TASCAM

TEAC Professional Division

FRONTIER DESIGN GROUP

US-224

Universal Serial Bus
Digital Audio Workstation Controller
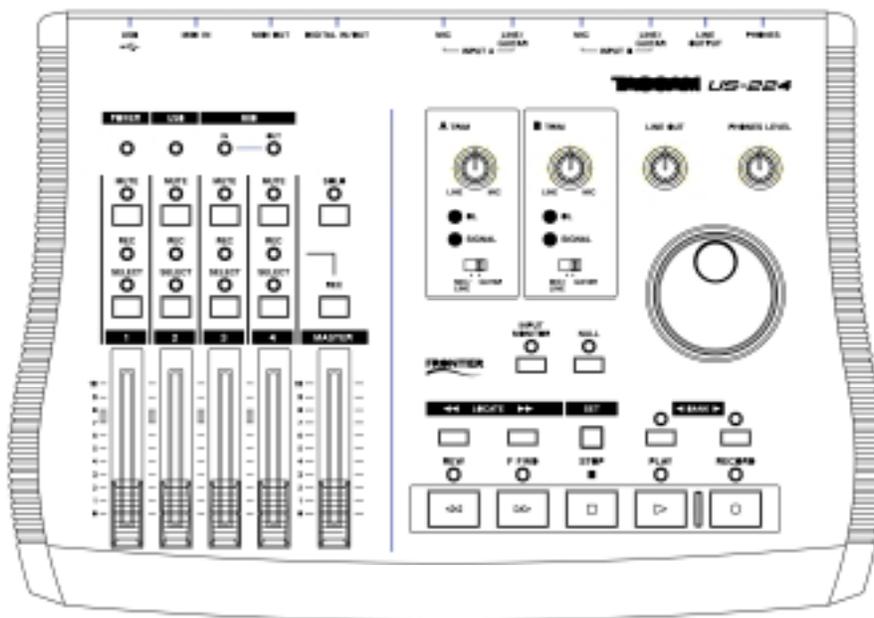
OWNER'S MANUAL

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 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.

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

For U.S.A

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.

IMPORTANT (for U.K. Customers)
DO NOT cut off the mains plug from this equipment.

If the plug fitted is not suitable for the power points in your home or the cable is too short to reach a power point, then obtain an appropriate safety approved extension lead or consult your dealer.

If nonetheless the mains plug is cut off, remove the fuse and dispose of the plug immediately, to avoid a possible shock hazard by inadvertent connection to the mains supply.

If this product is not provided with a mains plug, or one has to be fitted, then follow the instructions given below:

IMPORTANT: The wires in this mains lead are coloured in accordance with the following code:

GREEN-AND-YELLOW	: EARTH
BLUE	: NEUTRAL
BROWN	: LIVE

WARNING: This apparatus must be earthed.

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows:

The wire which is coloured GREEN-and-YELLOW must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol ç or coloured GREEN or GREEN-and-YELLOW.

The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.

The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

When replacing the fuse only a correctly rated approved type should be used and be sure to refit the fuse cover.

IF IN DOUBT — CONSULT A COMPETENT ELECTRICIAN.

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 consumers 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 domes-tique, cet appareil peut provoquer des interférences radio, dans ce cas l'utilisateur peut être amené à prendre des mesures appro-priées.

Für Kunden in Europa
Warnung
Dies is eine Einrichtung, welche die Funk-Entstörung nach Klasse A besitzt. Diese Einrichtung kann im Wohnbereich Funkstörungen versursachen ; in diesem Fall kann vom Betrieber verlang werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen.

SAFETY INSTRUCTIONS

Read all of these Instructions.
Save these Instructions for later use.
Follow all Warnings and Instructions marked on the audio equipment.

1) Read instructions — All the safety and operating instructions should be read before the product is operated.

2) Retain instructions — The safety and operating instructions should be retained for future reference.

3) Heed Warnings — All warnings on the product and in the operating instructions should be adhered to.

4) Follow instructions — All operating and use instructions should be followed.

5) Cleaning — Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

6) Attachments — Do not use attachments not recommended by the product manufacturer as they may cause hazards.

7) Water and Moisture — Do not use this product near water _ for example, near a bath tub, wash bowl, kitchen sink, or laundry tub; in a wet basement; or near a swimming pool; and the like.

8) Accessories — Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to the product. Use only with a cart, stand, tripod, bracket, or table recommended by the manufacturer, or sold with the product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.

9) A product and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the product and cart combination overturn.

10) Ventilation — Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.

11) Power Sources — This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your home, consult your product dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions.

12) Grounding or Polarization — This product may be equipped with a polarized alternating-current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug.
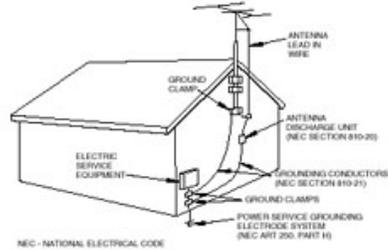
13) Power-Cord Protection — Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the product.

14) Outdoor Antenna Grounding — If an outside antenna or cable system is connected to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Article 810 of the National Electrical Code, ANS /NFPA 70, provides information with regard to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.

Example of Antenna Grounding as per
National Electrical Code, ANSI/NFPA 70

15) Lightning – For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power line surges.

16) Power Lines – An outside antenna system should not be located in the vicinity of overhead power lines or other electric light or power circuits, or where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them might be fatal.

17) Overloading – Do not overload wall outlets, extension cords, or integral convenience receptacles as this can result in fire or electric shock. Never spill liquid of any kind on the product..

18) Object and Liquid Entry – Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.

19) Servicing – Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

20) Damage Requiring Service – Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

a) when the power supply cord or plug is damaged

b) if liquid has been spilled or objects have fallen into the product

c) if the product has been exposed to rain or water

d) if the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation

e) if the product has been dropped or damaged in any way

f) when the product exhibits a distinct change in performance – this indicates a need for service.

21) Replacement Parts – When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock or other hazards.

22) Safety Check – Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.

23) Wall or Ceiling Mounting – the product should be mounted to a wall or ceiling only as recommended by the manufacturer.

24) Heat – The product should be situated away from heat sources such as radiators, heat registers, stoves or other product (including amplifiers) that produce heat.

Declaration of Conformity

Model Number :   US-224
Trade Name   :   TASCAM
Responsible Party :

    TEAC America, Inc
    7733 Telegraph Road
    Montebello, CA 90640

Telephone Number:

    1-323-726-0303

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Table of Contents

Introduction

1.1 Overview

The US-224 is a USB controller designed for Cubasis and other Digital Audio Workstation (DAW) software applications. Its design incorporates a two-input, two-output 24-bit audio interface, a 16-channel MIDI interface, and a control surface for your most-used mouse functions.

Our goal was to create a device to make your DAW software as easy to use as a Portastudio. The transport and other controls are designed and laid out to look and function just like a Portastudio – if you've ever used a tape recorder, you know how to use the US-224.

Because the US-224 is USB based, it's the ideal companion to any desktop- or laptop-based digital recording setup. And since it's as compact as a laptop, it can be combined with one to create a complete portable digital audio workstation solution.

1.2 Features

The input section comprises a 24-bit audio interface, capable of streaming two simultaneous tracks of audio into your computer. Inputs include two balanced XLR mic inputs, two 1/4" unbalanced line inputs (switchable to high-impedance, for direct input of a guitar, bass or other hi-Z source), and an S/PDIF digital input. Outputs include a pair of unbalanced line outputs on RCA connectors, S/PDIF output, and separate headphone output.

The US-224 also features MIDI Input and Output ports, allowing you to send and receive data and MIDI Time Code (MTC) from your MIDI-based keyboards and other devices.

The US-224's control surface includes a variety of controls which make working with audio software faster and easier. The channel section of the control surface consists of four channel faders (plus one master fader), four MUTE/SOLO buttons, a switch to toggle Solo and Mute functions, and individual record-ready and select switches. The master section features a DATA wheel, PAN control (assigned by pressing the channel SELect key) and dedicated transport and locate controls, offering one-button access to these often-used functions.

1.3 What's in the package

The US-224 package contains the following items. When opening the package, please make certain that all the included items are present. If anything is missing, contact the dealer where you purchased it.

- US-224 Controller
- USB Cable
- CD-ROM containing driver software and Cubasis VST

1.4 Nomenclature used in this manual

The following conventions will be used in this manual:
- ALL CAPS will be used to designate physical buttons, faders, controllers and LED indicators on the US-224.
- **BOLD CAPS** will be used to designate physical connectors on the US-224
- *Italics* will be used to designate software dialog messages
- *Underlined Italics* will be used to designate software menu functions and on-screen controllers.

2. Controls and Indicators

2.1 Front Panel
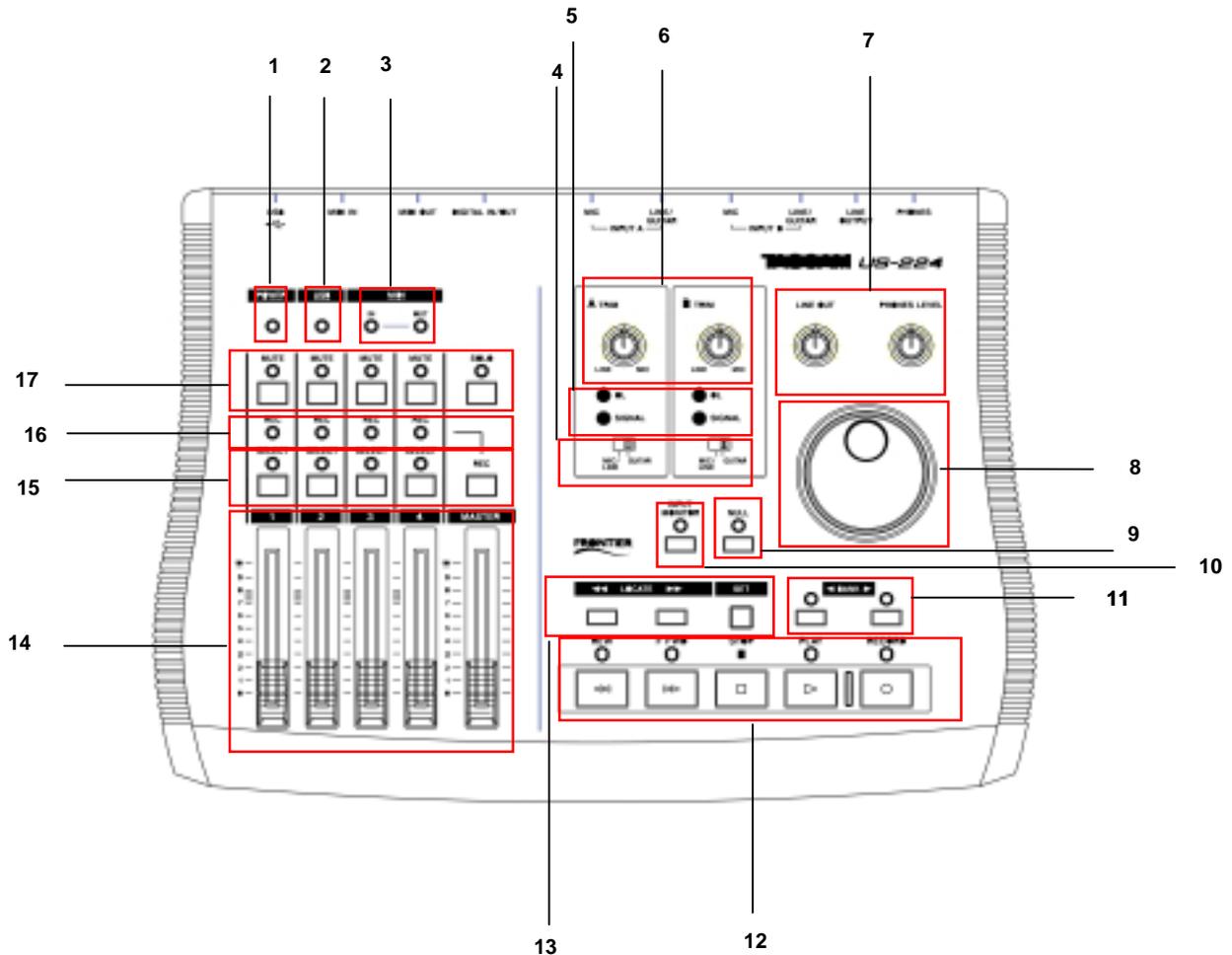
1. **Power LED**
2. **USB LED**
3. **MIDI In & Out LEDs**
4. **Mic/Line – Gtr Switches**
5. **Signal and OL LEDs**
6. **A and B Input Trims**
7. **Line Out and Phones Output Levels**
8. **DATA Wheel**
9. **NULL Switch and LED**
10. **Input Monitor Switch and LED**
11. **Bank Switches and LEDs**
12. **Transport Controls**
13. **Locate and Set Switches**
14. **Channel and Master Faders**
15. **SELect Switches and LEDs, RECord Ready Switch**
16. **RECord LEDs**
17. **MUTE Switches and LEDs, SOLO switch and LED**

2.2 Rear Panel
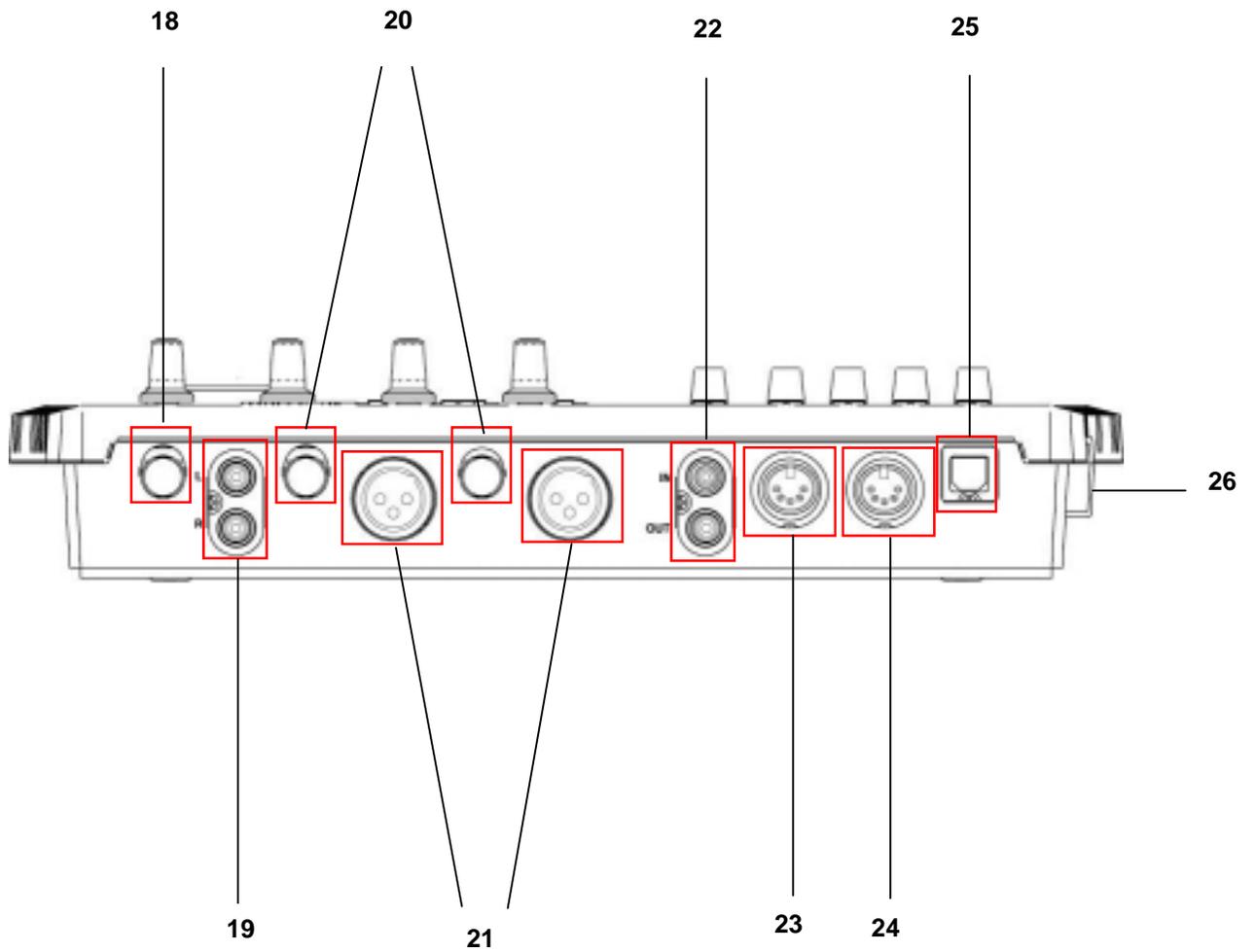
18. PHONES jack
19. OUTPUT L/R jacks
20. INPUT A and B
21. MIC INPUT A and B
22. Digital In and Out

23. MIDI Out
24. MIDI In
25. USB jack
26. POWER switch

2.3 Front Panel Descriptions

1. Power LED
Indicates that the unit is powered on when lit.

2. USB LED
Indicates a valid USB connection to the host computer when lit.

3. MIDI In LED
indicates presence of incoming MIDI data at MIDI input.

MIDI Out LED
indicates transmission of MIDI data from MIDI output.

4. Mic/Line / Gtr Switches
switches inputs between Mic/Line level and Hi-Z Level.

5. SIGNAL LED
indicates the presence of audio signal on the respective channel. (Specifically, when input level exceeds –42 dBFS.) Only functions on analog input.

OL LED
indicates an overload on the input level to the respective channel. (Specifically, a level of –2.5dBFS.) Only functions on analog input.

6. A and B Input Trims
input level adjustment. Rotate clockwise to increase input level of analog sources.

7. Line Out Level
controls the level to the RCA (analog) outputs.

Headphone Out Level
controls the level to the headphone outputs.

8. DATA Wheel
sends continuous controller information to application. In Cubasis, functions as a shuttle wheel if no SELECT switch is held down, or as PAN control if a channel SELECT switch is pressed and held.)

9. Fader NULL Switch and LED
when pressed, disengages physical faders from the application. Used to match US-224's faders with those of the software application's internal mixer. When using FADER NULL, the selected channel's REC and SEL LED's indicate the US-224's fader position relative to the associated channel in Cubasis' mixer.

10. Input Monitor Switch and LED
toggles Input Monitor adjust mode. When the associated LED is on, the FADER and MUTE switches for channel strips 1 and 2 control the level of Inputs A and B to the US-224's stereo output.

11. Bank Switches and LEDs
pages between successive banks of four faders.

12. Transport Controls:
REW
transport rewind.

FFWD
transport fast forward.

STOP
transport stop.

PLAY
transport play.

RECORD
transport record.

13. LOCATE << and >>
moves transport to L and R locate points.

SET
holding SET and pressing **<<** and **>>** buttons sets L or R locate points, either on the fly or while stopped

14. Channel Faders

send continuous controller information for banks of four faders, as selected by the BANK switch

Master Fader

controls level to the stereo bus output, and/or sends MIDI controller information to the host.

15. SELECT Switches

selects channel for editing, recording, etc.

SELECT LEDs

indicates selected status of channel.

RECord Ready Switch

when held, pressing the SELECT button toggles the selected channel(s)' record-ready status.

16. RECord LEDs

indicates record status of selected channel.

17. MUTE Switches

toggles mute or solo status for selected channel.

MUTE LEDs

when illuminated, indicates mute status of selected channel. (When SOLO LED is on, the associated channel's MUTE LED's indicate solo status when lit)

SOLO switch

toggles between mute and solo status.

SOLO LED

when illuminated, indicates MUTE buttons and LEDs are toggled to solo status.

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2.4 Rear Panel Descriptions

18. PHONES jack

standard 1/4" stereo headphone output.

19. OUTPUT L/R jacks

unbalanced (RCA) analog audio output of stereo bus.

20. INPUT A and B

Analog inputs A and B. Balanced when MIC/LINE-GUITAR switch is set to MIC/LINE; unbalanced when set to GUITAR

21. MIC INPUT A and B

Balanced XLR Inputs A and B.

22. Digital In and Out

S/PDIF digital input and output.

23. MIDI Out

MIDI output

24. MIDI In

MIDI input

25. USB jack

input for USB connection to host computer.

26. POWER switch

push on/push off power switch.

3. Installation

3.1 System Requirements

PC: Minimum requirements: Pentium II - 266 MHz (or equivalent) processor running Windows 98 (Second or Millennium Edition), Windows 2000 or Windows XP, 96MB RAM. Recommended: Pentium II 300MHz processor with 128MB RAM or better. (These requirements are for use with Cubasis VST. Other applications will have different requirements. Consult your application's manufacturer for further information.)

NOTE: The US-224 is not supported under Windows 95. We also do not recommend Windows98 First Edition, due to its limited USB implementation. A fast EIDE hard disk is required for throughput of multiple audio tracks. 96MB RAM is the minimum recommended, but with all digital audio programs, you'll have better results with more RAM. An SVGA graphics card is suggested (min. 256 colors, 800x600 resolution or better).

Although this product has been checked for use with standard configuration computers which meet the specifications above, we cannot guarantee the operation of the product, even with computers meeting the specifications, due to differences in architecture and implementation between computers.

Chipsets are also a concern with USB audio. We've found that the most dependable motherboards are ones which utilize Intel-based chipsets. You can determine your chipset by going into the Device Manager. On the Windows 98 desktop, right click on **My Computer**, and select **Properties**. Click on the **Device Manager** tab, and then click on the plus (+) sign next to **Universal Serial Bus Controllers**. (see illustration 3.01)
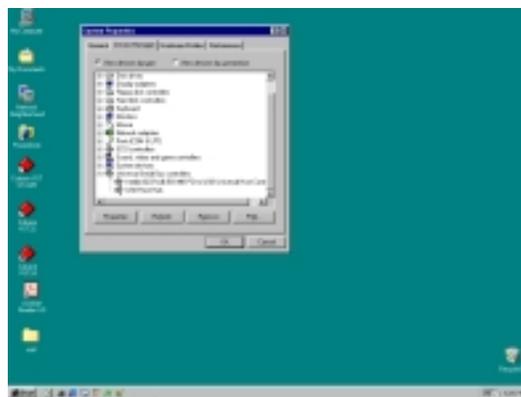
Illustration 3.01 - Determining your USB Controller

The following chipsets have been successfully run with the US-224:

Intel 82371 AB/EB PCI to USB Universal Host Controller
Intel 82371 SB PCI to USB Universal Host Controller
Intel 82801 AA PCI to USB Universal Host Controller
ALi PCI to USB Open Host Controller

Some other chipsets, notably those specifying Open Host Controllers or OHCI (rather than Universal Host Controllers or UHCI), have been subject to occasional incompatibilities. While most OHCI systems have no problems with the US-224, occasionally some older OHCI systems will exhibit problems. We have found that, in the majority of these rare cases, a PCI-based USB card utilizing an Opti-chip controller will work dependably. These cards (also available in PCMCIA format for laptops) are available through a number of manufacturers. Please consult the TASCAM website for further information.

MacOS: PowerPC running MacOS 8.6 or better, and a USB port. Any Macintosh computer with one or more USB ports running Mac O/S 8.6 or later (the US-224 has not been tested with Mac O/S X as of this writing. Please check the website for updates).

Very early iMac computers may need one (or more) firmware updates to use the US-224. Which firmware update(s) is (are) needed depends on which Mac O/S version is installed in the early iMac. Apple provides details in its Apple Support Article #58174.

PowerBook G3 Series (or later) with built in USB (or using a 3rd party PCMCIA USB Card) have been tested and work fine. Additionally, older PowerMac computers using 3rd party PCI-based USB cards also have been tested and work fine. Any iMac, G3 or G4 will work fine as well. A MacOS version earlier than 8.6 will not implement full USB support, and is not recommended. Again, plenty of RAM and fast drives are suggested.

3.2 Installation

Because the US-224 is a USB device, connection is pretty straightforward. Simply plug the USB cable into the US-224, and the other end into your computer.

Make certain that your computer's USB host port is enabled. (Normally, most standard PC BIOS settings default to enabled, but make certain that it hasn't been turned off in the BIOS).

NOTE: Handle the enclosed CD-ROM with care. If it becomes dirty or scratched, it will be impossible for a computer to read it, and the software cannot be installed. If the disc becomes unreadable, a charge will be made for its replacement.

Do not attempt to play the enclosed CD-ROM using an audio CD player, as this may cause damage to hearing, as well as to speakers, etc.

Use only the enclosed USB cable to connect the US-224 and the computer. Do not use other types of cable for this purpose, as some cables contain resistors. If you attempt to use such a cable, the audio input and output will not work properly, and the sound level will be inaudible or very faint.

3.2.1 Windows

The US-224 drivers are available on the CD as executable installers. You'll find two executable installer files on the disk, labeled as:
"US224_Win98_Install_1_10.exe"
(for Windows 98 Second Edition and Millennium Edition) and
"**US224_Win2k_Install_1_10.exe**"
(for Windows 2000 and Windows XP).

Note that we have also included the individual driver files as a ZIP file, for users wishing to install via Windows Hardware Manager. However, we recommend using the installers, as they will also locate and uninstall any files pertaining to older versions of the US-224 drivers.

To install under Win98SE or ME:

Note: The US-224 will run under Win98 SE (Second Edition) or ME (Millennium Edition). Due to its limited USB capabilities, First Edition Win98 is not recommended.

*Note: **Run the Installer with US-224 turned OFF.***

Double click on the executable file **"US224_Win98_Install_1_10.exe"**. (The blue US-224 icon). The installer will run.

Click the "Setup" button. The Welcome dialog box will appear.

Click the "Next" button. The driver files will be installed to your hard drive.

In some cases, Add Hardware Wizard may ask for the file "US224WDM.SYS". Should this occur, click Browse and direct it to the path **Windows/System32/Drivers**.

In some cases, Add Hardware Wizard may ask for your Win98 CD-ROM if it is unable to find all the needed system files. We suggest you have it handy.

The Setup Complete dialog will appear. Click "Yes, I want to restart my computer", followed by the Finish button. The computer will reboot.

Connect the US-224 to the computer, plug it in, and turn it on. The Windows plug-n-play will notice a new USB device and start the Add New Hardware wizard, which will find the needed files on its own. This will take about 30-60 seconds.

The drivers are now installed and the US-224 is ready to operate.

To install under Win2K or Windows XP:

Note: Run the Installer with US-224 turned OFF.

Double click on the executable file "**US224_Win2k_Install_1_10.exe**".   (The US-224 Setup icon). The installer will run.

- Click the "Setup" button. The Welcome dialog box will appear.

- Click the "Next" button. The driver files will be installed to your hard drive.

NOTE: You may be prompted by a message informing you that the software you are about to install does not have a digital certificate. Simply click "Continue the installation anyway" and proceed.

- If you are prompted to restart your computer, do so.

- Connect the US-224 to the computer, plug it in, and turn it on. The Windows plug-n-play will notice a new USB device and start the Add New Hardware

wizard, which will find the three needed files on its own. This will take about 30-60 seconds.

The drivers are now installed and the US-224 is ready to operate.

To install using Windows New Hardware Wizard:

- Unzip the driver files into a new (empty) folder on the hard disk.

- Connect the US-224 to the computer, plug it in and turn it on

- The Windows plug-n-play will notice a new USB device and start the Add New Hardware wizard.

- Choose "Search for a suitable driver for my device" and press Next

- Enter the path where the drivers are stored and press OK

- After Windows finds the "firmware download" driver, click Next

- Click "Finish" · The other driver components will be automatically discovered and loaded

- Click "Finish" if prompted, and reboot if prompted
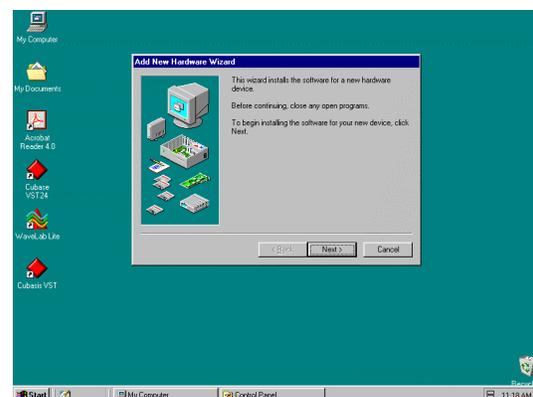
Illustration 3.02 - Windows 98 New Hardware Wizard

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3.2.2 Macintosh

Insert the CD-ROM into the computer, double-click on the US-224 installer, and follow its instructions.

Connect the US-224 to the computer, and connect power to the unit. When the US-224 is connected and powered up, the Mac will find the drivers itself.

3.3 Setting Up OMS (MacOS Only)

Cubasis, ProTools and several other applications rely on OMS for MIDI implementation. OMS (Open Music System) is a standard for MIDI management on the Macintosh. Since the US-224 relies on MIDI controller commands for its communication with the host computer, you will need to install OMS. (The exception is Digital Performer, which utilizes FreeMIDI. The v3 drivers support OMS and FreeMIDI independently.)

To set up OMS to work with the US-224:

▪ First, run the OMS installer. If you do not have the current version of OMS, it may be freely downloaded at www.opcode.com.

▪ Locate the "US-224 Drivers" folder, which was placed on your desktop when you ran the US-224 installer. In this folder, locate the US-224 OMS driver. Drag the US-224 OMS driver into the OMS folder inside your System folder. Do *not* drag this file into the Opcode folder on your hard drive – it will not work correctly.

▪ Restart your computer. Then turn on the US-224 and start the OMS Setup application (located in the Opcode folder on your hard drive).

▪ Select "New Studio Setup" from the File menu. When prompted to select a serial (modem or printer) port, leave both selections unchecked. Click yes and continue. OMS will assess all the MIDI ports attached to your computer and build OMS instruments for the ones it recognizes.

▪ When the setup is complete you should see a list of all your connected MIDI ports. At the least you should see three icons pertaining to the US-224 specifically: the US-224 icon, US-224 MIDI port and US-224 Control port.

(US-224 Control is the "virtual" MIDI port with which the US-224 and its control surface communicate with your host application.)

Once OMS setup is successfully completed, you can proceed with setting up the US-224 with your chosen application. Please refer to the specific documentation for your application for more details.

3.4 Tuning Your PC

A few words about computers and audio. Much has been written about the best ways to optimize your PC for handling audio applications, and generally speaking, it's a much deeper topic than we've got space for in this manual. But here are a few basic points to help you get the best out of your audio programs:

▪ Don't run extraneous applications. While it's likely you'll sometimes use your computer for applications other than audio, it's strongly recommended that you avoid running other applications at the same time you're running audio programs. Processing digital audio requires considerable overhead from your computer, so don't overtax the system by running other applications (especially graphics or internet tools) that can steal those resources.

- Certain devices, such as network cards and WinModems, can cause conflicts with the native handling of USB. Should you experience such conflicts, the offending device can usually be temporarily disabled in the Device Manager. Refer to your Windows manual for detailed instructions on how to resolve conflicts.

- Assuming your computer has an IDE hard disk (most do), enabling Direct Memory Addressing (DMA) on will improve performance. Some programs (such as Cubase VST) allow you to configure the DMA as enabled on install. If you've not already done this, here's how to configure the DMA transfer mode: On the Windows desktop, go to the Start menu, Settings, Control Panel, System. In the System Properties window, select the Device Manager tab. Click on the plus sign next to Disk Drives, and highlight the IDE disk listing, then click on the Properties button. Check the DMA box under options. (see illustration 3.03)
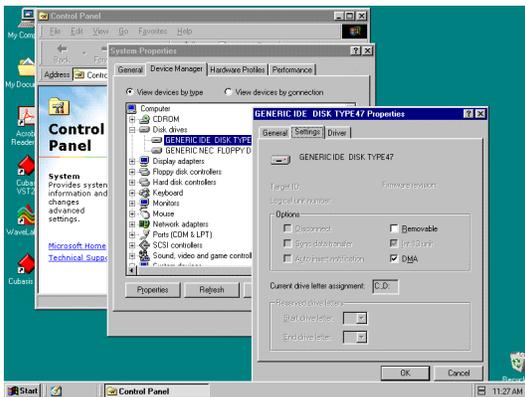
Illustration 3.03 - Enabling DMA on your IDE drives

In addition, a number of simple hardware modifications and enhancements can substantially improve your computer's handling of audio, as well as your track count and DSP capability:

- Increase the amount of RAM in your system. While most digital audio software will function with a minimum of 32 MB, increasing your computer's RAM to 96, 128 or even 256 MB will markedly improve performance.

- Consider the addition of a dedicated hard disk for audio; preferably one with a high spindle rate (over 7200 RPM is recommended for most audio applications). Using different drives for program and audio data speeds up the seek time for the audio track data. (Note that simply partitioning a large drive will not have the same effect, as the computer will still be accessing the same physical drive.) For best results, add a SCSI or Wide-SCSI drive and SCSI controller card. SCSI (and particularly Wide and UW-SCSI protocol) are capable of considerably higher data transfer speeds; you'll notice a dramatic increase in track count and in the amount of signal processing plug-ins your computer can handle. Note that some of the recent UDMA-66 drives have proven to be almost as fast (and certainly cheaper); however, they are still limited in the amount of physical drives allowed and the bus length.

- If you're presently using a PCI-based graphics card, and your motherboard has an AGP slot, consider getting an AGP-based graphics card. This will decrease traffic on the PCI bus and allow for faster screen redraws.

Special Note: For even more detail on optimizing your PC for audio, please refer to the PDF document **PC Optimization.pdf** included on the US-224 CD-ROM. This document is also available on the TASCAM website.

3.5 Notes on USB interfacing

The USB protocol is an extremely versatile one, and much has been made of the possibility of using multiple (over 100) devices on a single bus. While this is certainly a possibility, we recommend using as few other USB devices as possible in a system equipped with the US-224. The demands placed on the USB bus by passing multiple tracks of audio through it are considerable, and adding additional devices will risk reducing that bandwidth.

NOTE: The drivers of many other USB devices, especially CD burners, scanners, printers, and cameras, are written to poll the USB buss on a regular basis (usually once every millisecond). This can lead to dropouts, clicks, pops and other artifacts in your audio. We strongly suggest unplugging any non-essential USB devices while recording with the US-224. (USB keyboards and mice are the notable exceptions – in most cases they are passive devices with very minor bandwidth requirements.)

Another well-documented advantage of USB is the ability to "hot-plug" devices (that is, plug them in and out without powering the computer down). While this applies to the US-224 as well, we recommend against plugging or unplugging, or powering the unit on or off, while running your audio application. Doing so can result in audible pops, or even hanging or crashing the program.

You'll find a listing of web links and resources on hard disk recording on our website at www.tascam.com.

4. Hooking up Audio and MIDI to the US-224

4.1 Hooking up audio

To monitor output from your computer, connect the analog outputs of the US-224 to your mixer, amplifier or powered monitors. Output volume is controlled by the LINE OUT level pot. If you've got a digital mixer, external D/A converter, or other device with S/PDIF input, you may prefer to monitor via the US-224's S/PDIF output.
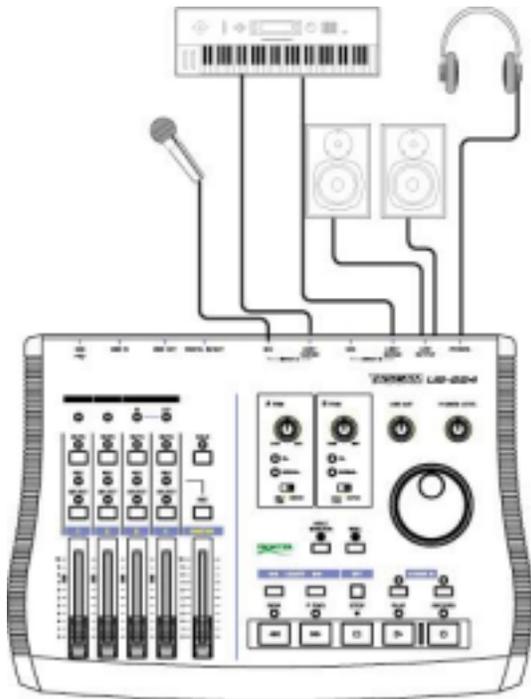
Illustration 4.01 - Connecting audio to the US-224

To record audio from the US-224 into your computer, simply connect a device to the appropriate input. Microphones should be plugged into the INPUT A or B XLR inputs.

Note that the US-224 does not supply phantom power, so if you're using condenser mics, you'll need an external preamp or power supply. You can connect line-level sources (e.g., keyboards and sound modules) into one of the two LINE INPUTS (A or B). If you wish to plug in a guitar, bass, or other high-impedance source, simply move the sliding switch below the Input Trim control to the "Guitar" position. Finally, digital sources (e.g., CD players, DAT's etc) may be connected to the S/PDIF INPUT.

The inputs of channels A and B are available as either balanced XLR mic-level inputs, unbalanced (1/4") line-level inputs, or S/PDIF digital inputs. Digital output is taken directly from the stereo output of your digital audio application. Digital input is chosen in the US-224's Control Panel, as detailed in Section 5.1.

While it's possible to use both mic and line level analog inputs simultaneously on either input, in actual practice this is not recommended, as the signal level of the inputs will be summed and very likely interfere with each other.

Inputs A and B are also switchable between the analog inputs and the S/PDIF digital input. The input source is selected in the US-224 Control Panel main page. (See section 5.1 for details).

Input level for analog sources is regulated by the TRIM level pots. **NOTE**: The INPUT A and B TRIM controls do not affect digital input. Sampled audio from the S/PDIF digital

input is passed directly to the application without modification. To reduce the level of the digital audio signal at inputs A and B, you will need to reduce the output level of your digital source.

Note about levels and gain structure here. The TRIM controls directly affect the input level at the A/D converters on the US-224, so it's advisable to use the SIGNAL and OVER LEDs to help set your levels. Unlike analog tape, when recording digital audio, it's important to keep your input level close to 0dB, but never to exceed it. If the input level is too high, the audio signal will clip - not a desirable sound. If the input level is too low, then the dynamic range that the US-224's A/D's are capable of is not being used, and the signal will be closer to the noise floor than it needs to be. In either case, this can not be fixed after the tracks have been recorded, so it's important to make this adjustment carefully.
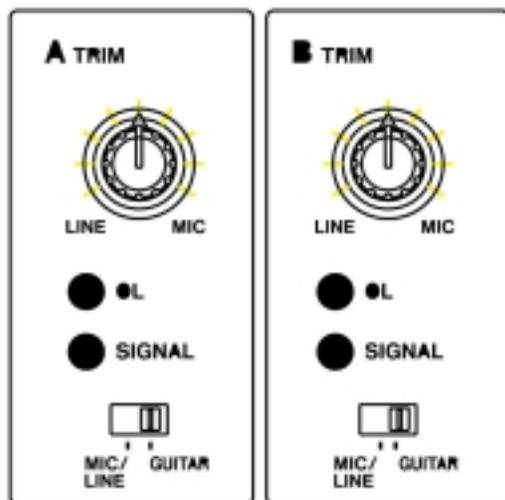

Illustration 4.02 - Input trims and level indicator LED's

4.2 Hooking up MIDI

The MIDI in and out jacks give you 16 channels of MIDI I/O. Simply connect the MIDI out of your keyboard or other device to a MIDI in jack on the US-224, and vice versa. If you've got a MIDI sync box, you can use the MIDI I/O's to send and receive MTC (MIDI Time Code). This allows you to sync tracks from your MTC-capable Portastudio, DTRS multitrack, or any other machine that accepts time code with your digital audio software, for transferring tracks back and forth for editing and processing.

4.3 Using the Input Monitoring

In digital audio, the amount of time it takes for the input signal to pass through the circuitry of the unit and the software processing and arrive at the outputs will sometimes result in an audible delay. (This is commonly referred to as "audio latency".) This added delay can be confusing when, for example, you're trying to overdub to previously recorded tracks.

The INPUT MONITOR mixer built into the US-224 eliminates this problem by providing a way to listen to the signals you're recording directly, without any computer processing delay. When the INPUT MONITOR button is depressed, the first two channel faders control the input levels of inputs A and B to the US-224's internal mixer. Changes in these levels affect the monitor and headphones outputs, but have no effect on the audio levels seen by the audio software application. The first two MUTE buttons also affect the inputs, and PAN is also available in this mode; the inputs come up panned to center, but can be SELected and PANned anywhere within the stereo field.

NOTE: In INPUT MONITOR mode faders 3-4 are inactive.

NOTE: All the controls mentioned here are also accessible via the ASIO control panel, which displays the current status of the INPUT MONITOR section.

4.4 Monitor vs. Master Level

It's important to make a distinction between MONITOR LEVEL control and level of the stereo bus output, as controlled by the MASTER FADER.

When using the US-224's analog inputs, only the TRIM controls actually affect the input level to the audio software application. When using the US-224's Digital inputs, the digital audio data received at the US-224's digital input is passed directly to the audio application without any gain or other modifications.

When monitoring audio playback from the application via the US-224, the level is controlled by that track's software gain control (which, in turn, is controlled by the US- 428's channel FADERs), the MASTER FADER, and the LINE OUT or PHONES OUT level controls.

The LINE OUT and PHONES level controls directly affect the audio levels that appear on the LINE OUTPUT and PHONES jacks, respectively. The audio level produced at the DIGITAL OUTPUT is not affected by either control.

The MASTER FADER is the final level control affecting the digital stereo output to the application, consequently changes made to the MASTER FADER level will also affect the output level to the speakers.

Thus, if you want to simply reduce the volume of your listening environment, you'll want to use the MONITOR LEVEL control to do this without affecting the level of your stereo mix.

5. The US-224 Control Panel

5.1 Main Page

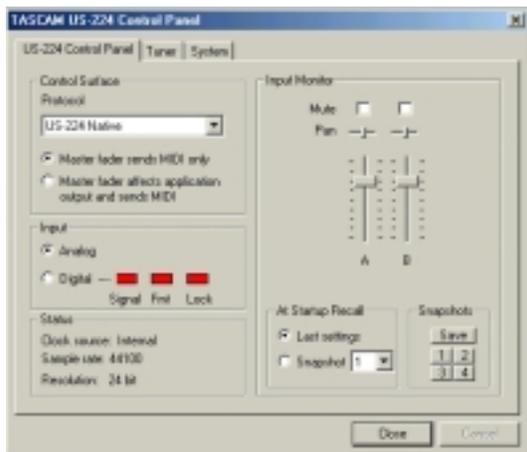In the Control Panel's main page, you can specify a number of options of the US-224's ASIO handling.

Illustration 5.01 - Control Panel Main Page

The *Control Surface Protocol* setting governs the type of MIDI messages used to send fader and button information from the US-224 to applications. The corresponding drop-down box allows you to select from US-224 Native or US-428 emulation modes. For more information US-428 emulation mode, refer to chapter 8. For use with most DAW applications, it's recommended that you leave the default "US-224 Native" selection.

The *Master Fader always* sends changes in position via MIDI. It can also be used to make the US-224 itself change the output level coming from an application. (This is useful for programs that do not have their own master volume control, such as Sound Forge.) In Cubasis, select the MIDI only option.

The *Input* selector toggles the source of the US-224's inputs from analog (via any of the mic or line inputs) to digital (via the S/PDIF input).

The *Status* area provides a view of the US-224's current settings:

Clock source: Internal or Digital In
Sample rate: 44100 or 48000
Resolution: 24 Bit or 16 Bit

Digital input:

Signal:
Red - no digital input
Green - digital input active

Fmt:
Red - improper format
Green - proper S/PDIF format

Lock:
Red - digital in not ready to record,
Green - digital in ready to record

The *Input Monitor* area is a viewable and controllable version of the US-224 INPUT MONITOR mixer. Here you can control the level and position of each US-224 input as it will appear on the LINE OUTPUT, DIGITAL OUT, and PHONES connectors. Three controls (level, pan and mute) are available for both inputs. Note that these controls can also be changed from the US-224 by pressing the INPUT MONITOR switch on the unit, and using channel strips 1and 2. If you make the changes this way, the controls displayed in the US-224 Control Panel will be updated to reflect the new values.

Any settings shown in the input monitor section of this control panel can be saved as one of four Snapshots. To save your settings as snapshot number 1, for example. click on "Save" and then click on "1". Any snapshot can then be recalled by just clicking on its corresponding button.

You can also control the input monitor settings that will be used when the US-224 first starts up. You can choose either the last settings in effect at the previous system shutdown, or any one of the four snapshots.

5.2 Buffer Size Adjustment

The US-224 Control Panel contains a second page, tabbed "System". On this page the buffer size can be adjusted. Smaller buffer sizes will result in lower latency, but requires a faster system.

About Buffer Sizing:

The US-224 driver temporarily stores input and output audio samples in buffers. Larger buffers provide more safety against other system activities interrupting the audio and producing clicks, pops or other audible artifacts.   Smaller buffers provide lower latency when using the computer to send input audio to output channels in order to monitor the input.   The driver lets users select which buffer size works best for their computer and audio application. Note: This adjustment does not affect the latency of the US-224's hardware input monitor, which is always less than an ultra-low 1.5 ms.

To adjust the buffer size, run the US-224 Control Panel and go to the System tab. The Audio Latency slider lets you change the buffer size from a minimum of 256 samples (128 samples on the Mac) to a maximum of 2048 samples.   All audio programs that use the US-224 must quit before a new audio latency setting takes effect.   Using Cubase VST at 44.1 kHz sampling rate, a 256 sample buffer size gives appx. 12 ms of monitoring latency, while a 2048 sample buffer gives appx 43 ms latency.
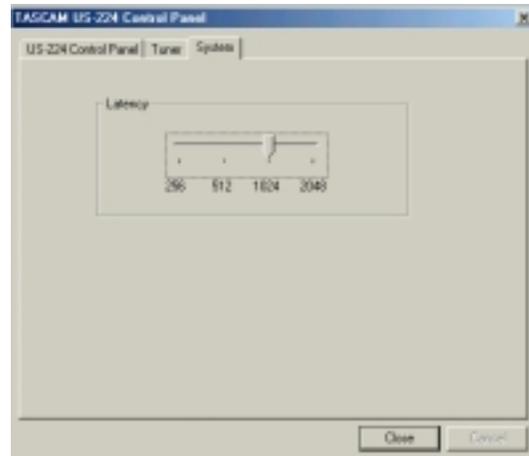
Illustration 5.02 – System Tab

5.3 The Chromatic Tuner

Open the US-224's control panel and select the "Tuner" tab.

In the "Input" section, select the US-224 input channel that you want to tune (A or B).

Play a note and adjust the trim knob for that input until the signal is strong, but not clipping.

The "Level" meter on the screen should display bright green segments without lighting the top red segment.

If desired, you can change the Tuning Standard in the "Reference" section. Normally, the Tuning Standard is set to 440 cycles per second for a middle "A" note, but you can use the up/down arrows to change it to a number between 430 and 450 cycles per second.

As you play, the detected note will be displayed below the Tuning lights (A# or E, for example). If the note is sharp, the "Sharp" arrow and a Tuning light to the right of '0' are bright red; if the note is flat, the "Flat" arrow and a Tuning light to the left of '0' are bright red.

The numbers below the tuning lights indicate how far out of tune the note is, in cents (100 cents is one semitone). When the note is in tune, the center '0' light and both the Flat and Sharp arrows are bright green.
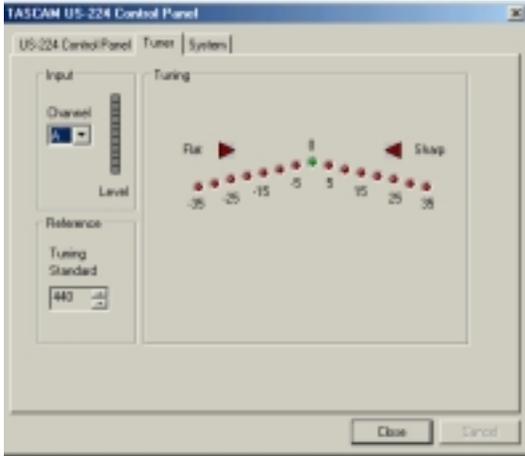
Illustration 5.03 – The Chromatic Tuner Page

Note: The chromatic tuner consumes some CPU bandwidth in your system. Therefore, when you finish using the tuner, we recommend that you either select another control panel tab or close the control panel.

6. Interfacing with your Audio Software

This section is intended to present the basic concepts needed to interface the US-224 with the bundled Cubasis VST application.

This discussion, however, is not intended to replace your software's users' manual. If you've got questions specific to Cubasis, please refer to the Cubasis User Manual for the program for further detail.

Note: While the US-224 will function with many of the same applications as the US-428 when in US-428 emulation mode, the full operational details of each individual program are beyond the scope of this manual. Details on using the US-224 in US-428 emulation mode may be found in chapter eight. More specific information on how the US-428 interacts with a number of other applications may be found in section eight of the US-428 manual, which may be downloaded in PDF format from the TASCAM website. You should also refer to the manual for your particular audio application for further details.

6.1 Selecting the US-224 as your Audio Device

6.1.1 Audio Control Panel

In Cubasis, open the Audio Control Panel (see illustration 6.01). It's located in the *Audio* pulldown menu, under *System*. Select the *ASIO Device* pull-down menu, and select *ASIO US-224 Driver.* If your software only supports 16 bit recording, a 16 bit driver has also been included.

Illustration 6.01 - Cubasis Audio Control Panel.

In the Audio Control Panel, you can select the number of audio channels you wish to use, as well as the sampling rate, Disk Cache settings, and MIDI to Audio offset. See the Cubasis manual for more information on these settings.

6.1.2. ASIO Control Panel

In the Audio Control Panel, click on the button marked ASIO Control Panel. The US-224 Control Panel will appear. In Cubasis, make certain the protocol is set to US-428 Emulation Mode. Refer to chapter five, US-224 Control Panel for information on these settings.

6.1.3 VST Remote

In Cubasis, the program will automatically recognize the US-224 as a remote controller unit. In most other applications, you will need to select the US-224 as the program's remote control. In the case of applications which do not directly support the US-224, you will need to select US-428 as your control device, and select US-428 emulation mode in the US-224's Control Panel.

To do this in Cubase (full versions), for example, select the VST Remote option from the Audio menu, and choose the US-428 option (See illustration 6.03). You will also need to set the Input and Output devices to "US-224 Control Port" and the "Remote" setting should match the setting chosen in the US-224 Control Panel (see illustration 6.03).

Illustration 6.03 - Cubase VST Remote Panel

6.2 Setting the Sample Rate and Bit Depth

The US-224 supports sample rates of 44.1kHz and 48kHz. In the Audio Control Panel, select the pull-down menu for Sample Rate and select either 44.1 kHz or 48 kHz.

The US-224 control protocol includes two separate drivers for 16-bit or 24-bit operation. This selection is made in the Audio Control Panel (see illustration 6.04).

NOTE: The bundled Cubasis VST supports only 16-bit audio. If you want to record in 24-bit mode you will need to upgrade to Cubase VST or another application that supports 24-bit audio.
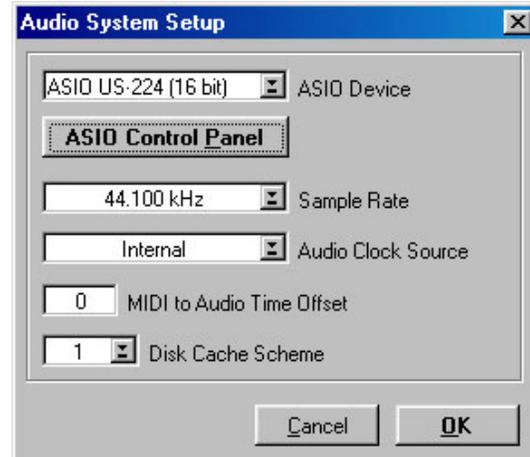
Illustration 6.04 - VST/24 Audio Control Panel

6.3 Input Enabling

You will need to enable the inputs on Cubasis. Open the Audio Input window (see Illustration 6.05) and select one mono track or a stereo pair.
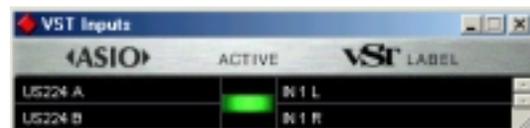
Illustration 6.05 - Input window

Note that Cubasis supports only one input for recording (though this can be a mono or stereo track).

Then select the inputs on Cubasis' internal mixer. If you're recording a mono input, left click on the input selector above the channel strip and select the desired input L or R. If you're recording a stereo track, the inputs will both be selected automatically Verify that the designated channels' inputs ("IN") are selected, and the associated channels are receiving signal. (see illustration 6.06)

Illustration 6.06 - Input selection window, showing Mutes and Solos

Highlight a track in the arrange window, and that track will automatically be Record-Enabled. (see illustration 6.07)

Verify that the drop-in and drop-out features in Cubasis (on the transport bar) are not enabled (or if so, that they are enabled at the desired locate points). Press the RECORD button on the US-224. Cubasis will issue a one or two bar countoff (depending on what's set in Cubasis' Metronome preferences menu), then commence recording.
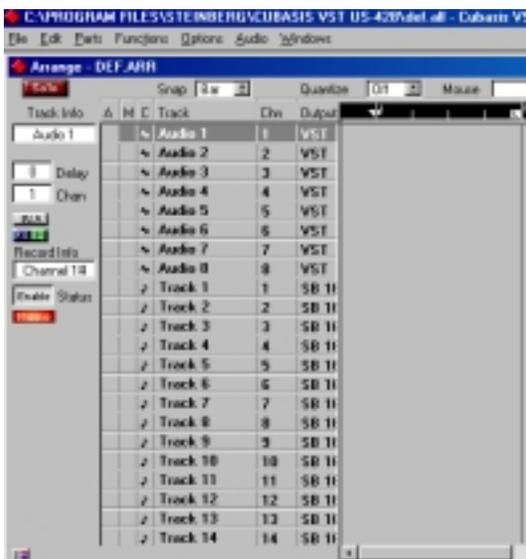
Illustration 6.07 - Record Enable

6.4 Transport Controls and Locate Points

The **transport controls** on the US-224 are set up to directly correspond to the on-screen transport controls in Cubasis. So, for example, pressing PLAY on the US-224 will activate the *PLAY* mode in Cubasis. Pressing STOP will halt playback on Cubasis. Pressing REW or FFWD will activate Cubasis' transports to Rewind or Fast Forward, respectively. The DATA Wheel will also act as a shuttle wheel for the transport. (See section 6.6 for details)

Cubasis will record audio or MIDI into the track that is highlighted on the Arrange screen (see above). Pressing RECORD will start Cubasis into a count-off, after which it will begin recording audio or MIDI data into the selected track.

Illustration 6.08 - Transport Bar

The **locate points** function much like the left and right mouse buttons in Cubasis. To jump to the Left locate point, press the LOCATE **<<** button, and to jump to the right point, press the LOCATE **>>** button.

To set locate points, hold the SET button and press the **<<** or **>>** button to set the corresponding locate point. This will work when the transport is stopped or when moving, allowing you to set locate points on the fly.

6.5 Mute/Solo

The MUTE buttons toggle the Mute function in Cubasis' VST Channel Mixer for the selected channel. When a channel is muted, there are two indications: the *Mute* button in the Cubasis VST Channel Mixer's display will be activated, and the MUTE LED on the US-224 corresponding to the muted track(s) will be illuminated.

The SOLO switch works by toggling the status of the MUTE switches to SOLO mode. When the SOLO button is pressed and the SOLO LED is lit, the MUTE buttons act as SOLO buttons, soloing the selected channel(s). (See illustration 6.06)

6.6 Data Wheel

The DATA WHEEL acts as a continuous controller, and is capable of a variety of functions. In Cubasis, its default function is as a transport shuttle. Rotating the wheel clockwise will advance the song position forward, and rotating it counter-clockwise will move the transport backward. (Note: Use of the transport shuttle will cause a momentary drop-out in the audio as the application re-syncs. This is normal operation in Cubasis.)

If a channel SELect switch is held down, the DATA Wheel will function as a PAN control for the SELected channel.

In other applications, the shuttle wheel can perform a number of other functions in US-428 emulation mode. Please refer to the US-428 manual for more details.

6.7 BANK Controls and FADER NULL

The BANK SELECT keys page between successive banks of four faders. Selecting any of the four faders will control the corresponding channel in the software's internal mixer.

The US-224 will support an unlimited number of channels. It is only limited to the maximum amount of channels your audio software will support.

When changing to a different bank of faders, you may find that the fader on the US-224 is now out of position with the associated channel's fader in Cubasis. Pressing the FADER NULL button will disengage the US-224's faders from the program, allowing you to move the US-224's fader to match the fader in the software's internal mixer. The REC and SEL LED's function as up/down indicators, guiding you to the correct fader position. For best results, it is recommended that FADER NULL function be utilized with the transport stopped.

6.8 ASIO2 Direct Monitoring

Some audio programs that can use ASIO 2 for audio input and output, such as Steinberg's Cubase VST, support a feature called "Direct Monitoring." This lets the program's user interface control hardware input-to-output monitoring paths. Without Direct Monitoring enabled, the latency is controlled by your buffer size setting (see section 5.2) and your program can add effects such as reverb and EQ in both the monitor and record paths. With Direct Monitoring enabled the latency is ultra-low (less than 1.5ms), but you can't hear effects in the monitor path (although they will be recorded if enabled).

To enable Direct Monitoring in Cubase VST, open the Audio Control Panel. In the "Monitoring" section of the window, check "ASIO Direct Monitor." (You also need either "Record Enable Type" or "Tape Type" monitoring enabled.)

7. A Sample Recording Session in Cubasis

Okay. You've got your US-224 connected to your computer, and you've loaded the drivers. Your audio software is loaded, and you're ready to cut some tracks. Let's walk through a typical recording session with the US-224 and Cubasis.

NOTE: *This chapter is intended as a quick start guide toward recording and mixing with Steinberg Cubasis and the US-224. It is in no way meant to be a comprehensive guide to Cubasis. For full details on the Cubasis application, please refer to the Steinberg Cubasis manual on the US-224 CD. You'll find Windows and MacOS versions.*

7.1 Setting Up

Before starting Cubasis, make sure that the US-224 is turned ON, that its USB cable is connected to your computer's USB port, and that the device has been initialized.

NOTE: *When turning the US-224 on or off, or launching or closing the application (e.g. Cubasis VST), turn down the LINE OUT and PHONES LEVEL controls.*

When Cubasis VST is running, do not turn off the US-224. Also, you should not disconnect or connect the cables of the US-224 or any other USB equipment while Cubasis VST is running.

If you launch Cubasis or another audio program before the US-224 has been initialized, the software will not "see" the US-224 and you will not be able to operate the software's controls, perform MIDI I/O, or record or play back audio. Likewise, many software applications don't expect that devices will be removed while the program is running. So make sure to exit your audio application programs before disconnecting or turning off the power to the US-224.

It is also advisable, as with all audio devices, that you turn your amplifier or powered monitors off until the program is up and running, to avoid audio spikes.

Once you are certain that the US-224 is up and running, start the Cubasis application by double- clicking on its icon on the screen. Open the Audio Control Panel and select the US-224 as your audio device (see "Selecting the US-224 as your audio device" in previous chapter.) If you don't see the US-224 listed in your Audio Control Panel, make sure it's been installed correctly by referring to the section on Troubleshooting.

Select the ASIO Control Panel, and choose a sample Rate (44.1kHz or 48 kHz). Your Audio Clock Source should be set to internal, unless you're using S/PDIF digital input or otherwise slaving Cubasis to an external source.

Select the Disk Caching Scheme. Option 1 is "Virtual Tape Recorder", used primarily when your tracks are linear and of longer duration. Option 2 corresponds to "Audio Sequencer", and is more applicable when using loops and shorter segments of audio. Option 3, "Tape Recorder/Sequencer", is your best choice when working with a combination of short audio clips and longer linear tracks. (For further information on Disk Caching, please refer to the Cubasis VST manual.)

If you're using Cubasis, the program automatically connects to the US-224 control surface and LEDs, but if you're using another program, you will probably need to select the "US-224 Control Port" MIDI In and Out devices in that program's MIDI Setup menu.

If you're using the US-224's internal MIDI interface, you'll need to enable it in the Options/MIDI Setup menu. For more information on setting up VST's very sophisticated MIDI functions, please refer to the VST manual.
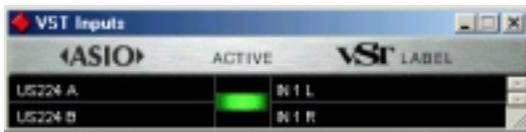
Connect your audio sources to the US-224. Connect an analog source via the XLR or 1/4" inputs, or a digital source via the S/PDIF input.

7.2 Recording Your Tracks

In Cubasis, choose the input(s) you wish to enable on the US-224. In the Audio menu, select *Input*, and click on the input pair on the US-224. The green *Input* icons will light in VST's Input window for active inputs.

Select the Audio track(s) to record to by highlighting that track in the Arrange window.

NOTE: If this is the first track recorded in a given project, Cubasis will probably respond with a dialog box asking you for a path to save the audio files. It is highly recommended that you create a unique folder for each song or project, as audio .WAV files can accumulate very quickly on your hard disk, and keeping them organized can get pretty complicated.

Once you've enabled your tracks, you'll want to monitor audio through them to set your levels. Open Cubasis' Monitor Mixer (Audio/Monitor menu), and make certain you've assigned your channel inputs and enabled them. You should see audio signal on those channels' meters (assuming you're sending signal from your source).

If your input signal is too high, the OL LED will glow steadily red. If the signal level is too low, you might only see a flicker, or nothing at all, on the SIGNAL LED.

You can regulate the input level of the input source in several ways. First, make sure that the signal you're sending to the US-224 is within a reasonable range – it should illuminate the green SIGNAL LED, but the

red OL LED should only flicker occasionally. You can then fine adjust the level with the TRIM knobs for the selected channel(s).

NOTE: The SIGNAL and OL LED's do not function with digital input.
In the case of digital input, input level is regulated by the output level of the source, and passed directly to the software application without modification.

On Cubasis' Transport Bar, you can enable the recording to drop in or out of Record based on the locate points you've set. If you do not wish to enable this function, make certain the buttons for drop in and drop out are not enabled.

Press the RECORD button on the US-224. If you've got the metronome's Count-off function enabled, you'll hear a one or two bar countoff, and then the program will enter Record mode. It will stop recording when it reaches the drop out point, or if none is enabled, when you hit the STOP button.

Cubasis will now create a display of the track(s) you've just recorded. This can take a few seconds to a few minutes, depending on how long the recorded tracks are and how many there are. You'll then see the tracks appear in your arrange window.

7.3 Overdubbing

To overdub more tracks, simply select and enable additional tracks as you did the previous ones, and repeat the procedure. You can monitor the tracks you've already recorded via the US-224's outputs, while recording additional tracks into Cubasis via the US-224's inputs. Be sure to assign each track to its own channel in the program's internal mixer. For more information on Cubasis' mixer functions, including groups and output assigns, please refer to the Cubasis manual.

When overdubbing, you can also select the INPUT MONITOR mode by pressing the INPUT MONITOR button on the US-224.

When the corresponding LED is illuminated, channel strips 1 and 2 can be used to adjust the level, pan and mute status of inputs A and B, respectively. This will enable the first two faders as Input level monitors, allowing you to hear the inputs at the source, in sync with the previously recorded tracks.

7.4 Mixdown

You can control the mix of the channels you've recorded via the US-224. Make certain you've got the correct bank selected - the small on-screen window that indicates "VST Mixer 1-8", or "CTM Mixer 1-8" or "GM Mixer 9-16" is your best indication of the currently selected bank. The LEDs next to the BANK buttons on the US-224 also indicate the selected bank:

VST Mixer 1-4   =   ◀◀ only
VST Mixer 5-8   =   ▶▶ only
CTM Mixer 1-4   =   ◀◀ only
CTM Mixer 5-8 =   ▶▶ only
CTM Mixer 9-12   =   ◀◀ only
CTM Mixer 13-16 =   ▶▶ only

You can change the level of a track by adjusting its corresponding fader on the US-224 control surface. To adjust other parameters on a particular channel, first press the SELECT key for that channel on the US-224. The selected channel will be highlighted below that channel's fader on the screen.

Moving the channel fader on the US-224 will adjust the relative volume of the selected channel in Cubasis. The corresponding fader on screen will update as you move the US-224's fader.

The PAN function on the US-224 will pan the selected channel from Left to Right on the stereo buss. To activate the PAN control, press and hold the SELect switch for the desired channel and then turn the DATA Wheel in the desired direction.

Once your tracks are recorded, mixing can be automated on Cubasis' internal mixer. By selecting *Write* on the mixer panel in Cubasis, your fader moves panning, etc., (as well as EQ, FX settings and other changes) can all be recorded into Cubasis' automated mixer settings. To play back the automated mix, select *Read* on the mixer panel. (You can play back existing mix moves while continuing to update your mix by selecting both *Read* and *Write*.)

For more detail on Cubasis' mixdown procedure, refer to the Cubasis manual.

8. Other Applications and US-428 Emulation Mode

As we've mentioned throughout this manual, the US-224 is an extremely versatile device. Its capabilities as a controller go well beyond those we've described thus far with the bundled Cubasis program.

Since the US-224 is based on TASCAM's very popular US-428, it is capable of providing basic functionality in most of the applications supported by the US-428 (subject to its hardware limitations).

Clearly it would be impossible to fully document the US-224's operational details with each application. If you want to operate the US-224 with a US-428 supported application in US-428 emulation mode, please refer to the specific chapter in the US-428 manual for details on setup and operation with that application.

It's also important to note that the US-224 is fully functional as a 16- and 24-bit audio interface and 16 channel MIDI interface with virtually all Windows and MacOS compatible applications. Even those applications which do not support the US-224 as a controller can still use the US-224 as an audio and MIDI interface.

Since the US-428's release, TASCAM has been working together with developers throughout the professional audio industry and beyond to create support for new applications; much of this research will also benefit users of the US-224. Since the development of new support for the US-428 and US-224 is ongoing and expanding, we recommend you visit the Computer Recording area of www.tascam.com for current news and information, and check out the online users' forum as well.

These individual documents are also available on the CD-ROM, as well as on our website. As new application support becomes available, we will be posting the information for free download.

8.1 Setting up Sound Manager Support (for use with ProTools Free and Other MacOS Applications)

The Macintosh Sound Manager is a standard 2-channel software interface for playing and recording sound on a Mac. The audio inputs and outputs (speakers) that are built into any Macintosh use the Sound Manager interface, and essentially every Mac application that uses sound supports it. This includes not only audio recording and editing programs, but also games, video editors, web browsers, MP3 players, and even Macintosh beeps and system sounds. Even some audio-oriented program only support Sound Manager I/O, such as Digidesign's Pro Tools Free. The Sound Manager input and output sources are selected by control panels. The control panels used are different in MacOS 8.6 and 9.0, and are explained separately below.

MacOS 9.0

The "Sound" control panel in MacOS 9.0 is used to select Sound Manager inputs and outputs. With this control panel active, click on the left of the window where it says "Output" to display the possible Sound Manager output devices. On the right, click on "US-224" to select it as the Sound Manager output. The US-224 has its own output volume controls, so the output volume slider can only be able to mute or enable sound output. Moving the volume slider to the right or clicking on it will send a system beep out the US-224 outputs.

When you click "Input" on the left, the available input devices appear on the right. Click on "US-224" to select it as the Sound Manager input device. Below it is "Input Source": select A:B.
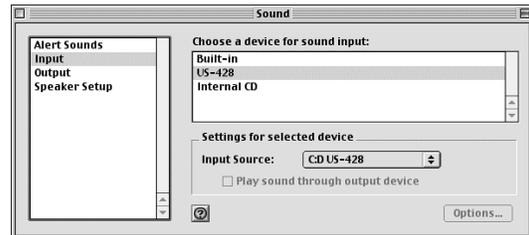
When an application is using the Sound Manager inputs, this "Input Source" field is grayed out, displaying the current inputs but preventing you from changing them here. You can still change the input pair without quitting your program, however. To do this, bring up the US-224 control panel and go to the System tab. You will find a selection there labeled "Sound Manager Input." Here you can change the input pair at any time, even when an audio program is active. The grayed out "Input Source" field in the "Sound" control panel "Input" section will display any input changes you make.

MacOS 8.6

The "Monitors and Sound" control panel in MacOS 8.6 has a "Sound" section. It displays the currently selected Sound Manager output and lets you select among several "Built In" input sources. It cannot be used to select the US-224 as the Sound Manger input or output.

The "Sound" control panel has a selection line at the top to let you choose among "Alert Sound," "Sound In," "Sound Out," and "Volume" windows. (Note: If your "Sound" control panel does not have all these options, you should use the alternate "Sound" control panel found in Apple Extras/Sound Control Panel.) With "Output" selected, you can choose "US-224" as the Sound Manager output. Since the US-224 has its own output volume control, its slider

under "Volume" in this control panel is only used to enable or mute the US-224 output.

Under "Sound In" you can select the "US-224" instead of the Mac's Built-in sources. You can also do this under the "US-224" control panel's "System" tab. There you will find a field labeled "Sound Manager Input". You can change this setting at any time, even while a program is using the Sound Manager I/O.
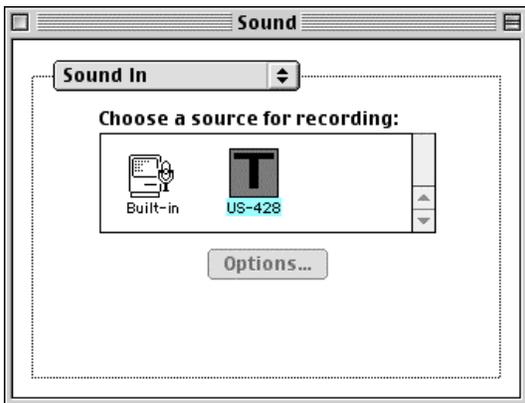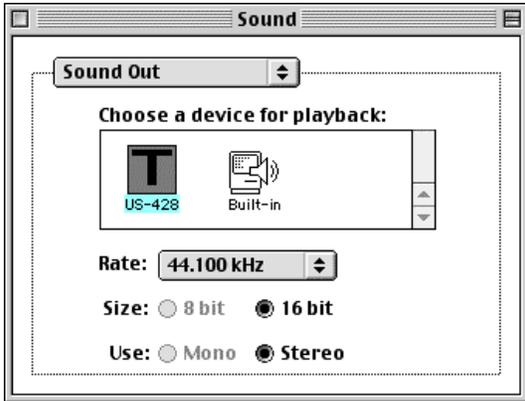
9. Technical Support

9.1 Troubleshooting

When installing the US-224 for the first time, if you experience any unusual behavior, here are some things to check:

Audio Drivers

In *Control Panel / System / Device Manager* (Win98SE/ME) or *Control Panel / System / Hardware / Device Manager* (Win2000/XP), find the Audio control panel. It's called *Sound, Video And Game Controller*s in Win98SE, or *Sound & Multimedia* in W98ME and Win2K. You should see two entries for the US-224:

- TASCAM US-224
- US-224 WDM Interface

In *Control Panel / Multimedia*, select the *Audio* tab.

Under *Playback, US-224 Out* should appear in the drop down menu
Under *Recording, US-224 A:B* should appear in the drop down menu

MIDI Drivers:

In *Control Panel / Multimedia*, select the *MIDI* tab. When *Single Instrument* is selected, you should see:

- US-224 Port 1
- US-224 Control

In *Control Panel / Multimedia*, select the *Devices* tab. Under *Audio Devices*, you should see:

- Audio for US-224

Under *Midi Devices And Instruments* you should see:

- MIDI for US-224.

Expand by clicking on the plus (+) sign and you should see:

- US-224 Port 1
- US-224 Control

(Port 1 corresponds to the US-224's physical MIDI I/O ports. US-224 Control is the "virtual" USB MIDI port with which the US-224 and its control surface communicate with your application.)

9.2 Tech Support Contacts

If you're unable to solve an installation problem, you've got several options for help.

First, we recommend you visit our website at www.tascam.com, and check for any updates, FAQ or support news.

Also on our website, you'll find our always lively Online User Forums. TASCAM Product Specialists are on line to field questions, but don't be surprised if your question is answered by another user. The BBS is also a forum for discussion, comments and ideas on the US-224 and US-428. You'll find users of a variety of software platforms, so someone's likely to be familiar with your program of choice.

Also, since many of the situations you're likely to encounter will be related to the software you're using, it's a good idea to check not only our website, but the websites and resources of the software program's manufacturer as well.

You can also email us at US428team@tascam.com, or contact our telephone support. Outside the US, please see the Contact page of our website for worldwide contact information.

Before Contacting Us

Before contacting us with your query, please have the following information available:

- Type of Computer (PC or Mac), processor type and speed, and (if possible) motherboard
- Type of USB Host controller (see the US-224 manual for details)
- Installed RAM, type of hard drive(s)
- Type of graphic card
- What OS are you running?
- If running Windows98SE, have you installed the HotFix?
- What other hardware is installed in this computer? SoundBlaster or other audio cards? Other USB devices/hubs? Scanner, CD burners, WinModem, etc?
- What application(s) are you running?
- If running the bundled Cubasis application, is/was another version of Cubase or Cubasis installed?
- What plugins to you have installed?

Please provide us with full details of your problem, including:

- Any errors or oddities encountered during setup and installation Items listed above that do not appear
- Any error messages encountered. Please try to copy or quote them in full.
- Any behavior that may cause errors, especially repeatable ones.

9.3 Troubleshooting FAQs

NOTE: While this manual contains some basic FAQ's, you will find a much more detailed FAQ document on the US-224 CD-ROM. The FAQ is also updated on a regular basis, so we suggest you check the TASCAM website for the current version.

Q. I don't see the US-224 in Cubasis' Audio Control Panel.
A. Check to see if the US-224 is installed correctly within your OS. In Windows, go to the Device Manager (My Computer/Control Panel/Setup), and click on the Sound, video and Game controllers tab to make sure the US-224 is installed and operating correctly. Also check to see that your USB cable is connected securely, and that the unit is powered up before booting Cubasis.

Q. I've connected audio to the US-224, but can't hear anything.
A. Make sure your input levels are sufficient. The green INPUT LED's should light to indicate the presence of analog audio signal at the inputs. Make sure your monitor or headphone levels are turned up, and connected correctly.

Q. My audio is distorted.
A. Check to see if the signal is overloading. The red OL LED's should only occasionally flicker. In the case of a digital input, try reducing the output level of the source.

Q. I can see a response on screen from Cubasis to the US-224, but I don't hear any audio.
A. Make sure your audio signal path is correctly routed. Make sure the channels you're trying to monitor are not in Input mode. Make sure your output level is turned up. Make sure that the US-224 ASIO driver (16 or 24 bit) is selected.

Q. I can hear audio, but I see no response to the US-224 on screen.
A. Make sure you've got the US-224 selected in the VST Remote menu. Make sure you're looking at the correct BANK of faders on screen.

Appendix A - MIDI Implementation Chart

Function		Transmitted	Recognized	Remarks
Basic Channel	Default Changed	X X	X X	Through
Mode	Default Messages Altered	X X ……	X X	Through
Note Number	True Voice	X ……	X	Through
Velocity	Note ON Note OFF	X X	X X	Through
After Touch	Keys Channels	X X	X X	Through
Pitch Bender		X	X	Through
Control Change		X	X	Through
Program Change	True #	X ……	X	Through
System Exclusive		X	X	Through
System Common	:Song Pos :Song Sel :Tune	X X X	X X X	Through
System Real Time	:Clock :Commands	X X	X X	Through
Aux Messages	:Local ON/OFF :All Notes OFF :Active Sense :Reset	X X X X	X X X X	Through

Mode 1 : OMNI ON, POLY Mode 2 : OMNI ON, MONO **O:Yes**
Mode 3 : OMNI OFF, POLY Mode 4 : OMNI OFF, MONO **X: No**

Appendix B – Control Protocol

Purpose

Provide simple, effective integration between the US-224 and host software applications.

Introduction

The US-224 provides digital audio I/O, MIDI, and control surface functions in a single affordable USB-based product. While the audio and MIDI I/O follow established which are easily interfaced with host applications, full integration of the control surface aspects of the US-224 requires a set of messages to be defined which permits two-way communication of control information between the host application and US-224.

Functional Groups

The US-224's control surface are divided into several major functional groups:

- Transport and Locate switches and status LED's
- Per-channel controls (faders, switches, and LED's)
- Bank switching buttons and LED's
- Function switches, LED's and continuous "data wheel"

Communication model

Standard MIDI controller and sysex messages will be used to communicate between the host and US-224. In many cases, the commands transmitted by the US-224 are identical to those generated by the JL Cooper CS-10 controller. In general, it is desired that overall system "state information" be maintained by the host application, rather than in the US-224. As an example, here is how a change in transport state from STOP to PLAY might be communicated:

- User presses PLAY button on US-224.
- Play-button command is sent via USB to host application as MIDI .
- Application receives Play message from the "US-224 Control" Midi input device.
- Application switches to PLAY mode, just as if user had performed the operation with a mouse-click.
- Application sends Transport Update message to "US-224 Control" Midi output device, which is sent via USB to the US-224.
- US-224 interprets transport-update command, and responds by activating the PLAY LED.

In this example, the US-224 doesn't "know" the state of the transport. It has simply sent command indicating the button-press, and responded to the transport-update command from the host by lighting the appropriate transport LED.

Transport/Locate command set

The US-224 contains a set of standard transport switches: REW, FFWD, STOP, PLAY, and REC. In addition, dedicated status LED's are used to communicate the current transport state to the user. The LED's indicate REW, FFWD, PLAY, and REC. (Note that there is no LED to indicate STOP.) Additionally, there are three locate switches, which can be used to set and locate to markers established on the host application's timeline. SET is intended to be used as a SHIFT key, along with either the < or > button to drop a marker at the application's current time.

US-224 to Host Messages (transmitted at button-down):

- TRANSPORT_REWIND
    o Button-down: BF 13 7F
    o Button-up: BF 13 00
- TRANSPORT_FFWD
    o Button-down: BF 14 7F
    o Button-up: BF 14 00
- TRANSPORT_STOP
    o Button-down: BF 15 7F
    o Button-up: BF 15 00
- TRANSPORT_PLAY
    o Button-down: BF 16 7F
    o Button-up: BF 16 00
- TRANSPORT_REC
    o Button-down: BF 17 7F
    o Button-up: BF 17 00
- LOCATE_LEFT (non CS-10)
    o Button-down: BF 18 7F
    o Button-up: BF 18 00 7.
- LOCATE_RIGHT (non CS-10)
    o Button-down: BF 19 7F
    o Button-up: BF 19 00
- SET_LOCATE (non CS-10)
    o Button-down: BF 1A 7F
    o Button-up: BF 1A 00

Host to US-224 Messages (transmitted when host transport-state changes:

- UPDATE_TRANSPORT_LED:

    o State is REWIND: F0 4E <UNIT> 12 01 13 <STATE> F7
    o State is FFWD: F0 4E <UNIT> 12 01 14 <STATE> F7
    o State is STOP: F0 4E <UNIT> 12 01 15 <STATE> F7
    (Note: US-224 has no STOP LED: message is defined for future devices)
    o State is PLAY: F0 4E <UNIT> 12 01 16 <STATE> F7
    o State is REC: F0 4E <UNIT> 12 01 17 <STATE> F7

Where:
- <UNIT> is device ID. Should be transmitted as 0 for now.
- <STATE> == 0 turns LED OFF
- <STATE> == 7F turns LED ON

Per-channel Control command set

The US-224 includes a set of 4 channel-strip controls and LED's. Each channel-strip includes the following controls:

    a.   linear fader for gain control
    b.   Mute/Solo switch and LED
    c.   Record-enable LED
    d.   Select switch and LED

Three modifier switches affect the channel strip indicators:

    a.   A momentary NULL switch and LED (to aid the user in matching the fader sliders with the "virtual" value maintained by the application software). When the application receives a NULL button-down message, it compares its internal fader values with the most recently-received physical fader positions for the currently- active bank of eight channels, and sends out messages which light the REC and SELECT LED's to indicate the direction the user needs to move each of the faders to agree with the application's virtual fader levels. When the user releases NULL, the application sends REC and SELECT LED update messages which will cause them to revert to their "native" function (indicating record and channel-select status).

    b.   A REC (record) button which acts as a "shift" key, enabling the track select switches to affect the record-enable status of the corresponding track in the application software.

    c.   A MUTE/SOLO mode button, which toggles the function of the mute buttons and indicators, making them activate a SOLO function on their associated track.

US-224 to Host Commands:

    1.   FADER_POSITION: BF 4x vv x = [0..3], vv = [0..3F]
    2.   MUTE_SWITCH:
           a.   Button-down: BF 0x 7F
           b.   Button-up: BF 0x 0 x=[0..3]
    3.   SELECT_SWITCH:
           a.   Button-down: BF 2x 7F
           b.   Button-up: BF 2x 00 x=[0..3]
    4.   NULL_SWITCH
           a.   Button-down: BF 28 7F
           b.   Button-up: BF 28 00
    5.   REC_EN_SWITCH:
           a.   Button-down: BF 29 7F
           b.   Button-up: BF 29 00
    6.   SOLO_SWITCH:
           a.   Button-down: BF 2A 7F
           b.   Button-up: BF 2A 00

Note: In these messages, <STRIP #>is a number in the range [0..3], corresponding to the channel-strip #, and <STATE>is either 0x00 (LED OFF) or 0x7F (LED ON) . Transmit<UNIT> as 0 for now.

1. UPDATE_MUTE_LED: F0 4E<UNIT>12 02<STRIP #> <STATE> F7
2. UPDATE_SEL_LED: F0 4E<UNIT> 12 03<STRIP #> <STATE> F7
3. UPDATE_REC_LED: F0 4E<UNIT> 12 04<STRIP #> <STATE>F7
4. UPDATE_NULL_LED: F0 4E<UNIT> 12 05 <STATE> F7
5. UPDATE_SOLOMODE_LED: F0 4E<UNIT> 12 06 <STATE> F7

Note: following message forces US-224 to send current fader position messages to host via the US-224 Control Port

6. DUMP_FADER_POS: F0 4E<UNIT>12 10 <STRIP #> <STATE>F7

Bank-Switching Command Set

The US-224 has two switches that allow the user to select the bank of application channels that is addressed by the four channel-strips. For example, an application with 32 virtual tracks would define eight banks of four channel strips each. The Bank-L and Bank-R switches let the user quickly shift the control surface to address any bank of four channels. There are two LED's adjacent to the Bank-L and Bank-R switches, which indicate that pressing the button will cause the application software to switch to the next lower or higher bank, respectively. It is OFF when there are no further virtual fader banks available in that direction.

US-224 to Host Commands

- BANK_LEFT:
    o Button-down: BF 10 7F
    o Button-up: BF 10 00
- BANK_RIGHT:
    o Button-down: BF 11 7F
    o Button-up: BF 11 00

Host to US-224 Messages:

1. UPDATE_BANK_LEFT_LED: F0 4E<UNIT> 12 07<STATE> F7
2. UPDATE_BANK_RIGHT_LED: F0 4E<UNIT> 12 08<STATE> F7

where<STATE> is either 0x00 (LED OFF) or 0x7F (LED ON) <UNIT>is device ID. Should be transmitted as 0 for now.

Continuous data wheel

A data wheel is provided for general-purpose parameter modification. In addition to the pan level setting described above, the data could be used for scrubbing, locating, or any other purpose the application programmer desires.

US-224 to Host Commands:

   DATA_WHEEL (identical to JL Cooper CS-10)
         a.   BF 60 vv, vv = 2's complement using 7 data bits

Host to US-224 Messages:

UPDATE_ASN_LED: F0 4E<UNIT> 12 0F<STATE> F7

where

<UNIT> Transmit as 0 for now.
<STATE> is either 0x00 (LED OFF) or 0x7F (LED ON)
.

Appendix C - US-224 Technical Specifications

General

Frequency Response
20 Hz - 20KHz 1.0 dB / -3.0 dB
LINE INPUT A/B to LINE OUTPUT
TRIM min., +4 dBu input
LINE OUTPUT level max.

Noise Level
Better than 92 dB A Weight
MIC INPUT A/B to LINE OUTPUT
TRIM min., 150 ohm terminated
LINE OUTPUT level max.

Signal Processing Delay
Less than 2 ms
MIC/LINE to LINE OUT Input Monitor
Fs = 44.1KHz

THD
Better than 0.01%
MIC INPUT A/B to LINE OUTPUT
0 dBu input TRIM min.
LINE OUTPUT level max.
LINE INPUT A/B to LINE OUTPUT
TRIM min., +20 dBu input
LINE OUTPUT level max.

Crosstalk
Better than 85 dB at 1KHz
LINE INPUT A/B to LINE OUTPUT
TRIM min., +4 dBu input
LINE OUTPUT level max.

Click: Less than -35 dBu
Fader Attenuation: Better than -90 dB at 1 KHz
Mute Level: Better than -90 dB at 1 KHz

Dimensions:
12" x 8.3" x 2.4" (30.4 x 21.1 x 6.2 cm)
Weight (unit itself): 0.85 Kg (1.9 lbs)

Power Consumption: 2W

MIC INPUT A/B (Analog)
Connector: XLR-3-31
(1:= GND, 2:= Hot, 3:= Cold) : Balanced
Input Impedance: 2.2k ohm
Nominal Input Level (TRIM max.): -54 dBu
Nominal Input Level (TRIM min.): -16 dBu
Maximum Input Level: 0 dBu (TRIM min.)

LINE/GUITAR INPUT A/B (Analog)
Connector: 1/4"
(Tip:Hot; Ring:Cold; Sleeve:GND)
(Balanced at LINE, Unbalanced at GUITAR)
Input Impedance 22k ohm at LINE
                                  680k ohm at GUITAR
Nominal Input Level (Trim max.):
-34 dBu at LINE
-48 dBV (-36.8 dBu) at GUITAR
Nominal Input Level (TRIM min.):
+4 dBu at LINE
- 10 dBV (-7.8 dBu) at GUITAR
Maximum Input Level (TRIM min):
+20 dBu at LINE
+6 dBV (+8.2 dBu) at GUITAR

LINE OUTPUT (Analog)
Connector: RCA pin jack, Unbalanced
Output Impedance: 100ohm
Nominal Output Level: -10 dBV (-7.8 dBu)
(LINE LEVEL -10dB)
Maximum Output Level: +6 dBV (+8.2 dBu)
(LINE LEVEL max)

PHONES output (Analog)
Connector: 1/4" TRS Stereo
(Tip:L, Ring:R, Sleeve:GND)
(when nominal impedance 40 Ohms loaded)
Maximum Output Power: 10m W + 10m W
Maximum Output Level: +6 dBV (+8.2 dBu)

DIGITAL IN
Connector: RCA pin jack
Format: IEC60958 Type2
Input impedance: 75 ohm
Input Level: 0.5Vp-p

DIGITAL OUT
Connector: RCA pin jack
Format: IEC60958 Type 2
Output Impedance: 75 ohm
Output Level: 0.5Vp-p

MIDI IN
Connector: 5P DIN
Format: Standard MIDI Format
MIDI Out
Connector: 5P DIN
Format: Standard MIDI Format
USB
Connector: USB Down stream connector
Format: USB Version 1.1

ADC / DAC
AD/DA Converter
24Bit, 64 times oversampling
Delay: 17 samples (ADC), 15.4 samples (DAC)

Audio Performance

MIC INPUT (A, B XLR Analog INPUT to DIGITAL OUT)
Frequency Response
20 Hz - 20KHz + 0.5dB / -1.0 dB
TRIM min., -16 dBu input
S/N
Better than 93 dB A Weight
TRIM min., 150 ohm terminated
LINE OUTPUT max.
T.H.D.
Better than 0.007% at 1kHz
TRIM min., 0 dBu input

LINE INPUT (A, B 1/4" Analog INPUT to DIGITAL OUT)
Frequency Response
20 Hz - 20KHz, +0 .5 dB / -1.0 dB
TRIM min., +4 dBu input
S/N
Better than 93 dB A Weight
TRIM min., 150 ohm terminated
LINE OUTPUT max.
T.H.D
Better than 0.007% at 1KHz
TRIM min., +20 dBu input

LINE OUTPUT (DIGITAL IN to LINE OUTPUT)
Nominal Output: +6dBV
0 dBFs input, LINE OUTPUT max.
Frequency Response:
20 Hz - 20KHz, +0.5 dB / -1.0 dB
–16 dBFs input, LINE OUTPUT max.
S/N:
Better than 97 dB A Weight, 0 dBFs input,
LINE OUTPUT max.
T.H.D.
Better than 0.007% at 1KHz
TRIM min., 0 dBFS input
LINE OUTPUT max.

PHONES Output
Maximum Output: More then 10m W + 10m W at 1KHz, 40 ohm loaded
Frequency Response:
100 Hz - 20KHz, +1.0 dB / -3.0 dB
Nominal level, 40 ohm loaded
T.H.D.: Better than 1 %
1KHz, Output 10m W + 10m W, 40 ohm loaded

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US-224