* or press Alt-F8 on the keyboard.
- The Settings window will open. Click on the tab at the bottom of this window titled *Prefs*.
- At the top of the screen is a checkbox labeled *Load Last Project on startup*. Check this box.



## Front Panel Operation

- On the front panel of the X-48, press the **PREF** button, press the Up/Down arrows to select `Load Last Project` and press **CHNG**.
- Use the up/down buttons to select `On` and press **ENTER**.

## Transport Operations

### Local

The X-48 has six transport buttons you should already be familiar with. These buttons are found on the front panel and on the VGA display:

**REW** rewinds the transport. After rewinding for three seconds, it rewinds at a faster rate. After another three seconds, faster still.

**F FWD** puts the transport in Fast-Forward. It moves at increasingly faster rates like the Rewind button.

**STOP** stops playback, recording or loop playback.

**PLAY** starts playback, loop playback or loop recording

**RHSL** starts Rehearsal recording. This simulates recording (changing input monitor modes as selected) without actually punching into record. It can also be used to set punch in/out points.

**REC** starts recording when pressed at the same time as **PLAY**. It can start recording on its own if One Button Record is set to on, see next section.

### One-Button Record

This function allows recording to begin when the record button is pressed by itself, instead of requiring the record and play buttons to be pressed at the same time.



## Mouse/Keyboard Operation

- Click on the Windows menu and select *Settings* or press Alt-F8 on the keyboard.
- The Settings window will open. Click on the tab at the bottom of this window titled *Transport*.
- At the top of the screen is a checkbox labeled *One Button Record*. Check this box.

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## Front Panel Operation

- On the front panel of the X-48, press the **PREF** button, press the Up/Down arrows to select **One Button Record** and press **CHANGE**.
- Use the up/down buttons to select **On** and press **Enter**.

## TC Chase

The TC Chase feature allows your X-48 to chase incoming timecode.



## Front Panel Operation

- On the front panel of the X-48, press the **TC CHASE** button. The X-48 will chase the timecode you've selected in the Sync Control Mode menu.

See the section titled "Synchronization" for more on timecode chase.

## Rehearse

The Rehearse feature allows you to hear the effects of recording without actually recording to disk. This feature is useful for testing auto-punch in and out points or for rehearsing talent before recording.



## Mouse/Keyboard Operation

- Click on the **REH** button in the transport section in the top-right corner of the screen.



## Front Panel Operation

- Press the **RHSL** button on the front panel of the X-48.

## Pre/Post Roll

The Rehearse feature allows you to hear the effects of recording without actually recording to disk. This feature is useful for testing auto punch-in and -out points or for rehearsing talent before recording.



## Mouse/Keyboard Operation

- Click on the Windows menu and select *Settings* or press Alt-F8 on the keyboard.
- The Settings window will open. Click on the tab at the bottom of this window titled *Transport*.
- Click the checkbox labeled *Enable Pre/Post-Roll*. You can click on the fields for pre-roll and post-roll to specify how many seconds you require.

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## Front Panel Operation

- On the front panel of the X-48, press the **PREF** button. Use the Up/Down buttons to select *Use Pre/Post-Roll* and press **CHNG**.
- Use the up/down buttons to select *On* and press Enter.
- Pre-roll and Post-roll times can also be changed in the Preferences menu.

## Varispeed

Varispeed playback changes the playback speed of the recorder, re-sampling at the output to maintain the selected sample rate. It can be useful when an instrument cannot be tuned to match a recording or to speed up or slow down a song's playback (while simultaneously changing the pitch).



## Mouse/Keyboard Operation

- Click on the Windows menu and select *Settings* or press Alt-F8 on the keyboard.
- Click the *Sync* tab.
- Click on the checkbox labeled *Varispeed Enable*. Use the slider or click in the text box to specify the amount of varispeed.

## Recording and Playing Back

### Input Monitoring

There are three options for input monitoring:

- Normal input monitoring puts any track that's in record in input monitoring. Whether the transport is in play, record or stop, you will hear the input only and not what is recorded. This mode is typically used for tracking.
- When the recorder is in **Auto Input** mode, you will hear the input when the transport is in stop or record. When the transport is in play, you will hear what was previously recorded. This mode is used for punch-in recording, so that the artist and engineer can hear what was previously on the track before recording over a section of that performance.
- **ADR Monitoring Mode** is similar to Auto Input, but puts the track in input only when the transport is in record. The track reverts to playback in stop or play to prevent feedback.
- **All Input** mode enables input monitoring for all tracks, whether they are armed for recording or not. This mode is often used for live recording.



## Mouse/Keyboard Operation

- For Auto Input, click on the Options menu, scroll over the *Auto Input* submenu and select *On* or *ADR*.
- For All Input, click on the Options menu and select *All Input*.

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## Front Panel Operation

- To enable Auto Input, press the **AUTO INPUT** button on the front panel.
- For All Input mode, hold the **SHIFT** button while pressing **AUTO INPUT**.



## Putting Individual Tracks into Input

You can put tracks into input mode on a channel-by-channel basis.

- From the Mouse/Keyboard interface, click the *I* button next to any track number.
- From the front panel, hold the **SHIFT** button and press any track arming button.

## Record Enable



### Mouse/Keyboard Operation

- Click on the *R* button to the right of the track numbers on the left side of the screen in the Tracks view. The button will flash red to indicate it is ready for record.



### Front Panel Operation

- Press the Record Enable buttons on the front panel. The Record indicator will flash on tracks that are ready to record.

## Punch Crossfade Time

To avoid an audio click when punching in and out of record, the X-48 automatically fades into and out of record. This crossfade time is very fast, but prevents an audio pop. The crossfade time can be set between 0ms (disabled) and 90ms in increments of 10ms:



### Mouse/Keyboard Operation

- Click on the Windows menu and select *Settings*. Select the *Prefs* tab and click the *Punch Crossfades* submenu. Select the desired crossfade time.



### Front Panel Operation

- Press the **PREF** button and use the up/down buttons to select Punch Crossfade. Press the **CHNG** button, select the desired crossfade time using the up/down buttons and press **CHNG** again.

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## Undo/Redo

Unlike tape machines, you can undo a recording pass and then put it back with redo. Undo/redo is only available from the mouse/keyboard interface.



Mouse/Keyboard Operation (only)

- Click the Edit menu and choose *Undo* or press Control-Z on the keyboard.


## Metering

Several metering parameters are available:

- *Peak Hold* displays the highest signal level achieved, either for a few seconds or until cleared.
- Meters can be *Pre-fader* or *Post-fader* (not applicable in Mixer Bypass mode). This means that the meters show the signal level either before or after the signal hits the mixer interface.
- (GUI only) you can *View Masters* to see the signal level for the group and aux channels.



Mouse/Keyboard Operation

- Click on the Meter button  if meters are not displayed at the top of the screen.
- Click on the Options menu and select the *Meters* submenu. From this submenu you can select *Peak Hold* and *Clear Overloads*.
- Click on Options > Meters > Mode to select *Pre-Fader* or *Post-Fader* metering.
- Click on Options > Meters > View Masters to see the group and aux master levels, or click on the on-screen meters themselves.
- To set the amount of time that peak values stay on the meters, click Windows and select Settings. Click on the *Prefs* tab and change the *Clear Overloads* pulldown to change the interval to 1 second, 5 seconds, 30 seconds or Hold (infinite).



GUI Meter Display

You can display the meters by clicking the bargraph icon in the center of the screen



or by pressing **1** on the keyboard.



Front Panel Operation

- Press the **PREF** button and scroll to the *Meters* sub-menu and press **CHNG.**



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- Select *Meter Mode* and press the **CHNG** button to switch between *Pre-Fader* (the default) and *Post-Fader*.
- Select *Meter Range* and press the **CHNG** button to switch between *-∞ to 0dB* (minus infinity to 0dB, the default) *-24dB to 0dB* or *-12dB to 0dB*. These fine dB scales can be useful when sending test tones to the recorder, such as for aligning the analog I/O card or a Dolby encoder.
- Select *Peak Hold* to switch this function on or off.

## Using Markers

Markers allow you to label sections of a recording for visual reference and to locate back to later.



Mouse/Keyboard Operation


- To create a marker, click the *Edit* menu and select *New Marker* or press the *Enter* key on your keyboard's number pad.
- To access a memory location, open the *Markers* window from the *Windows* menu. From here you can select a memory location, rename it and locate to it.

## Loop Playback

You can loop a section of the timeline for playback or recording. The loop plays back (with preroll and postroll settings, if assigned) until the stop button is pressed.



Mouse/Keyboard Operation

- Drag the loop start and stop points to the location you want them. The loop markers are blue triangles that fill the entire height of the timeline ruler, and are at 0:00:00:00 by default.
- Click the loop button  to turn on the loop function.
- Press *Play*.

## Loop Mode

The X-48 has three Loop Modes:

- *Play Once and Cue* plays through the loop once, then locates to the beginning of the loop (or pre-roll point if enabled) and stops.
- *Play Once and Stop* plays through the loop once and then stops at the loop end (or post-roll point if enabled).
- *Play Repeatedly* plays through the loop, locates to the beginning of the loop (or preroll point if enabled) and plays again, repeating until the stop button is pressed.

By default, the Loop mode is set to *Play Once and Cue*. To change this behavior:

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## Mouse/Keyboard Operation

- Click on the Windows menu and choose *Settings*.
- Select the *Transport* tab.
- The submenu titled *Loop Mode* has the three choices explained above.



## Front Panel Operation

- Press the **PREF** button. Press the up/down buttons until you select *Loop Mode* and press **CHNG**.
- Select one of the three choices explained above and press Enter.

## Auto Punch

The Auto Punch function automatically drops into and out of record when switched on. This is used to automate a difficult punch in and out, such as one word in a lead vocal or an ADR (automated dialog replacement) line that will be attempted several times.



## Mouse/Keyboard Operation

- First, set the punch in and punch out points. By default, these are set for the last place you manually punched in and out. (You can disable this function by opening the *Settings* window, click the *Transport* tab and uncheck *Update Punch Points*.) You can also drag the punch in and out points in the timeline ruler, they're the red triangles that fill the timeline ruler. You may want to zoom into a waveform and set the markers manually if you're trying to replace or spot-erase some recorded audio.
- Hold the Shift button and click the Record button on the onscreen transport to switch on Auto Punch mode. The Record light will flash.
- Move the transport to a location before the punch-in point and press Play. When the transport reaches the punch-in point it will punch into record. When it passes the punch-out point it will go into play again.



## Front Panel Operation

- First, set the punch in and out points. By default, the recorder remembers the last timecode that you punched into and out of record and uses these for your punch in and out points. (To change this behavior, open the Preferences menu, select *Update Punch Points* and change that setting to *Off*.) You can use the Rehearse button to punch in and out of record without actually recording to set new punch in and out points.
- To enter Auto Punch mode, hold the **SHIFT** button and press **RECORD**. The Record light will flash.
- Move the transport to a location before the punch-in point and press Play. When the transport reaches the punch-in point it will punch into record. When it passes the punch-out point it will go into play again.


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## Loop Recording

You can also record while in loop mode. When you record in loop mode (and non-destructive recording is selected), a new audio file is written each time the recorder makes a pass. You might use this feature when trying multiple successive takes of a guitar solo, for example. To use the loop recording feature, turn on both Loop Playback and Auto Punch and press Play. (See previous sections.)

## Using the VGA Recorder Interface

### Meters

The X-48 displays meters on the top of the screen by default. To show or hide these meters, click the  button in the middle of the display. For more about the on-screen meters, see Page 40, Metering.

### Naming Tracks

Each of the tracks can be named for easy reference and for auto-naming recorded wave files. To name a track:



Mouse/Keyboard Operation (only)

- Click on the *Tracks* tab at the bottom of the screen or press F1.
- Double click on the track-name on the left side of the screen, such as *Track 1*
- Type a new name and press Enter.

### Scrolling

You can control the way that tracks scroll on the X-48:

- *None* means that playback will not change the view selected in the screen
- *Auto-Scroll* means that the center line will remain stationary and the waveform will move under that. The playback line needs to move to the center of the display first, but once it "catches up" it will remain there.
- *Page Flip* tells the playback line to scroll across the screen, then advance to the next chunk of timeline and scroll across that. This is the default view for Pro Tools.

To change the scrolling behavior:

- Click the Options menu and select *Scrolling*
- Choose either *None*, *Auto-Scroll* or *Page-flip*

You can also click the Auto Scroll button in the top left corner of the Tracks display:



### Timebar Format

The time ruler can be displayed in SMPTE time or in samples. To change this behavior:

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- Click the Options menu and select *Timebar Format*
- Choose either *SMPTE* or *Samples*

## Clip Properties

To specify information about a clip, open the Clip Properties window:

- Use the Smart tool to select a clip
- Under the Windows menu, select *Clip Properties...* or press Control-2 from the keyboard.
- You can change the name of the file, specify an exact start and end point, or move the clip to the timecode embedded in its Broadcast WAVE file or playhead position.
- You can also specify a fade in and fade out time and shape from this window, mute or lock the clip position



Another way to edit these values, without opening the Clip Properties window, is to click the Info button in the display. A new panel opens up below the transport with the same clip options.

## Navigating the Timeline

There are several ways to change the playhead position:

- Drag the bottom scrollbar left and right, then click in the track display to jump to that position
- Use the Fast Forward and Rewind buttons, either on-screen or on the front panel
- Double-click the timecode position readout and type in a new location with the keyboard
- Use an external machine control device (see next section on Synchronization)

## Status Displays

To the right of the menu displays, you should see a screen similar to the one above. This shows, from left to right:

- Current sample rate
- Auto Input, All Safe and Timecode Chase status (blue when on)
- DSP load – with several plug-ins loaded, this level may grow higher and slow down your system
- Project Name

## Input Routing

There are two ways to route inputs to tracks:

Routing in **groups of 8**:

- Select the Windows menu and click *Settings*
- Click the I/O tab

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- The *Input Routing* pulldown menu selects which bank of 8 inputs will feed the selected tracks. For example, setting the *Input Routing* for tracks 25-32 to *Input Grp1 1-8* will route inputs 1-8 to tracks 25-32.

Routing by **individual channels** (this supercedes the groups of 8 above):

- Click a track in the Tracks tab (F1)
- Click the DSP button in the middle of the display (or press F6)
- Click the *Input* pulldown menu and select an input from 1-48.

## Synchronization

### Requirements

In order to reliably synchronize the X-48 to another device, two references are required:

- A **location reference**, typically SMPTE (LTC) timecode sent to the X-48's Timecode Input or into the RS-422 (Sony 9-pin) Remote input. This tells the X-48 *where in the timeline to go*.
- A **clock reference**, typically word clock sent to the X-48 through a BNC cable. This tells the X-48 *how fast to go once it gets to the right location*.

The X-48 can be run without an external word clock source, but it will eventually drift out of sync. (You can also use a digital audio signal such as AES/EBU as a clock source.) You will also hear clicks and pops in the digital audio if your entire studio is not resolved to a single master clock.

Note that video clock is available on the X-48, but it cannot be used as the reference clock. Video clock is only updated 60 times per second, where word clock is updated 48,000 times or more per second. Long cable runs can also cause video clock to go out of phase, which may cause problems with digital consoles. Video clock on the X-48 is used to define the frame edge of the SMPTE input.

- **Word Clock** sets the playback speed. Once the SMPTE input tells the transport where to go, the X-48 plays at the rate set by its Sample Clock source (*Settings* menu, *Source*).
- **Video Clock** gives a precise frame edge to the SMPTE timecode. Not available as a clock reference.
- **SMPTE Timecode** is used as a location reference, defining where in the timeline to locate to.
- **MIDI Timecode (MTC)** is sometimes used as a location reference with MIDI sequencing software or computer-based DAW software
- **RS-422** remote receives transport commands such as play and record. It also carries SMPTE timecode for location reference.

As these reference sources are all related, you can see the importance of making sure that all of your devices are resolved to the same clock reference. Another way to look at sync on the X-48 is to examine the order that things happen when the X-48 is online:

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1. The X-48 either sees a transport command from the RS-422 signal or sees SMPTE timecode and goes into play.
2. The X-48 looks at either the SMPTE input or the RS-422 to figure out where in the timeline to begin playback.
3. If enabled, the X-48 looks to the video clock input for a more exact timestamp for the incoming SMPTE.
4. Once the X-48 is locked to the right SMPTE frame, it starts playing at the rate dictated by its sample clock source.
5. If the incoming SMPTE isn't resolved to the same clock and drifts out of sync by a difference greater than the flywheel setting, the X-48 stops.
6. When SMPTE timecode stops or an RS-422 stop command is received, the transport stops.

## Sample Rate

A sample rate should be chosen when first creating a project, with consideration to what will be done with the final product. Your choices are:

- **44100** (CD standard)
- **48000** (DAT standard)
- **88200** (2x CD standard)
- **96000** (2x DAT standard)
- **42336** (44.1k conversion from film (24) to PAL (25))
- **44056** (44.1k pull-down)
- **44144** (44.1k pull-up)
- **45938** (44.1k conversion from PAL (25) to film (24))
- **46080** (48k conversion from film (24) to PAL (25))
- **47952** (48k pull-down)
- **48048** (48k pull-up)
- **50000** (48k conversion from PAL (25) to film (24))
- **84672** (2x 44.1k conversion from film (24) to PAL (25))
- **88112** (2x 44.1k pull-down)
- **88288** (2x 44.1k pull-up)
- **91875** (2x 44.1k conversion from PAL (25) to film (24))
- **92160** (2x 48k conversion from film (24) to PAL (25))
- **95904** (2x 48k pull-down)
- **96096** (2x 48k pull-up)
- **100000** (2x 48k conversion from PAL (25) to film (24))

If you change the sample rate after audio has been recorded, that audio will play back at a different pitch. To change the sample rate:



### Mouse/Keyboard Operation

- Click the Windows menu and select the *Settings* window.
- Click on the *Sync* tab and click the *Sample Clock Rate* submenu. Choose a sample rate from the list.

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## Front Panel Operation

- Press the **SYNC** button. Press the up/down buttons to select **Sample Rate** and press **CHNG**.
- Select a sample rate from the list using the up/down buttons and press **Enter**.

## Clock Source

One of the most important settings on the X-48 is the sample clock source, which governs playback speed and keeps audio pops from happening. There are five choices:

- **Internal** is the default. This can be used if the X-48 is either used by itself, with an analog console or as the master clock for the studio.
- **Word Clock** should be used when you have an external, dedicated master clock available. The word clock generator needs to be set to the same sample rate as the X-48. (Note: the Word Clock input can accept a tri-phase signal from HDTV devices.)
- **S/PDIF** clocks the X-48 from the digital audio signal coming into the S/PDIF Digital Input.
- **TDIF Port 1** clocks the X-48 from the digital audio signal coming into the TDIF Digital Input channels 1-8.
- If you have digital audio option cards installed (IF-AD24(X) / IF-AE24(X) ), those will show up as an available clock source as 'ADAT Card' / 'AES/EBU Card'.

When in doubt, use Word Clock as the reference source. To change the clock source:



## Mouse/Keyboard Operation

- Click the **Windows** menu and select the *Settings* window.
- Click on the *Sync* tab and click the *Source* submenu. Choose your desired master clock from the list.



## Front Panel Operation

- Press the **SYNC** button. Press the up/down buttons to select **Sample Clock Source** and press **CHNG**.
- Select a clock source from the list using the up/down buttons and press **Enter**.

## BNC Clock In/BNC Clock Out

These parameters allow the word clock signal input or output to be multiplied or divided by 2, or used as-is. This allows, for example, a 48kHz word clock generator to be used when recording at 96kHz, or allows 48k and 96k devices to be used at the same time. To change these settings:



## Mouse/Keyboard Operation

# Recorder

- Click the *Windows* menu and select the *Settings* window.
- Click on the *Sync* tab and click the *BNC In* or *BNC Out* submenu. Choose a setting from the list.



## Front Panel Operation

- Press the **SYNC** button. Press the up/down buttons to select *BNC Clock In* or *BNC Clock Out* and press **CHNG**.
- Use the up/down buttons to select a setting and press Enter.

## BNC Word Clock Output Polarity

This setting allows the Word Clock signal output phase to be reversed. This may be necessary in large systems or with long cable runs.



## Mouse/Keyboard Operation

- Click the *Windows* menu and select the *Settings* window.
- Click on the *Sync* tab and check the box labeled *Invert Word Out Polarity*.



## Front Panel Operation

- Press the **SYNC** button. Press the up/down buttons to select *Word Out Polarity* and press **CHNG**.
- Use the up/down buttons to select either *Normal* or *Inverted* and press Enter.

## Video Clock Frame-Edge Resolve

Video Clock in the X-48 can be used to define the frame edge of incoming and generated timecode for stability and repeatability. (But not as a sample clock source, see *Requirements* above.) To enable video clock:



## Mouse/Keyboard Operation

- Click the *Windows* menu, select the *Settings* window and click the *Sync* tab.
- Check the box labeled *Resolve to Video In* in the *Time Code* area.



## Front Panel Operation

- Press the **SYNC** button. Press the up/down buttons to select *Resolve to Video In* and press **CHNG**.
- Press the Up/Down buttons to select *On* and press Enter.

## Frame Rate

The X-48 syncs to any frame rate of SMPTE timecode:



# Recorder

- **30-frame non-drop** is occasionally used in music studios to sync console automation to a tape machine (2" reel-to-reel tape may be striped with this format)
- **30-frame drop** is rarely used
- **29.97 non-drop** is the standard for non-broadcast post-production in the U.S.
- **29.97 drop** is the standard for broadcast television post production in the U.S.
- **25-frame** is the standard in Europe
- **24-frame non-drop** is sometimes used for HDTV production or film location recording
- **24.975 non-drop** is 25-frame pull-down, used to play 25-frame videos on American NTSC monitors
- **23.976 non-drop** is "HD pull-down," used to play down-converted HD videos on American NTSC monitors

To change the frame rate:



Mouse/Keyboard Operation

- Click the Windows menu and select the *Settings* window.
- Click on the *Sync* tab and click the *Frame Rate* submenu. Choose your desired frame rate from the list.



Front Panel Operation

- Press the **SYNC** button. Press the up/down buttons to select **Frame Rate** and press **CHNG**.
- Select a frame rate from the list using the up/down buttons and press **Enter**.

## Control Mode

Four control modes are available:

- **Internal** is the default setting, the X-48 controls its own transport and ignores the SMPTE timecode input.
- **SMPTE** follows the SMPTE timecode input for location, either from the RS-422 input or the balanced LTC input on the rear panel.
- **MIDI (MTC)** looks to the MIDI input for timecode.
- **Theater Play** plays a section of the timeline, stops, and waits for a Play command to play the next section.

To change the control mode:



Mouse/Keyboard Operation

- Click the Windows menu and select the *Settings* window.

# Recorder

- Click on the *Sync* tab and click the *Control Mode* submenu. Choose the desired control mode from the list.



## Front Panel Operation

- Press the **SYNC** button. Press the up/down buttons to select *Control Mode* and press **CHNG**.
- Select a control mode from the list using the up/down buttons and press Enter.

## Chase Freewheel

Chase Freewheel dictates how far out of sync the SMPTE timecode can drift before the X-48 drops out of play or record. The choices are 0, 5, 10, 20, 50 or 100 frames. To change the setting:



## Mouse/Keyboard Operation

- Click the *Windows* menu and select the *Settings* window.
- Click on the *Sync* tab and click the *Chase Freewheel* submenu. Choose the desired setting from the list.



## Front Panel Operation

- Press the **SYNC** button. Press the up/down buttons to select *Chase Freewheel* and press **CHNG**.
- Select a value from the list using the up/down buttons and press Enter.

## Chase Relock

If the SMPTE drifts outside of the Chase Relock Threshold window (see next section), this setting tells the X-48 what to do:

- **Always** tells the transport to shift to the correct timecode value, even if it's in record.
- **Only if not recording** shifts the transport in play but not in record.
- **Never** ignores the slight timecode offset.

To change the re-lock setting:



## Mouse/Keyboard Operation

- Click the *Windows* menu and select the *Settings* window.
- Click on the *Sync* tab and click the *Chase Relock* submenu. Choose a setting from the list.

# Recorder



## Front Panel Operation

- Press the **SYNC** button. Press the up/down buttons to select Chase Relock and press **CHNG**.
- Choose a setting from the list using the up/down buttons and press Enter.

## Chase Relock Threshold

This parameter governs how far out of sync the X-48 can drift before the Chase Relock feature forces it back in sync. (Or not, see previous section.) The range is 1/3 frame, 1 frame, 2 frames, 5 frames or 10 frames. If the timecode suddenly jumps outside of the window set by the Timecode Freewheel parameter, playback or recording will stop. This setting can only be changed from the GUI interface.



## Mouse/Keyboard Operation (only)

- Click the Windows menu and select the *Settings* window.
- Click on the *Sync* tab and click the *Relock Threshold* submenu. Choose a setting from the list.

## Timecode Offset

This offsets the transport from the incoming timecode. The offset can be either positive or negative. To change the offset:



## Mouse/Keyboard Operation

- Click the Windows menu and select the *Settings* window.
- Click on the *Sync* tab and click in the *Time Code Offset* field. Type a new offset with the keyboard.



## Front Panel Operation

- Press the **SYNC** button. Press the up/down buttons to select Chase Offset and press **CHNG**.
- Use the **CHNG** and **HOME** buttons to cursor through the display. Use the up/down buttons to change the offset. The Enter button saves your offset.

## Chase Lock Deviation

Chase Lock Deviation displays the difference between incoming timecode and the X-48's transport. It can be useful if you think that the machine is drifting out of sync or for troubleshooting. There is no setting to change, it's only a display of how far out of sync the machine is (ideally 0). To view this setting:

# Recorder



## Mouse/Keyboard Operation

- Click the *Windows* menu and select the *Settings* window.
- Select the *Sync* tab. Look at the *Lock Deviation* display at the bottom of the screen.



## Front Panel Operation

- Press the **SYNC** button. Press the up/down buttons to select *Chase Lock Deviation* and press **CHNG**.
- Watch the lock deviation. When you're finished, press the *Exit* or *Home* button.

## Timecode Output Muting

This setting is useful when the device receiving timecode cannot accept off-speed timecode, such as some console automation systems.

- *Play Only* – Outputs timecode only when the transport is running at a normal play speed
- *Mute FF/Rew* – Mutes the timecode output when in FF or REW
- *Mute Jog/Shuttle* – Mutes the timecode when the transport is running at a non-play speed such as shuttle
- *None* – The timecode is never muted

To change this setting:



## Mouse/Keyboard Operation

- Click the *Windows* menu and select the *Settings* window.
- Select the *Timecode Output Muting* submenu and choose a setting.



## Front Panel Operation

- Press the **SYNC** button. Press the up/down buttons to select *Output Muting* and press **CHNG**.
- Select a setting and press *Enter*.

## ***Advanced Recorder Operations***

### Audio File Naming

The X-48 can auto-name new audio files either based on the project name or the track name. This setting can only be changed from the GUI – since there are no track names when using the X-48, it defaults to naming audio files based on the project name. To change this preference:

# Recorder



## Mouse/Keyboard Operation (only)

- Click the *Windows* menu and select the *Prefs* window.
- Select the *Audio File Naming* submenu and choose your preferred naming convention.

## Track Key Punch

The X-48 can be set to enter record mode without any tracks armed. Recording will then begin on any channel whose track-arming button is pressed. To enable this function:



## Mouse/Keyboard Operation

- Click the *Windows* menu and select the *Settings* window.
- Select the *Transport* tab. Check the box labeled *Track Key Punch*.



## Front Panel Operation

- Press the **PREF** button. Press the up/down buttons to select *Track Key Punch* and press **CHNG**.
- Select either *Off* or *On* using the up/down buttons and press *Enter*.

# Editing

## Editing

### *Edit Tools*



#### I-Beam Tool

The I-beam tool is used to select a portion of a recorded clip or clips. When the I-beam tool is dragged through the middle of a clip, only that section will be edited. For example, if you wanted to erase a cough in the middle of a recorded voiceover, the I-beam would allow you to select just that cough and then hit delete on the keyboard. Double-clicking on a clip with the I-beam tool selects the entire clip.



Mouse/Keyboard Operation (only)

**Note:** Editing is only possible using the keyboard and mouse – you can't edit tracks from the front panel. So all of the instructions in this chapter refer to the mouse, keyboard and monitor interface. These instructions also assume that you've selected the *Tracks* view at the bottom of the screen or by pressing F1.

- Click on the I-Beam button in the top-left corner of the screen (pictured above) or press F9 on your keyboard.
- Click and drag a portion or a complete clip in the timeline, or multiple clips across multiple tracks. Any editing functions you perform (i.e. cut, copy, paste, delete) will be applied only to the portion of the clip you selected and highlighted.



#### Object Tool

Press F8 to select the Object tool, or click the button pictured above in the top-left corner of the screen. This tool does different things depending where your mouse is:

- When it's not hovering over a clip, it looks like a cursor (+) sign. You can click and drag over clips to **select multiple objects**. (It doesn't select only portions of clips like the I-Beam).
- When you mouse over the bottom left or bottom right corner of a clip, you get a tool that looks like a horizontal line with arrowhead on either side. This tool allows you to **change the beginning or ending point** of a clip. Drag the end point inward to shorten a clip, or drag it back out to lengthen it (if there is any waveform there).
- Mouse over the top left or top right corner, and the tool changes to a horizontal line under a white arc. This is the **fade tool**, which allows you to add a fade-in or fade-out to a clip. If clips on multiple tracks are selected, the fade-in or -out is changed on all of those tracks.
- Move to the middle of a clip, and your cursor changes into the **finger tool**. Click and drag to move the clip (or multiple selected clips).

# Editing



## Smart Tool

Press F11 to select the Smart tool, or click the button pictured above in the top-left corner. Like the Object tool, this tool does different things depending where your mouse is:

- When it's not hovering over a clip, or if it's over the bottom half of a clip, it acts like the **I-Beam** tool. Like the I-Beam tool, you can select a portion of a waveform. However, unlike the I-Beam tool, you can only select audio on a single track.
- When you mouse over the bottom left or bottom right corner of a clip, you get a tool that looks like a horizontal line with arrowhead on either side. This tool allows you to **change the beginning or ending point** of a clip. Drag the end point inward to shorten a clip, or drag it back out to lengthen it (if there is any waveform there).
- Mouse over the top left or top right corner, and the tool changes to a horizontal line under a white arc. This is the **fade tool**, which allows you to add a fade-in or fade-out to a clip. If clips on multiple tracks are selected, the fade-in or -out is changed on all of those tracks.
- Move to the top half of a clip, and your cursor changes into the **finger tool**. Click and drag to move the clip (or multiple selected clips).
- Double-click on a clip with the Finger tool and you get the **Clip Properties** window. See page 44 for more on this window.



## Magnify Tool

Press F12 to select the **Magnify** tool, or click the button pictured above in the top-left corner. The magnify tool allows you to select a section of the timeline to fill the screen. To use this tool, click and drag over the section you want to focus on, such as a pair of clips on tracks 1 and 2. When you release the mouse, those two clips will fill the VGA screen.

## Selecting & Editing

### Selecting Clips

To select complete clips, use the Object tool. To select a portion of a clip or clips, use the I-beam or Smart tool. See the previous section for more information.

### Selecting Time


To select a range of time across all tracks, mouse over the timeline above all of the tracks. No matter which tool you've been using, the cursor will change into an I-beam tool. Click and drag in the time ruler to select a time range across all tracks. Your selection is displayed with the in/out point markers, described in the next section.

### In and Out Points

Your selection range is displayed on-screen by the in and out point markers, which look like small blue flags in the timeline ruler.

# Editing



To see exactly what has been selected, click the  button. The screen will show information about your selection start and end points as well as the length of the selection. For an exact time selection, such as 00:02:00:00, you can click in these fields and type in a new in point, out point or selection length.

## Clip Properties

There are three ways to call up this window:

- With a clip selected, click the Windows menu and select *Clip Properties*
- With a clip selected, press Control-2 on the keyboard
- Double-click a clip using the Finger tool in the Smart Tool

This window gives you several options for working with a clip:

- You can **name** the clip.
- Type in exact **start**, **end** and **length** times.
- You can also specify an exact **fade-in** and **fade-out** time and **crossfade shapes**, either linear, exponential or reverse exponential.
- Clips can also be **muted** or **locked** by clicking these checkboxes. Locking a clip makes it impossible to edit until unlocked.
- Another set of buttons in the Clip Properties window allow you to move the clip either to the timecode embedded in a Broadcast WAVE file ("**Broadcast Time**") or to the current **Play Position**.

Click OK or Cancel to confirm or ignore the changes.

## Snap to Grid

Clips can snap to a grid for exact placement of imported or recorded audio in the timeline. To access this feature, click on the *Options* menu and select *Snapping*. This menu has three settings:

- **Enable Snapping** turns the snap feature on or off.
- **Draw Snap Grid** displays vertical grid lines in the timeline for visual reference.
- **Snap To** is another submenu that selects how fine the snap grid is drawn. The options are Hours, Minutes, Seconds, Frames or Subframes.

## Cut, Copy, Delete, Paste

These commands do the expected edit functions to the selected audio. Keyboard shortcuts are Control-X for Cut, Cntl-C for Copy, Cntl-V for paste and Delete for Delete. The only one that requires further explanation is Delete, which doesn't actually delete the audio off the drive but just removes it from the Edit Decision List (EDL). You can always undo the operation or, if you've deleted a range of a clip, pull the new clip's head or tail to fill the deleted space.



# Editing

## Repeat Paste

Repeat Paste (Control-Alt-V) pastes the audio in the clipboard multiple times. You might use this feature to create a loop that plays through a song or to fill a section of film dialog with room tone for ADR. When you select the repeat paste command, the system will prompt you to ask how many times it should repeat the audio.

## Crop

Crop (Control-U) cuts the head and tail of a clip outside of the selected range. Select a range inside of a clip using the I-Beam tool, then use the Crop command to shorten it's length to include only the selected range.

## Insert Time

This command (Control-T) inserts silence into the selected time range and shifts all audio after that selection later. It's the same as splitting the clip at the In point and moving all audio after that point back the same amount of time as the selection length.

## Delete Time

This command deletes the time from the timeline represented by the selected time range and shifts all audio after that selection forward.

## Split

The Split command (Control-E) slices a clip wherever the timeline is. If you've selected a range of a clip, it separates that selection into a new clip. This separation would allow one part of a clip to be treated or editing differently from the other part of the clip.

## Play From Selection

This function (shortcut "P" on the keyboard) begins playback from the beginning of the selection range. It ignores the pre-roll setting, if any. You might use it to hear the effects of an edit in context of the program.

## History List

The History List command (Control-H) opens a window that shows you every edit you've done in the project, up to a maximum of 999 edits. You can press the *Undo* and *Redo* buttons at the bottom of this window, or click on a command in the list and it will undo that edit and everything after it.

You can also *Clear* the history list. This removes all of the entries from the Undo history, and make it impossible to undo any of your edits after you confirm the action.

The History is stored with the project, so when recalling a project at a later date, it's still possible to undo the most recent operations.

# Editing

## Audio Processing

### Pitch/Time Stretch

Selecting this item from the Process menu opens the *Time Compression/Pitch Shift* window. There are two options in this window. *Time Compression* allows you to specify a new length for the clip using the mouse and keyboard. The start time for the clip remains the same while the end point changes to reflect the new length. The clip's fade in or out remains non-destructive.

*Pitch Shift* is a slider that allows you to change the pitch of the selected clip, from 150% (1/2 octave higher) to 50% (1 octave lower). Click OK to process the clip.

### Consolidate

Selecting this item from the Process menu merges all selected clips or time into one audio file. Any crossfades or fade ins/outs that were added to the clip are also written to the new clip. This command may be used before exporting all of the edits on a track as one long Broadcast WAVE file.

# Mixer

## Mixer

### Mixer Interface

#### Mixer Introduction

The X-48 includes a software digital mixer/router with the following features:

- 48 playback channels, each with 4-band parametric EQ and compression
- Level, pan, solo and mute controls
- Input and output source selection per track/channel
- 6 aux sends, pre or post-fader
- 6 stereo aux returns, useful for using a common VST effect on multiple channels (i.e. reverb)
- Four inserts, compatible with supported VST plug-ins
- 12 stereo subgroups
- Dynamic automation engine supporting mouse-drawn break-point style automation

#### Mixer Bypass

When you first use the X-48, the mixer section is disabled to improve input to output delay and CPU usage. Before using any of the mixer functions you need switch off Mixer Bypass. To do this:

- Click the Windows menu and choose *Settings*
- Select the *System* tab. Un-check the box labeled *Mixer Bypass*.



#### DSP View

Click the DSP button pictured above or press F6 on the keyboard to open the DSP panel. When you open this window, you should see five panes (you may need to click the reveal triangle or scroll down):

- The **Track** section includes the fader, meter and pan controls. There's a *record* arming button, *input* monitor button, *solo* and *mute* buttons. The *Mix* button sends that track/channel to the Master output. You also get a field to *name* the track and another *input* and *output* menu for setting the source and destination for your track.
- **Inserts** has four insert points for supported VST plug-ins. (See the following section for information on installing and using 3rd-party plug-ins.) The *On* button allows you to bypass the inserted effect (by turning it off). The *Edit* button opens that plug-in's edit window. The center menu opens a list of all VST plug-ins installed in the system.
- **Aux Sends** shows the six aux sends and allows you to send the selected channel to them. The *Pre* button, when lit, makes these pre-fader sends. The *On* button turns the send on or off. The knob at the bottom shows the amount of that channel sent to the send.
- **Dynamics** is a compressor for the selected track. *Threshold* changes the channels compressor threshold and is displayed in dBfs. *Ratio* is the amount of gain reduction that occurs after the audio crosses the threshold. *Attack* and *Release* control the

# Mixer

amount of time until gain reduction is fully-functional, and *Soft* applies a soft knee for extreme ratio settings. *On* turns the effect on and off and *Gain* is a post-compressor makeup stage.

- The **Equalizer** section houses a four-band full-parametric EQ section. The *On* button at the top-right corner of this panel switches the EQ on, and the *On* button above each band switches that band on. (Note that you need to press two *On* buttons to hear EQ, the master ON button and one band's ON button.) The *Type* pulldown menu gives you a choice of Low Shelf, High Shelf, Peaking, Low Pass and High Pass for each band. You can use the *Gain*, *Frequency* and *Q* knobs to change EQ, or grab the dots in the graphic display.

## Mixer Tabs

There are five tabs at the bottom of the VGA display:

- **Tracks** is the track/waveform view (or press F1)
- **Ch. 1-24** jumps to the first 24 channels of the mixer (or press F2)
- **Ch. 25-48** jumps to the second 24 channels of the mixer (or press F3)
- **Groups** jumps to the subgroups and aux returns (or press F4)
- **Masters** jumps to the Master output (or press F5)

All of the mixer channels, groups and masters are located in one large window, so you can see channels 12-35 if necessary.



## Automation

To display automation, click the button pictured above or press Alt-A. You can automate the level of a track using this automation, and also play back automation from imported projects. The edit tools change in this mode:

- Use the **Cursor tool** (click the "+" button or press F8) to write automation. Click and drag on a track to write new automation points.
- If you mouse over one of the automation points with the Cursor tool, your cursor turns into the **Finger** tool. Click and drag any automation point to change its level or time position.
- In automation mode, the Smart tool becomes an **Eraser** so that you can delete automation entries.
- Use the **I-beam** tool to select automation. You can cut, copy, paste or delete automation from the keyboard or Edit menu.

## External Control

The X-48 supports the TASCAM US-2400 as a mixing control surface. Connect the US-2400 to the USB input and set its control mode to *Native* by holding *Select* and *Channel* during power up. The US-2400 controls the X-48's transport, fader levels, pan, aux sends, bank select channels, and more.

# Mixer

## Third-Party Plug Ins

The X-48 officially supports Waves plug-ins and Antares Auto-Tune plug-in. Other plug-ins have not been tested and may result in undesired operation, requiring the X-48 be reloaded from the factory restore CD.

To install plug-ins, do one of the following:

- Insert the installer CD in the X-48. If there's an autorun.exe file on the CD, just follow the prompts as you would on a computer. Install the plug-ins in D:\FreewareVST
- Use the *Launch External Application* command in the File menu to run the installer on the CD, then follow the prompts. Install the plug-ins in D:\FreewareVST

Both Waves and Antares require an iLok dongle for copy protection. Authorize the dongle on a computer then plug it into the X-48's USB jack when prompted by the plug-in installer.

## CPU Meter

The CPU meter is located at the top of the screen. It displays a bargraph and a percentage of CPU used. As you use EQ, dynamics and VST plug-ins, the CPU meter will begin to rise. If the X-48 displays errors and has trouble playing back tracks, try disabling some of the inserted effects. It is strongly recommended that VST effects only be used during mixdown, not during recording, in order to avoid their added latency and CPU load.

## Routing

Each recorder track goes directly to the mixer channel that has the same number as the track. Mixer channels can be routed to various destinations, like physical outputs or Groups. Click the bottom-most text display on a mixer channel to reveal a menu of output routing choices, or open the DSP View to see the same menu along with other parameters of that mixer channel. You can change the output to a group or pair of outputs for submixing use, see the next section for examples.

## ***Mixer Applications***

### Submixing

One of the typical uses for the subgroups is to combine tracks when you don't have enough mixer inputs for your session. For example, 17 tracks of percussion can be combined into a stereo group then sent through a pair of outputs to come up on a pair of faders on your console. To use this feature:

- Make sure *Mixer Bypass* is disabled, see previous section.
- Click on the tab at the bottom of the screen where your tracks are, such as *Ch. 1-24*.
- Find your track in the mixer view. You can change the level, pan it left or right, add EQ, etc.
- Click the *Output* field at the bottom of the channel strip. This opens a menu of options. Mouse over the *Groups* submenu and choose a stereo group from 1 to 12.

# Mixer

- Select the *Groups* tab at the bottom of the screen. Click on the output field at the bottom of the group channel. Select *Stereo Outs* and choose a pair of outputs for your Group.

## Monitoring While Recording

Another useful feature of the mixing engine is to monitor tracks while recording. During a live event, the X-48 can serve as a 48-track recorder as well as your monitor mixer. Connect your mic preamps to the (optional) analog inputs and connect the S/PDIF output to a D/A converter or 2-track recorder, like the TASCAM DV-RA1000HD. You can then monitor through the D/A converter or recorder using headphones or monitors. To set up the X-48 for record monitoring:

- Make sure *Mixer Bypass* is disabled, see previous section.
- Check your channel strips to make sure the *MIX* button is on/green so that tracks are being routed to the stereo mix out.
- Click on the *Masters* tab at the bottom of the screen.
- Click the *Output* field on the Master channel on the right side of this window. This opens a menu of options. Mouse over the *Stereo Outputs* submenu and choose *SPDIF*.
- Connect the S/PDIF digital out to the S/PDIF digital in on your D/A converter or recorder. Change the on-screen mixer channels to mix. Since the mixer is after the recorder, any changes made to the monitor mix will not affect the recording.

## Final Mix

It is possible to complete your project entirely inside the X-48. You can insert VST plug-ins, add EQ and compression and automate channel levels during mixdown. You'll still need a master recorder to monitor and capture the final mix, like the TASCAM DV-RA1000HD. To mix on the X-48:

- Click the *Output* field on the Master channel on the right side of this window. This opens a menu of options. Mouse over the *Stereo Outputs* submenu and choose *SPDIF*.
- Make sure that the *Mix* button is on/green for any tracks/channels you want to go to the Master out.
- Connect the S/PDIF digital out to the S/PDIF digital in on your D/A converter or recorder. Change the on-screen mixer channels and DSP settings to mix your project.

# Specifications

## Specifications

### **Audio I/O**

TDIF	6 x 25-pin (female) D-sub connectors Conform to TDIF-1 standard
S/PDIF IN/OUT	2 x RCA pin jacks(input/output impedance 75ohm) IEC60958 data format

### **Miscellaneous I/O connections**

WORD SYNC IN	BNC connector Switchable 75ohm termination TTL level
WORD SYNC OUT/THRU	2 x BNC connector TTL level
VIDEO IN/THRU	2 x BNC connector Tri-level signal supported
MIDI IN/OUT	2 x 5-pin DIN connectors Conform to MIDI specifications
TIME CODE IN/OUT	2 x 1/4" TRS jacks Conform to SMPTE specifications
FOOT SWITCH	1/4" TS jack
REMOTE(for Sony 9-pin)	9-pin female D-sub connector Wired to RS-422 standards
USB	4 x USB 2.0 'A' type connectors
10/100/1000	RJ45 LAN connector 10BASE-T/100BASE-TX/1000BASE-TX Ethernet
10/100	RJ45 LAN connector 10BASE-T/100BASE-TX Ethernet
VGA	15-pin female Dsub VGA connector
MOUSE	PS/2 Mouse port
KEYBOARD	PS/2 Keyboard port
FireWire 1/2	IEEE1394 6-pin connector IEEE1394a

### **Physical characteristics**

Maximum overall dimensions(w x d x h)	483 x 439 x 184(mm) 19 x 17.3 x 7.3(in)
Weight	13.7kg (30.2lbs)
Voltage requirements	120VAC, 60Hz 230VAC, 50Hz 240VAC, 50Hz
Power consumption	150W
Supplied accessories	- Power cord - Owner's manual - Quick reference guide

# Specifications

- System restore CD
- Documentation CD,
- Two white plastic spacers & screws for installation of digital cards(IF-AE24/IF-AD24)



# Notes

# Notes

# Notes

# TASCAM

TEAC Professional Division

# X-48

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