TASCAM

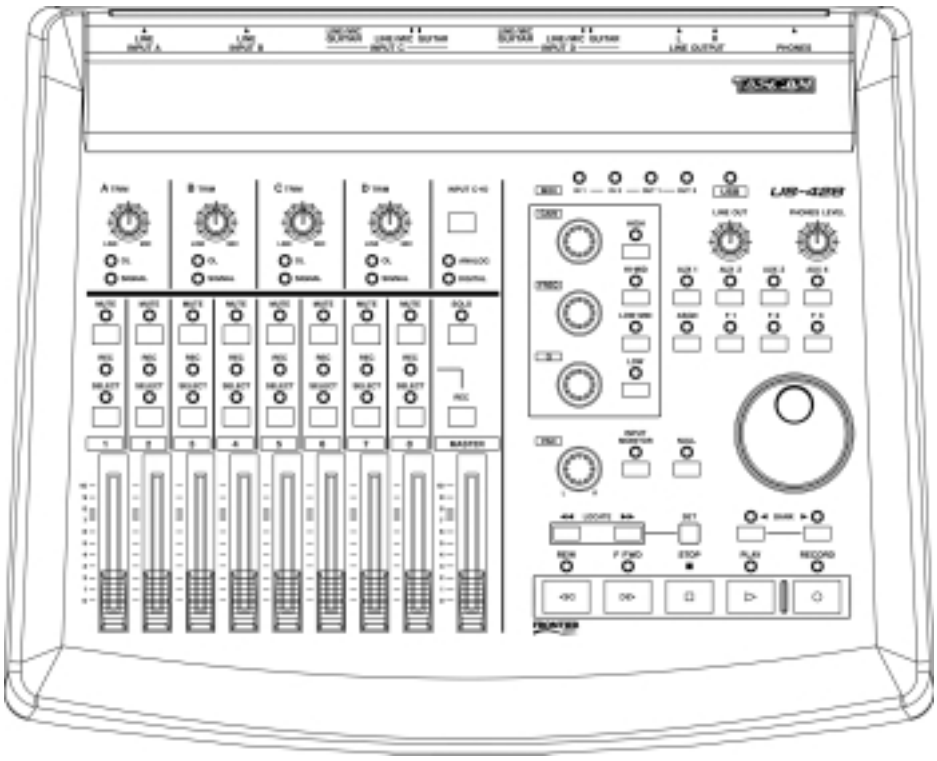
TEAC Professional Division

FRONTIER DESIGN GROUP

US-428

Version 3.0 Edition

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 re-fit 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, ANSI/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.

"Note to CATV system installer:
This reminder is provided to call the CATV system installer's attention to Section 820-40 of the NEC which provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as practical.

Declaration of Conformity

Model Number : US-428
Trade Name : TASCAM
Responsible Party: TEAC AMERICA, INC
Address : 7733 Telegraph Road, Montebello, California, U.S.A.
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.

Contents

1. Introduction

1.1 Overview

The US-428 is a USB controller primarily designed for Digital Audio Workstation (DAW) software applications. Its design incorporates a four-input, two-output 24-bit audio interface, a dual 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-428.

Because the US-428 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 up to four simultaneous tracks of audio into your computer. Inputs include two balanced XLR mic inputs, two balanced 1/4" TRS 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-428 also features two independent MIDI I/O ports, allowing you to send and receive data and MIDI Time Code from your MIDI-based keyboards and other devices. You can, for example, use one port for MIDI modules and devices, and the other to synchronize your MIDI Time Code capable Portastudio, DTRS or other multitrack tape machine with your digital audio software.

The US-428'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 eight channel faders (plus one master fader), eight mute buttons, a switch to toggle Solo and Mute functions, and individual record-ready and select switches. The master section features four Aux Sends, a dedicated EQ module (with continuous controllers for level, frequency and Q, as well as four band-selection buttons), a data wheel and four application-defined soft keys. Dedicated transport and locate controls offer one-button access to these often-used functions.

1.3 Special Note Regarding Programming of the US-428

The many faders, switches and other controls on the US-428 make it an extremely versatile device. The basic operational premise behind the US-428

is that of a simple controller unit; that is, most of the hardware controls on the US-428 are sending out simple MIDI controller messages to and from the host computer's audio application. For simplicity's sake, this manual details the US-428's operation in conjunction with Steinberg's Cubasis VST (which is included with the US-428); however the basis of the US-428's MIDI control protocol allows other applications to readily send and receive US-428 control surface messages. Thus the US-428 can be used to control a wide variety of applications, from DAWs to virtual synths, video editing programs and more.

In many cases, communication with a particular application can be accomplished using the application's ability to redirect or "map" the US-428 control surface messages to the application. By making the programming specifications publicly available both in this manual and on our website, TASCAM has encouraged the creation of new applications for the US-428. Setup and operation with many other currently supported applications are also described in section eight of this manual. As support is added for additional applications, we will be posting up-to-date news and details on our website at www.tascam.com. There you'll also find an online users' group, where users will be encouraged to post MIDI maps of their own creation, and TASCAM product specialists will be on line to help answer questions and field suggestions.

1.4 What's in the package

The US-428 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-428 Controller
- AC Adaptor PS-P428 (7.5 VAC, 1000 mA)
- USB Cable
- CD-ROM containing driver software and Cubasis VST

1.5 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-428.

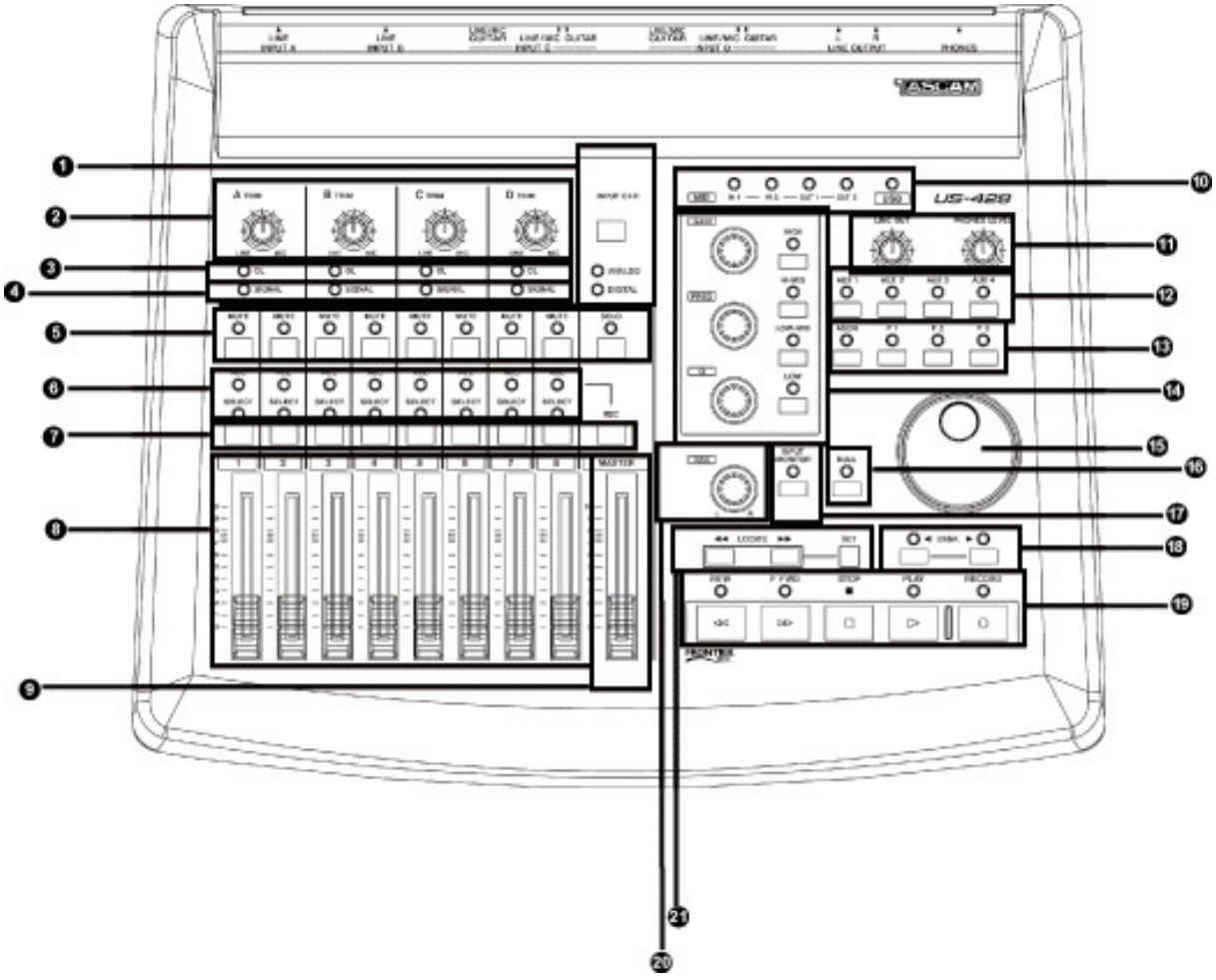
BOLD CAPS will be used to designate physical connectors on the US-428

Italics will be used to designate software dialog messages

Underlined Italics will be used to designate software menu functions and on-screen controllers.

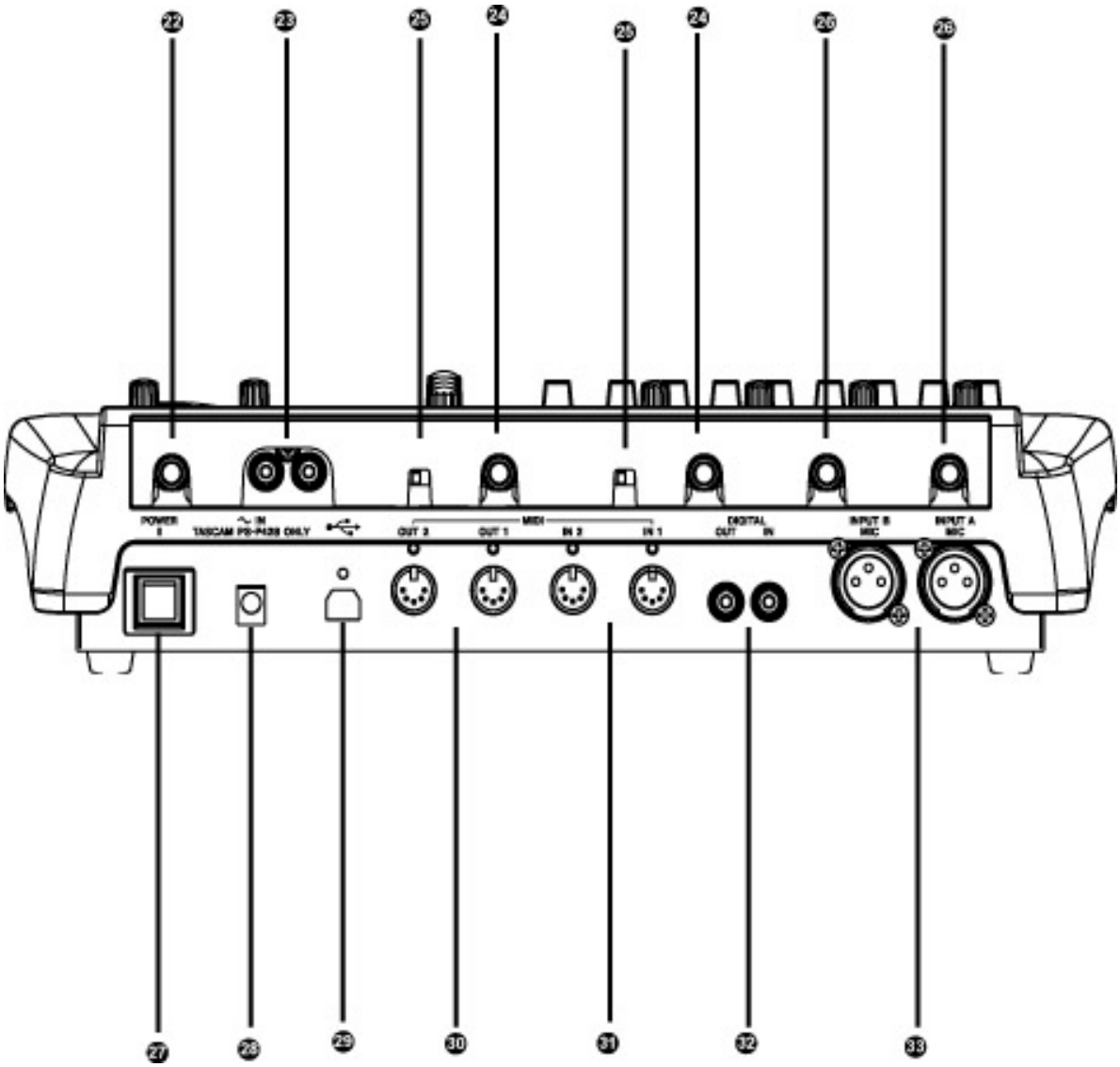
2. Controls and Indicators

2.1 Front Panel



1 INPUT C/D Select and LEDs
2 INPUT Trim Pots
3 OVERLOAD LED
4 SIGNAL LED
5 Channel MUTE and SOLO switches and LEDs
6 REC and SELECT LEDs
7 REC and SELECT switches
8 CHANNEL faders
9 MASTER fader
10 MIDI and USB Status LEDs
11 LINE OUT and HEADPHONES Level Controls
12 AUX 1 through 4 Select Switches
13 User Soft Keys
14 EQ Module
15 Data Wheel
16 Fader NULL
17 INPUT MONITOR
18 BANK Selection Switches
19 TRANSPORT Controls
20 PAN Control
21 LOCATE Controls

2.2 Rear Panel



22 **PHONES** jack
23 **OUTPUT** L/R jacks
24 **INPUT** C and D
25 **LINE/MIC / GUITAR** switch
26 **INPUT** A and B
27 **POWER** switch
28 **POWER** jack
29 **USB** jack
30 **MIDI Out** 1 and 2
31 **MIDI In** 1 and 2
32 **Digital** In and Out
33 **MIC INPUT** A and B

2.3 Front Panel Descriptions

1. INPUT C+D button
toggles inputs C and D between the unbalanced analog inputs (1/4") and the digital S/PDIF inputs.

ANALOG LED
indicates analog signal input to inputs C and D.

DIGITAL LED
indicates digital signal input (via S/PDIF) to inputs C and D. When glowing steadily, indicates valid digital input. When flashing, indicates an input error on the digital inputs. Refer to the ASIO control panel for error details.

2. INPUT TRIM A - D
input level adjustment. Rotate clockwise to increase input level of analog sources.

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

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

5. MUTE switch
toggles mute or solo status for selected channel.

MUTE LED
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.

6. SELECT LED
indicates selected status of channel.

REC LED
indicates record status of selected channel.

7. SELECT button
selects channel for editing, recording, etc.

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

8. CHANNEL FADERS 1 through 8
send continuous controller information for banks of eight faders, as selected by the BANK switch.

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

10. MIDI In LED's 1 & 2
indicates presence of incoming MIDI data at MIDI input 1 or 2.

MIDI Out LED's 1 & 2
indicates transmission of MIDI data from MIDI output 1 or 2.

USB LED
indicates an active USB connection.

11. LINE OUT
controls the level to the RCA (analog) outputs.

HEADPHONE OUT
controls the level to the headphone outputs.

12. AUX 1 through 4
selects the host application's auxiliary sends 1 through 4.

13. ASGN
Application specific key.
(In Cubasis, ASGN + Aux 1 or 2 will enable the Aux Send for the selected channel. ASGN + EQ band switch will enable the EQ for the selected channel.)

F1 through F3
Application specific function keys. In Cubasis VST, these keys perform the following functions:
F1 - Open Audio Mixer window (when Bank 1 is selected); open MIDI Mixer (when Bank 2 or 3 selected).
F2 - Open VST FX Send window.
F3 - Toggle between open windows.

14. EQ GAIN
controls the gain level of chosen band of EQ in the host program's internal EQ.

EQ FREQ
controls the center frequency of chosen band of EQ in the host program's internal EQ.

EQ Q
controls the bandwidth surrounding the center frequency of the chosen band of EQ in the host program's internal EQ.

EQ HIGH
selects the highest band of EQ in the host program's internal EQ (up to a maximum of four bands).

EQ HI MID
selects the upper midrange band of EQ in the host program's internal EQ (up to a maximum of four bands).

EQ LO MID
selects the lower midrange band of EQ in the host program's internal EQ (up to a maximum of four bands).

EQ LOW
selects the lowest band of EQ in the host program's internal EQ (up to a maximum of four bands).

15. DATA Wheel
sends continuous controller information to application. (In Cubasis, functions as a shuttle wheel if no AUX LED's are lit, or as Aux Send level if Aux key is selected.)

16. Fader NULL
when pressed, disengages physical faders from the application. Used to match US-428'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-428's fader position relative to the associated channel in Cubasis' mixer.

17. INPUT MONITOR
toggles Input Monitor adjust mode. When the associated LED is on, the FADER and MUTE switches for channel strips 1,2,3 and 4 control the level of Inputs A,B,C and D to the US-428's stereo output.

18. BANK Selector
pages between successive banks of eight faders.

19. REW
transport rewind.

FFWD
transport fast forward.

STOP
transport stop.

PLAY
transport play.

RECORD
transport record.

20. PAN
controls L-R panning on selected track.

21. 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.

2.4 Rear Panel Descriptions

22. PHONES jack
standard 1/4" stereo headphone output.

23. OUTPUT L/R jacks
unbalanced (RCA) analog audio output of stereo bus.

24. INPUT C and D
unbalanced analog inputs C and D.

25. LINE/MIC / GUITAR switch
switches between line level and Hi-Z (inputs C & D).

26. INPUT A and B
balanced analog inputs A and B.

27. POWER switch
push on/push off power switch.

28. POWER jack
input for AC Adaptor PS-428

29. USB jack
input for USB connection to host computer.

30. MIDI Out 1 and 2
MIDI outputs 1 and 2.

31. MIDI In 1 and 2
MIDI inputs 1 and 2.

32. Digital In and Out
S/PDIF digital input and output.

33. MIC INPUT A and B
Balanced XLR Inputs A and B.

3. Installation

3.1 System Requirements

PC: Minimum requirements: Pentium 200 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-428 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)

The following chipsets have been successfully run with the US-428:

- 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-428, occasionally some older OHCI systems will exhibit problems. We have found that, in the majority of these 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.

Illustration 3.01 - Determining your USB Controller

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-428 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-428. 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-428 is a USB device, connection is pretty straightforward. Simply plug the USB cable into the US-428, 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-428 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-428 v3 drivers are available on the CD as executable installers. You'll find two executable installer files on the disk, labeled as "**US428_Win9x_Install_3_05.exe**" (for Windows 98 Second Edition and Millennium Edition) and "**US428_Win2k_Install_3_05.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-428 drivers.

Also included on the CD are previous (v2.0) drivers for your convenience.

To install under Win98SE or ME:

Note: The US-428 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-428 turned OFF.

- Double click on the executable file **US428_Win9x_Install_3_05.exe**. (The blue US-428 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 "US428WDM.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-428 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-428 is ready to operate.

To install under Win2K or Windows XP:

Note: Run the Installer with US-428 turned OFF.

- Double click on the executable file **US428_Win2k_Install_3_05.exe**. (The blue US-428 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-428 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-428 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-428 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

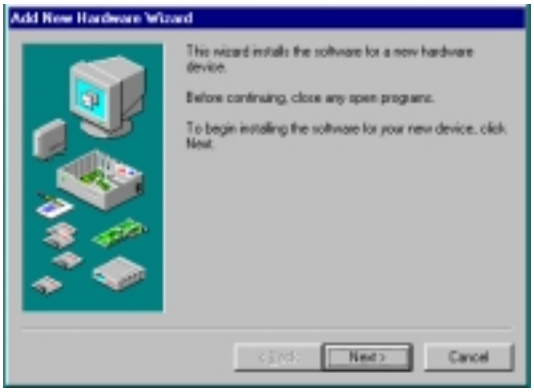


Illustration 3.02 - Windows 98 New Hardware Wizard

3.2.2 Macintosh

- Insert the CD-ROM into the computer, double-click on the US-428 installer, and follow its instructions.

- Connect the US-428 to the computer, and connect power to the unit. When the US-428 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-428 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-428:

- 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-428 Drivers" folder, which was placed on your desktop when you ran the US-428 installer. In this folder, locate the US-428 OMS driver. Drag the US-428 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-428 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 four icons pertaining to the US-428 specifically: the US-428 icon, US-428 MIDI ports 1 and 2, and US-428 Control port.

(Ports 1 and 2 correspond to the US-428's physical MIDI ports. US-428 Control is the "virtual" MIDI port with which the US-428 and its control surface communicate with your host application.)

Once OMS setup is successfully completed, you can proceed with setting up the US-428 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)

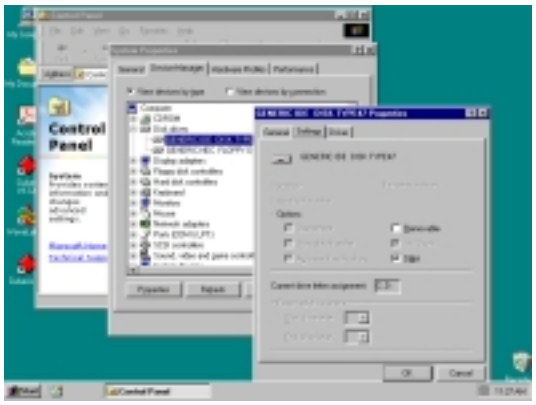


Illustration 3.03 - Enabling DMA on your IDE drives

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-428 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-428. 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-428. (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-428 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-428

4.1 Hooking up audio

To monitor output from your computer, connect the analog outputs of the US-428 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-428's S/PDIF output.

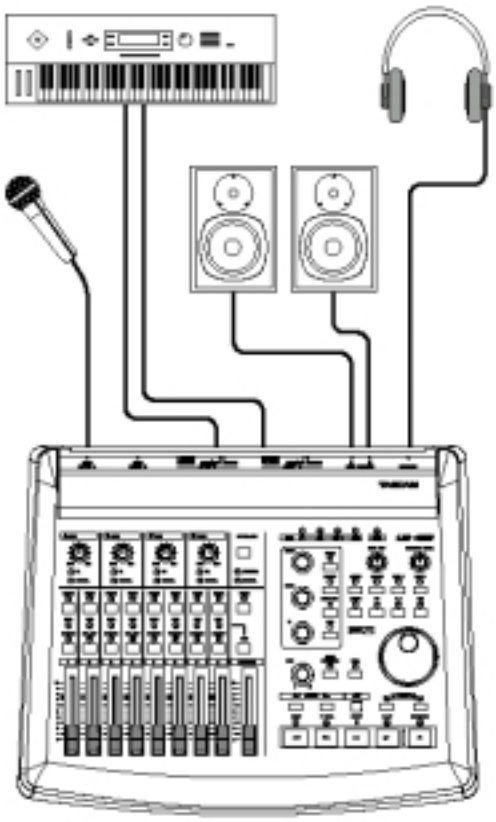


Illustration 4.01 - Connecting audio to the US-428

To record audio from the US-428 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-428 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 four LINE INPUTS (A through D). If you wish to plug in a guitar, bass, or other high-impedance source, simply use input C or D, and move the sliding switch next to the input connector 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 or balanced TRS (1/4") line-level inputs. While both sets of inputs are capable of functioning simultaneously, 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 C and D are switchable between the unbalanced 1/4" analog inputs C and D and the S/PDIF digital input. The input source is selected by pressing the INPUT C+D switch.

Input level for analog sources is regulated by the TRIM level pots (diagram), located directly above the

faders. To use digital audio input, switch the INPUT C+D selector to Digital. The INPUT C and D 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 C and D, you will need to reduce the output level of your digital source.

A note about levels and gain structure here. The TRIM controls directly affect the input level at the A/D converters on the US-428, 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-428'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.

4.2 Hooking up MIDI

The two MIDI in and out jacks are independent, giving you a total of 32 channels of MIDI I/O. Simply connect the MIDI out of your keyboard or other device to a MIDI in jack on the US-428, and vice versa. If you've got a MIDI sync box, you can dedicate one of the two MIDI I/O's to sending and receiving 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.

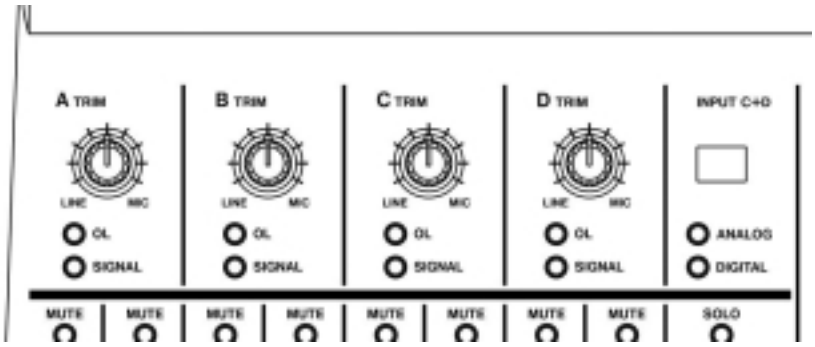


Illustration 4.02 - Input trims and level indicator LED's

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-428 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 four channel faders control the input levels of inputs A, B, C or D to the US-428’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 four MUTE buttons also affect the four inputs, and PAN is also available in this mode; the four inputs come up panned to center, but can be SELected and PANned anywhere within the stereo field.

NOTE: *In INPUT MONITOR mode faders 5-8 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-428’s analog inputs, only the TRIM controls actually affect the input level to the audio software application. When using the US-428’s Digital inputs, the digital audio data received at the US-428’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-428, 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-428 Control Panel

5.1 Main Page

In the Control Panel's main page, you can specify a number of options of the US-428's ASIO handling.

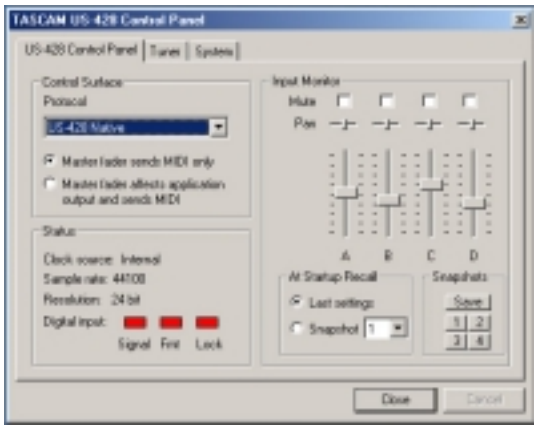


Illustration 5.01 - Control Panel Main Page

The *Control Surface Protocol* setting governs the type of MIDI messages used to send fader and button information from the US-428 to applications. The corresponding drop-down box allows you to select from a number of options, including US-428 Native, JL Cooper CS-10 emulation (both standard and Pro-Tools specific), Native Instruments B4, and two different Four Controller Banks modes. For more information on the various "non-native" modes, refer to the specific chapters pertaining to these applications and uses. For use with most DAW applications, it's recommended that you leave the default "US-428 Native" selection.

The *Master Fader always* sends changes in position via MIDI. It can also be used to make the US-428 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 *Status* area provides a view of the US-428'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-428 INPUT MONITOR mixer. Here you can

control the level and position of each US-428 input as it will appear on the LINE OUTPUT, DIGITAL OUT, and PHONES connectors. Three controls (level, pan and mute) are available for each input A, B, C and D. Note that these controls can also be changed from the US-428 by pressing the INPUT MONITOR switch on the unit, and using channel strips 1-4. If you make the changes this way, the controls displayed in the US-428 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-428 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-428 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-428 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 initial driver for the US-428 had a fixed buffer size. This version of 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-428’s hardware input monitor, which is always less than an ultra-low 1.5 ms.

To adjust the buffer size, run the US-428 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-428 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.

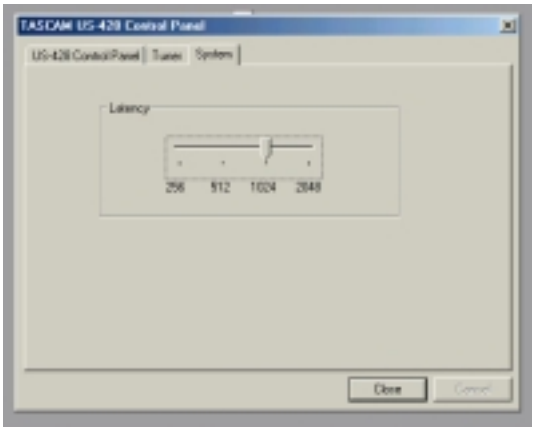


Illustration 5.02 – System Tab

5.3 The Chromatic Tuner

Open the US-428's control panel and select the "Tuner" tab.

In the "Input" section, select the US-428 input channel that you want to tune (A, B, C, or D).

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.

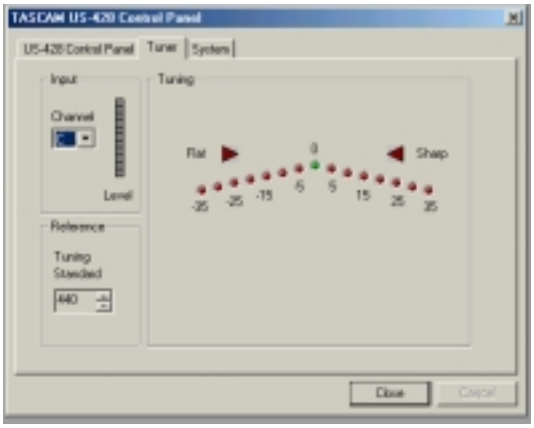


Illustration 5.03 – The Chromatic Tuner Page

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-428 with an audio software application. It's important to note that different programs will implement some of the features described here differently. As it would be beyond the scope of this manual to detail the operation of each individual program, we'll discuss the concepts presented here as they relate to the operation of the US-428 with the Cubasis VST audio software included in the US-428 package. Details on using the US-428 with a number of other applications may be found in section eight of this manual. Please refer to the manual for your particular audio application for further details.

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

6.1 Selecting the US-428 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 *Syste*m. Select the *ASIO Device* pull-down menu, and select *ASIO US-428 Driver.* If your software only supports 16 bit recording, a 16 bit driver has also been included.

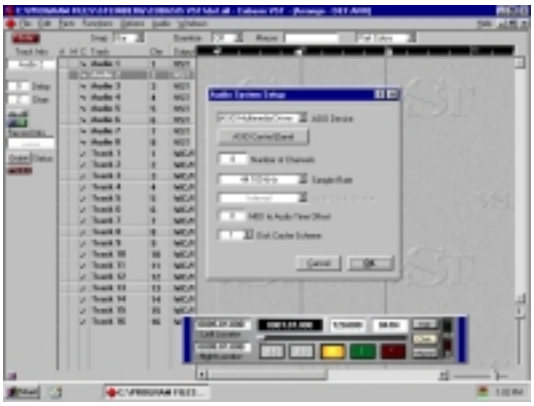


Illustration 6.01 - Cubasis Audio Control Panel.

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-428 Control Panel will appear. In Cubasis, make certain the protocol is set to US-428 Native Mode. Refer to chapter five, US-428 Control Panel for information on these settings.

6.1.3 VST Remote

In Cubasis, the program will automatically recognize the US-428 as a remote controller unit. In most other applications, you will need to select the US-428 as the program's remote control. 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-428 Control Port" and the "Remote" setting should match the setting chosen in the US-428 Control Panel (see illustration 6.03).

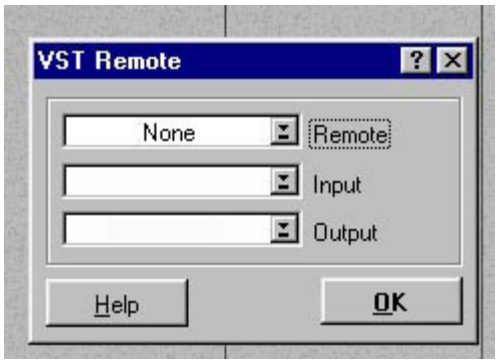


Illustration 6.03 - Cubase VST Remote Panel

6.2 Setting the Sample Rate and Bit Depth

The US-428 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-428 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).

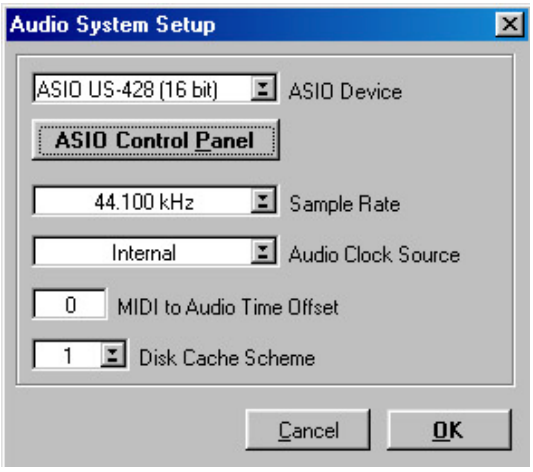


Illustration 6.04 - VST/24 Audio Control Panel

6.3 Input Enabling

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

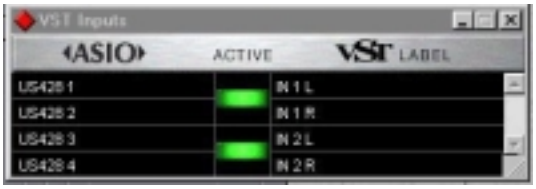


Illustration 6.05 - Input window

NOTE: *Cubasis supports only one input for recording (though this can be a mono or stereo track). To fully utilize the US-428's four input capabilities, you'll need to run it with a full version of Cubase VST, Emagic Logic, Cakewalk, or another application that supports multiple inputs on record.*

Then select the inputs on Cubasis' internal mixer. Hold Control and left click on the input selector above the channel strip, and select the desired input. 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)

Illustration 6.07 - Record Enable

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-428. Cubasis will issue a one or two bar countoff (depending on what's set in Cubasis' Metronome preferences menu), then commence recording.

6.4 Transport Controls and Locate Points

The transport controls on the US-428 are set up to directly correspond to the on-screen transport controls in Cubasis. So, for example, pressing PLAY on the US-428 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, when AUX is not selected, will also act as a shuttle wheel for the transport. Rotating the wheel clockwise will advance the song position forward, and rotating it counter-

clockwise will move the transport backward.

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-428 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 EQ controls

The US-428 control surface has dedicated EQ controls that let you make changes to the setting on up to four bands of EQ in the internal mixer of your audio recording program. In the case of Cubasis, the US-428's LOW and HIGH EQ buttons address the lower and upper

bands of Cubasis' two bands of internal EQ, respectively.

Press one of the EQ band selection buttons (LOW, LOW-MID, HI-MID or HIGH) to activate the associated band of internal EQ in the software. Once you have activated a particular band, the EQ GAIN control regulates the amount of equalization, in dB, which is added or subtracted from the signal. The EQ FREQ controls the center frequency around which the EQ cut or gain is centered. The EQ Q controls the width of the band of frequencies affected by the EQ GAIN control.

To open a selected channel's EQ panel via the US-428, press one of the EQ selection buttons and then the SELECT key on any channel, and the EQ/Aux Send panel for the selected channel will open.

Illustration 6.10 - EQ Control Panel in Cubasis

Illustration 6.11 - EQ Control Panel in VST/32

6.7 Aux Buttons

The AUX buttons 1 through 4 select the corresponding *AUX SEND* in the software. When an AUX LED is illuminated, the selected AUX level is controlled via the DATAWHEEL. To open a channel's Aux Send panel in Cubasis, press one of the AUX SEND buttons, and then the SELECT key on any channel; the EQ/Aux Send panel for the currently selected channel will open.

6.8 Data Wheel

The DATA WHEEL acts as a continuous controller, and is capable of a variety of functions. In Cubasis, when an AUX LED is illuminated, the level of the selected AUX Send is controlled via the DATAWHEEL. When no AUX LED's are selected, the DATAWHEEL functions as a shuttle wheel, moving the transport in the direction the wheel is turned.

6.9 BANK Controls and FADER NULL

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

The US-428 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-428 is now out of position with the associated channel's fader in Cubasis. Pressing the FADER NULL button will disengage the US-428's faders from the program, allowing you to move the US-428'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.

6.10 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-428 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-428 and Cubasis.

NOTE: This chapter is intended as a quick start guide toward recording and mixing with Steinberg Cubasis and the US-428. 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-428 CD. You'll find Windows and MacOS versions.

7.1 Setting Up

Before starting Cubasis, make sure that the US-428 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-428 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-428, or disconnect the power supply. Also, you should not disconnect or connect the cables of the US-428 or any other USB equipment while Cubasis VST is running.

If you launch Cubasis or another audio program before the US-428 has been initialized, the software will not "see" the US-428 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-428.

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-428 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-428 as your audio device (see "Selecting the US-428 as your audio device" in previous chapter.) If you don't see the US-428 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 (INPUT C and D set to DIGITAL), 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-428 control surface and LEDs, but if you're using another program, you will probably need to select the "US-428 Control Port" MIDI In and Out devices in that program's MIDI Setup menu.

If you're using the US-428's internal MIDI interface, you'll need to enable it in the Options/MIDI Setup menu. Each of the US-428's independent MIDI Ins and Outs can be enabled separately. 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-428. 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-428. In the Audio menu, select Input, and click on the input pair (or pairs, in Cubase VST) you'll be using on the US-428. 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: All four will only appear if you've enabled their Inputs, as described above. 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-428 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-428. 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-428's outputs, while recording additional tracks into Cubasis via the US-428'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-428. When the corresponding LED is illuminated, channel strips 1,2,3 and 4 can be used to adjust the level, pan and mute status of inputs A, B, C and D, respectively. This will enable the first four 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-428. Make certain you've got the correct bank selected - the small on-screen window that indicates "VST Mixer 1-8", or "GM 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-428 also indicate the selected bank:

- VST Mixer = ⏪ only
- GM Mixer 1-8 = ⏪ and ⏩
- GM Mixer 9-16 = ⏩ only.

You can change the level of a track by adjusting its corresponding fader on the US-428 control surface. To adjust other parameters on a particular channel, first press the SELECT key for that channel on the US-428. The selected channel will be highlighted below that channel's fader on the screen.

Moving the channel fader on the US-428 will adjust the relative volume of the selected channel in Cubasis. The corresponding fader on screen will update as you move the US-428's fader.

The PAN control on the US-428 will pan the selected channel from Left to Right on the stereo buss. To open the EQ panel, select the desired channel and then press ASGN and select any of the four bands of EQ on the US-428's EQ pod. The EQ's level, center frequency and Q can then be controlled via the US-428's EQ knobs.

To select a channel's FX sends, select the desired channel and then press ASGN and select any of the four AUX buttons. The level of the Aux send is controlled via the DATA WHEEL.

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, EQ and FX settings and changes, panning, etc., 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 Operational Modes

As we've mentioned throughout this manual, the US-428 is an extremely versatile device. Its capabilities as a controller go well beyond those we've described thus far with the bundled Cubasis program. Clearly it would be impossible to fully document the US-428's operational details with each application, but we've attempted in this chapter to give a brief overview of some of the many other currently supported operational modes and interfaces of the US-428.

It's also important to note that the US-428 is fully functional as a 16- and 24-bit audio interface and 32 channel MIDI interface with virtually all Windows and MacOS compatible applications. Even those applications which do not support the US-428 as a controller can still use the US-428 as an audio MIDI interface.

Since the US-428's release, TASCAM has been working together with developers from all over the professional audio industry to create support for new applications with the US-428. While we've included documentation on a number of currently supported applications here, the development of new support for the US-428 is ongoing and expanding. We recommend you visit the US-428 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 Cubase VST - Windows

The US-428 is fully supported under Cubase v5.xx for Windows, including ASIO 16 and 24 bit drivers and control surface mapping. Note that the US-428 is fully functional as both an audio and 32 channel MIDI interface in earlier versions of Cubase as well. In the previous version (v3.7x), partial functionality of the controller surface is supported; however, to fully utilize the features of the US-428 under Cubase VST, it is necessary to run v5.00 or later.

The full version of Cubase VST (as well as VST Score and VST/32) support a four band fully parametric EQ on each channel. Of course, it's supported on the US-428 - each of the four bands of VST are controlled by the four associated EQ band selector buttons.

Before setting up the US-428 to work with Cubase, please install the US-428 v 3.0 drivers. Begin the setup procedure below with the US-428 plugged in and powered on. If you have not already done so, install Cubase VST

NOTE: Several revisions and bug fixes were implemented in subsequent updates to VST 5. We suggest you visit Steinberg's website and make sure you've got the most current version.

Installing under Cubase 5.0 and later:

- Open the Cubase application.
- From the **OPTIONS** pulldown menu, choose **REMOTE SETUP / SETUP**.
    - Under **REMOTE**, select US-428.
    - Select **US-428 CONTROL** for **INPUT** and **OUTPUT**.
- Under the **OPTIONS / AUDIO SETUP / SYSTEM** menu, locate the **ASIO DEVICE** selector and choose one of the US-428's ASIO drivers (16 or 24 bit) as the device.
- Under **VST INPUT**S, make sure both pairs of inputs are open (green input indicators are lit).

***Note*:** these parameters save with the song and are not globally remembered. You will need to save the song as DEF.ALL if you want the US-428 remote setup to load automatically.

- Open the US-428's Control Panel (Device Manager). From the pulldown menu, select "US-428 Native".

You should now be ready to use Cubase 5.0 with the US-428.

With Cubase 3.7 and earlier:

- Open the Cubase application.
- From the **AUDIO** pulldown menu, choose **SYSTE**M. In the ASIO drop-down menu, select the US-428 16- or 24-bit ASIO drivers.
- From the **OPTIONS / VST REMOTE** menu, select **CS-1**0. Select the **US-428 CONTROL PORT** for the in and out communication.
- You should now be ready to use Cubase 3.7x.

Note that support under older versions of Cubase is limited. You will not have access to unlimited fader channels or all EQ and Aux sends. Full control will only be available in VST 5.0 and later.

8.2 Cubase VST – MacOS

The US-428 is fully supported under Cubase v5.00 for MacOS, including ASIO 16 and 24 bit drivers and control surface mapping. Note: the US-428 is fully functional as both an audio and 32 channel MIDI interface in earlier versions of Cubase as well. In v4.1, partial functionality of the controller surface is supported; however, to fully utilize the features of the US-428 under Cubase Mac, it is necessary to run v5.00 or later.

Before setting up the US-428 to work with Cubase, please install the US-428 MacOS v2.00 drivers, and set up the OMS. (Refer to the enclosed documents on setting up both the drivers and OMS.) Begin the setup procedure below with the US-428 plugged in and powered on.

Installing under Cubase 5.0 and later:

Open the Cubase application.

From the **OPTIONS** pulldown menu, choose **MIDI SETUP / SYSTEM**. Under **OMS COMPATIBILITY**, select **IN AND OUT**.

Still under the **OPTIONS / MIDI SETUP / SYSTEM** menu, open the **INPUT FROM** menu and enable all inputs shown for the US-428 (**MIDI 1, MIDI 2** and **US-428 CONTROL**)

Under the **Options / Remote Setup** menu, select **SETUP**, and in the resulting **VST REMOTE** dialog, select the US-428, and **US-428 CONTROL PORT** for the **INPUT** and **OUTPUT** communication.

- Under the **OPTIONS / AUDIO SETUP / SYSTEM** menu, locate the **ASIO DEVICE** selector and choose one of the US-428's ASIO drivers (16 or 24 bit) as the device.

Note: these parameters save with the song and are not globally remembered. You will need to save the song as DEF.ALL if you want the OMS MIDI setup to load automatically.

- Open the US-428's Control Panel (Apple menu). From the pulldown menu, select "US-428 Native".

You should now be ready to use Cubase 5.0 with the US-428.

With Cubase 4.1 and earlier:

- Open the Cubase application.
- From the **OPTIONS** pulldown menu, choose **MIDI SETUP / SYSTEM**. Under **OMS COMPATIBILITY**, select **IN AND OUT**.
- Still under the Options / MIDI Setup / System menu, open the **INPUT FROM** dialog and enable all Inputs shown for the US 428 (**MIDI 1 AND 2 AND US-428 CONTROL**)
- **Note:** these parameters save with the song and are not globally remembered. You will need to save the song as DEF.ALL if you want the OMS MIDI setup to load automatically.
- From the **OPTIONS / VST REMOTE** menu, select **CS-10**. Select the **US-428 CONTROL PORT** for the in and out communication.

- From the **OPTIONS / AUDIO / SYSTEM** menu, select the ASIO device tab and choose one of the US 428's ASIO drivers (16 or 24 bit) as the device.

Note: these parameters save with the song and are not globally remembered. You will need to save the song as DEF.ALL if you want the OMS MIDI setup to load automatically.

You should now be ready to use Cubase 4.1.

8.3 Nuendo - Windows and MacOS

The US-428 is fully supported under Nuendo v1.xx for Windows and Mac, including ASIO 16 and 24 bit drivers and control surface mapping. We suggest you make sure you've got the most current update.

Before setting up the US-428 to work with Nuendo, please install the US-428 v3.0 drivers. (Refer to the document on installing the US-428 drivers with either Win98SE/ME or Win2000.) Begin the setup procedure below with the US-428 plugged in and power on. If you have not already done so, install Nuendo.

Installing the US-428 under Nuendo:

Open the Nuendo application
From the **DEVICES** menu, choose **DEVICE SETUP.**
Select the **ADD/REMOVE** tab. Select "**TASCAM US-428**" from the device menu and click **ADD**. **TASCAM US-428** should appear on the list of loaded devices on the left side of the window.
Highlight **US-428** and click the **SETUP** tab. Select **US-428 CONTROL PORT** for **MIDI INPUT** and **MIDI OUTPUT.**
Highlight **VST MULTITRACK**. In the **ASIO DRIVER** pull-down menu, select **ASIO US-428** (16- or 24-bit) driver.
Highlight **DEFAULT MIDI PORTS**. Select **US-428 MIDI** 1 or 2 from the **INPUT** and **OUTPUT** drop-down menus.
From the **DEVICES** menu, choose **VST INPUTS.** Make sure at least one pair of inputs for the US-428 are set to active.

If you're running Nuendo for the first time, you'll need to create a new project. Select **FILE/NEW PROJECT,** and choose **EMPTY PROJECT**.

You'll then need to add tracks to the project. Select the **PROJECT/ADD TRACKS** menu. This can be done one-at-a-time by choosing the type of track (**AUDIO**, **MIDI** or **GROUP**), or by selecting **MULTIPLE**.

Once you've created Audio tracks, you can open the VST Mixer (**DEVICES/VST MIXER**, or press F1 on the US-428 or F3 on your computer keyboard). You should have control of Nuendo's faders, mutes, transports and other basic functions, as well as EQ and Aux sends. The controller mapping for the US-428 within Nuendo largely follows the same protocols as Cubase and Cubasis. Refer to the US-428 manual for more info on these functions. Refer to the Nuendo manual for more info on basic operations of the program.

8.4 ProTools – Windows and MacOS

The US-428 can control Digidesign's Pro Tools software application on both the MacOS and the PC. Digidesign offers a free version, ProTools Free, that is an attractive application for use with the US-428. On the Macintosh it uses SoundManager for audio, and Windows Multimedia (MME) on the PC. You can see compatibility details and can order a free CD-ROM of Pro Tools Free at www.digidesign.com.

Note: At the time of this writing, the downloadable MacOS version (5.0.1) supports the use of remote control hardware, but the Windows version does not. The CD-ROM version of ProTools Free, however, contains control hardware support in both MacOS and Windows versions, and thus should be quite compatible with the US-428. If you have the downloaded Windows version, you can download the additional files necessary for control hardware support. As of this writing, this file is located at: http://download.digidesign.com/support/digi/windows/pt/MIDIControllers501.zip .

Pro Tools Free: This free software application offers eight tracks of digital audio and 48 tracks of MIDI. You can record up to two inputs simultaneously, and use the US-428 control surface to control mixing, plug-ins, automation, and more.

Before using the set-up information provided in this chapter, first install Pro Tools Free (and OMS if you're on a Mac) as described in the ProTools document "PT FREE Quick Start Guide.pdf" that comes with the Pro Tools Free download. Make sure that Pro Tools Free is working using your computer's built-in speaker before proceeding further. You can use the sample project provided with Pro Tools Free to test it.

To use the US-428 in this set-up, you must have version 2.00 or later of the US-428 driver installed on your system. Before using this set-up document, first read the documentation on installing the US-428 drivers.

SETTING UP THE US-428

Pro Tools Free can only use Sound Manager input and output on the Mac or Windows MME input and output on the PC. Note that this is not required though. For example, you can use the US-428 to control Pro Tools while sending Pro Tools' audio I/O through a different device, even the Mac's built-in sound system.

Version 2.00 and later of the US-428 driver includes special emulation software to let the US-428 act like a JL Cooper CS-10™ attached to Pro Tools. This is different than the normal CS-10 emulation mode since Pro Tools uses it in some special ways. In the US-428 control panel, select "Pro Tools® CS-10" for the control protocol.

You might need to adjust the audio latency for your system. Do this in the System tab of the US-428 control panel. Using a smaller setting will reduce the audio input to output latency through Pro Tools Free, but also increases the chance of audio drop outs. A setting of

1024 works well on many computers. If you get an error message when playing that says “You’re running out of CPU power. Take out some plug-ins to free up CPU power” then you should first try increasing your latency setting. You might also adjust your CPU usage limit under the Setups/Hardware… menu item. For advice on low-latency input monitoring, see the Input Monitoring section below.

SETTING PRO TOOLS TO USE THE US-428 CONTROL SURFACE

- Start Pro Tools and load or start a new session, then do the following:
- Open the US-428 Control Panel. Select **CS-10 PROTOOLS** from the pulldown menu.
- Under MIDI/Input Devices… make sure that “US-428 Control Port” is checked
- Choose Setups/Peripherals and select the “MIDI Controllers” button
- On line #1 select “CS-10” under “Type”
- Select “US-428 Control Port” under “Receive From” and “Send To”
- Select “8” under “# Ch’s”
- Click “OK” in the Peripherals window

To test the set-up, you should be able to move a fader or press a transport key and see that Pro Tools is responding.

HOW TO USE THE US-428 WITH PRO TOOLS

The original CS-10 has 8 faders, a row of 8 keys and LEDs above these keys, a data wheel with a button on each side of it, left/right keys, up/down keys with LEDs, transport keys, 6 potentiometer knobs, and 10 general purpose keys. The Pro Tools interface for this device maps all these controls onto Pro Tools features. Since the US-428 has a different (but similar) set of controls, the “Pro Tools CS-10” protocol emulates a CS-10 while communicating with Pro Tools.

INPUT MONITORING

With Pro Tools Free, you can monitor your inputs using on-screen controls, including listening to plug-in effects applied to input in real time. As an engineer, this can be quite handy, but as a performer it is less than ideal since the input to output latency (time delay from input to output signal) is tens of milliseconds long. That's long enough to ruin your timing if you are trying to record while listening to previously recorded tracks (overdubbing).

For ultra-low latency monitoring (< 1.5msec), you can instead use the US-428's hardware input monitoring feature. Using this technique, you won't hear plug-in effects being applied to your inputs, but your timing will be rock solid. Here's how to do it:

- For record enabled tracks, assign their output to an unused bus. This way, you won't hear Pro Tools’ high latency monitor output.
- Push the "INPUT MONITOR" key on the US-428. Now the first 4 channel strips control the input monitor level of the 4 inputs.
- Adjust the mute, level, and pan settings for the 4 inputs.
- Push "INPUT MONITOR" again to exit this mode.

You can adjust your hardware input monitor settings at any time, even in the middle of a recording pass.

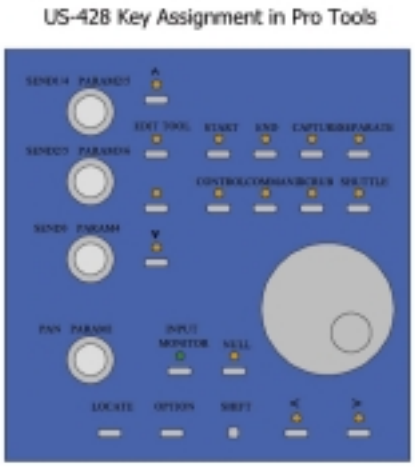


Illustration 8.01 – Pro Tools Keys

MODIFIER KEYS

Modifier keys are held down to alter the action of a knob or other key. The Shift, Control, Option, Alt and/or Command keys found on your keyboard are also mapped to US-428 keys, and either the keyboard or US-428 key gives the same behavior. In the key summary on the last page, a listing like “SET+PLAY” means hold down the SET key and then press the PLAY key. This is the same as holding the keyboard SHIFT and pressing PLAY.

TRANSPORT CONTROLS

The five transport keys on the US-428 operate exactly like the on-screen transport buttons. This includes some special behaviors. You can hold the SET key and press PLAY to play in half-speed mode. You can hold the ASGN key and press RECORD to cycle through the different record modes (Normal, Destructive, Loop, QuickPunch).

If "Audio During Fast Forward/Rewind" is not selected under Setups/Preferences.../Operation, then you can tap the REW or FFWD keys to move backward or forward in steps. (The step size depends on your selected time display mode.) Or you can hold down the REW or FFWD keys to move the time line continuously.

"PASS THROUGH NULL" CONTROLS

In using the US-428 with Pro Tools, the physical faders and rotary control positions at times will not match their on-screen counterparts. When you move a control, like a level fader, pan control, or effect parameter knob, it will not affect the on-screen control until it has moved past the on-screen position, called the null point. The on-screen control will then stay locked to the physical control after this. Once you have stopped moving the control, it will still stay locked until the Touch Timeout time has passed. Then, once again, you have to pass through the null point to regain control. (You can adjust the Touch Timeout setting in Setups/Preferences.../Automation.)

CHANNEL STRIPS

Each channel strip has controls for level, mute, solo, select, and record enable. The channel strip fader controls the corresponding on-screen level fader, but remember that you must move it through the on-screen position before it takes effect. As you start to move a fader that is not locked to its on-screen counterpart, either the HI-MID or LO-MID LED will light up to show you which direction you need to move the fader to reach the null point.

You can press the MUTE keys to mute/unmute a channel. The MUTE light displays the current MUTE state for that

channel. If you press the SOLO key, the SOLO LED will light up and you are in SOLO mode. Now the MUTE keys become SOLO keys for the 8 channels, and the MUTE lights become SOLO lights. Press the SOLO key again, and you are back in MUTE mode.

Pressing a SELECT key selects a track for panning, send level, or plug-in parameter control, and deselects other tracks. Once selected, its on-screen name will be highlighted in green. Hold the SET key and press SELECT to toggle the selection of a track for editing, deleting, etc. Its on-screen track name will get a white background.

You can move to different banks of 8 channel strips by using the BANK keys (<BANK and BANK>). Pressing these will move the selection by 8 to the right or left (or as far as possible) and the MUTE and REC lights will be updated for the currently active channel strips. The currently selected track for panning, etc. will also move (and the same green LED will stay lit).

CHANGING PARAMETERS

When a track is selected, you can use the four rotary knobs in different ways to control the track's pan setting, send levels, and plug-in parameters. There are different sets of parameters for a track that these four knobs can control. The "top" set includes pan, and five send levels. With a track selected, you get to its top parameter set by holding LOCATE> and pressing the HIGH key. The HIGH LED lights to show that the top set is selected.

Now you can move the PAN knob (through the null point!) to change the pan setting for the selected track. You can also change the send level for all five sends, A through E. (See the summary at the end for details.) Hold the SET button while moving a knob for finer control.

On screen you can select any plug-in and display its settings. The track for the plug-in, if it is different than the selected track, will have its name highlighted in red. Load the "4-band EQ II" plug-in in an insert. Now press the LOW button several times. As you do, a set of plug-in parameters is highlighted (up to 6 at a time for a plug-in). The set goes to the bottom then cycles back to the top. Now try turning an EQ knob back and forth. Once it moves through the parameter's null point, you can control it with the US-knob. All six plug-in parameters selected can be controlled (only 4 are used per set for this EQ). See the summary at the end for details, and for more on using plug-ins with Pro Tools, see "DigiRack Plug-Ins Guide.pdf" that came with Pro Tools.

SCRUBBING AND SHUTTLING

The data wheel on the US-428 can be use to scrub and shuttle audio in Pro Tools, and to create selections of data for editing. Here's a brief example of how to use these features to select some audio. Please refer to the CS-10 chapter of the MIDI Controller Guide (listed below) for lots of details.

This description assumes that "Edit Insertion Follows Scrub/Shuttle" is disabled under Setups/Preferences.../Operation. Press F3 to go into shuttle mode, and move the data wheel to shuttle the cursor near your desired start point. Press F2 to go into scrub mode. Scrub the audio with the data wheel to find your approximate start point. Now hold down SET and scrub towards the end point. Hey, you're creating a selection. Press <BANK to go to the start of the selection, hold down SET and F1, and scrub more finely, adjusting the exact selection start point.

Press BANK> to do the same to trim the end point. Now press F2 or STOP to exit scrub mode.

You can switch between scrub and shuttle modes at any time, and can leave scrub or shuttle mode by pressing the button with the lit up LED or STOP. Note that the normal transport controls, and much else, are disabled when in scrub or shuttle mode. Again, the Pro Tools documentation has much more details about using a MIDI controller for such functions. Check it out.

ZOOM/SCROLL/EDIT

Several key commands, listed in the Summary, exist to perform various zooming, scrolling, and editing functions.

FIND OUT MORE

More information about how Pro Tools uses external MIDI controllers, and the CS-10 in particular, can be found on Digidesign's web site. Their guide can be found at: www.digidesign/support/docs/MIDI_Controllers_Guide.pdf.

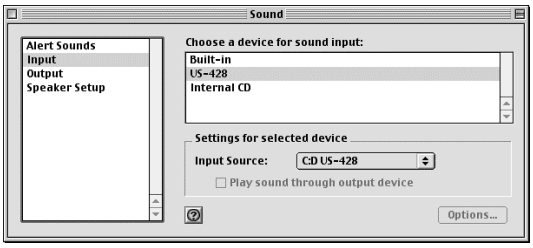
8.4.1 Setting up SoundManager Support

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-428" to select it as the Sound Manager output. The US-428 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-428 outputs.

When you click "Input" on the left, the available input devices appear on the right. Click on "US-428" to select it as the Sound Manager input device. Below it are two choices for "Input Source": either A:B or C:D. You can select either as the enabled input pair.



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-428 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.

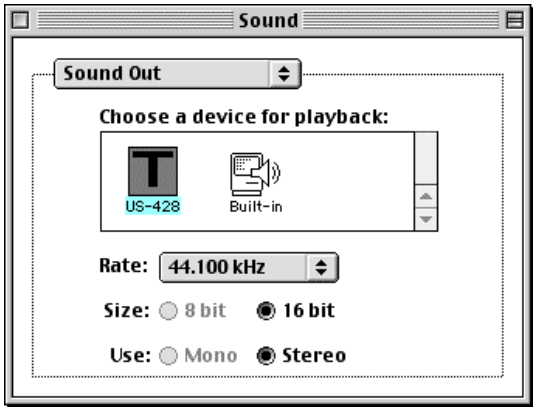
MacOS 8.6

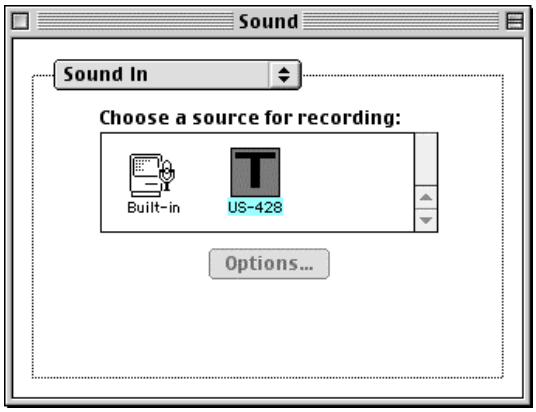
The "Monitors and Sound" control panel in MacOS 8.6 has a "Sound" section. It displays the currently selected Sound Manager output and lets you select among several "Built In" input sources. It cannot be used to select the US-428 as the Sound Manger input or output.

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-428" as the Sound Manager output. Since the US-428 has its own output

volume control, its slider under “Volume” in this control panel is only used to enable or mute the US-428 output.

Under “Sound In” you can select the “US-428” instead of the Mac’s Built-in sources, but it doesn’t let you select between the US-428’s A:B and C:D input pairs. To do this, go to the “US-428” control panel’s “System” tab. There you will find a field labeled “Sound Manager Input” that selects between the two input pairs. You can change this setting at any time, even while a program is using the Sound Manager I/O.





8.5 Digital Performer (MacOS)

The US-428 is supported in Digital Performer v2.7 and later. Before setting up the US-428 to work with Digital Performer, please install the US-428 MacOS v3 drivers, and set up either OMS or FreeMIDI. (Refer to the chapters on setting up both the drivers and OMS. Information on setting up FreeMIDI may be found in the Digital Performer documentation)

Begin the setup procedure below with the US-428 plugged in and powered on.

Locate the Digital Performer Control Surface Plugin on the US-428 CD-ROM. (If you've downloaded the driver from our website, locate the folder on your hard drive.) Drag it into the **PLUGINS** folder within the **DIGITAL PERFORMER** folder.

IMPORTANT: The Control Surface Plugin **must** be in the **PLUGINS** folder within the **DIGITAL PERFORMER** folder, along with the Digital Performer application itself. Failure to use the correct folder will result in non-performance.

Next, verify that the ASIO drivers are installed correctly. Open the **ASIO DRIVERS** folder within the **DIGITAL PERFORMER** folder. Verify that this folder contains both the US-428's 16 bit and 24 bit ASIO drivers. (If not you can copy them from the US-428 folder on the Desktop, which was created during installation.)

Open the US-428 Control Panel (Apple menu). Select **US-428 NATIVE** from the pulldown menu.

Open Digital Performer. Select an existing project, or open a new one.

From the **BASICS / MOTU AUDIO SYSTEM OPTIONS** menu, select **CONFIGURE HARDWARE DRIVER**. From the pulldown menu that appears, select the **ASIO** device option, and then select one of the US-428's ASIO drivers.

Select the **BASICS / CONTROL SURFACE SETUP** menu. From the **HARDWARE** pulldown menu, select the US-428 as the Control Surface. Select **US-428 CONTROL PORT** from the **MIDI COMMUNICATION** drop down menu. If you wish to use the MIDI ports on the US-428, you must go to the **BASICS / SET INPUT FILTER** menu and check the box marked **ACCEPT INPUT FROM MMC DEVICE.**

Controller Surface Mapping

Note: The **SET** and **REC ENABLE** buttons act as shift keys, and should be held down while pressing other buttons to modify their behavior.

Transport Controls:

STOP Stop, or rewind if already stopped
PLAY Play toggle
REC Record toggle and one-touch recording
REW Fast rewind (REW LED lit)
FFWD Fast forward (FFWD LED lit)
SET + REW Slow rewind (REW LED flashing)
SET + FFWD Slow forward (FFWD LED flashing)

(If you select Fast or Slow Forward mode while playing, Digital Performer will play at double or half speed.)

<<LOCATE Go to beginning of song
LOCATE>> Go to end of song
SET + <<LOCATE Set Memory Start to current time
SET + LOCATE>> Set Memory End to current time

Channel Controls:

The US-428 has 8 channel strips and a master fader. The master fader controls the volume for any and all tracks that contain master faders. Regular channel strip faders never affect a master fader track.

Each channel strip contains a fader, a **SELECT** button, a **SELECT** LED, a **RECORD** LED, a **MUTE** button, and a **MUTE** LED. The eight channel strips affect a bank of eight contiguous tracks within Digital Performer's Mixing Board window. The set of tracks being controlled may be changed as described in the "Bank Selection" section below.

The channel fader directly controls the volume of a track (unless it's a master fader track). Select a track by pressing the **SELECT** button. The corresponding **SELECT** LED will light. Pressing a **SELECT** button will deselect any previously selected track(s). With the **TRACK** window active, the currently selected track is highlighted.

Pressing **SET + SELECT** will toggle the select state of a track. This may be used to select or deselect multiple tracks, or to change the set of selected tracks.

The **PAN** knob will control the panning for the selected track(s). Holding **SET** while panning gives you finer control.

The **REC** button acts like a shift key with the **SELECT** buttons. Holding **REC** and pressing a **SELECT** button toggles the record enable state for that track. **SET + REC** clears all record-enabled tracks.

The **MUTE** buttons control both mute and solo status of a track. When the **SOLO** LED is unlit, pressing a **MUTE** button toggles the mute status of a track, and the **MUTE** LED's reflect the mute status of the track. Pressing the **SOLO** button toggles the Global Solo State, indicated by the lit **SOLO** LED. When the **SOLO** led is lit, pressing a **MUTE** button toggles the solo state of the track, and the **MUTE** LED reflects the solo status of the track. (When the last track's **SOLO** is cleared, the Global Solo Status is automatically cleared by Digital Performer, and the tracks' mute status is once again shown.) **SET + SOLO** clears all mutes when the **SOLO** led is not lit, or clears all solos when the **SOLO** LED is lit.

Aux Send Controls:

Audio tracks have four aux send levels and aux send mutes. (To see them, display the send field in the track window.) To change these controls, select a track(s) and press the **AUX1**, **AUX2**, **AUX3** or **AUX4** button. Its LED will light, indicating that the **DATA WHEEL** now controls that function. Moving the **DATA WHEEL** will now control the selected Aux Send level for the selected track(s). Holding **SET** while moving the **DATA WHEEL** allows for finer control. Pressing the currently selected **AUX** button will turn off the **AUX** LED and the **DATA WHEEL** will resume normal operation. Pressing a different **AUX** button will select a different Aux Send to be controlled. Pressing **SET** + an **AUX** button will toggle the corresponding send mute status for the selected track(s).

Bank Selection:

<<BANK Shift 8 tracks to the left
BANK>> Shift 8 tracks to the right
SET + <<BANK Shift 1 track to the left
SET + BANK>> Shift 1 track to the right

If less than 8 tracks remain to the left or right, the bank buttons will shift as many tracks as available. The **<<BANK** LED is lit if you can shift further left, and the **BANK>>** LED is lit if you can shift further right. Performing any banking operation will automatically bring the Mixing Board window to the front.

Note that banking actions are disabled if the **REC** button or any **SELECT** button is being held down. This is to prevent banking during a possible updating of tracks' automation data.

Fader Nulling:

When changing banks, a physical fader position might not match the corresponding channel's on-screen fader's position. Pressing the **NULL** button places the US-428 into Null mode and lights the **NULL** LED. In this mode, the fader strips' red **REC** and green **SEL** LED'S display whether the fader is too high (**REC** LED on) or too low (**SEL** LED on). When both are lit, the physical fader matches the on-screen fader's position. Press **NULL** again to return to normal operational mode.

Window Navigation

F1 Toggle Mixer window to front/back
F2 Toggle Track Overview window to front/back
F3 Cycle through the open windows

SET + F1 Enter Insert Parameter mode
SET + F2 Save open file
SET +F3 Close the front window

GAIN Scroll window right/left
FREQ Scroll window up/down
Q Zoom window horizontally in/out
SET +Q Zoom window vertically in/out

EQ Controls

If you place a **PARAEQ 4-BAND** effect in the topmost insert slot for an audio track, the US-428 can directly control that EQ. Pressing the **LO, LOMID, HIMID** or **HI** buttons will activate the EQ controls for the first (leftmost) selected track. When the EQ controls are active, one of the **LO, LOMID, HIMID** or **HI** LEDs will be lit. Pressing the button below that led will deactivate the EQ controls (which is different from deactivating the EQ inserted effect).

With the EQ controls active, the following controllers are functional:

GAIN Change filter gain for selected EQ band

SET + GAIN Fine filter gain adjust

FREQ Change filter frequency for selected EQ band

SET + FREQ Fine filter frequency adjust

Q Change filter bandwidth for selected EQ

SET + Q Fine filter bandwidth adjust
SET + Lo, LoMid, HiMid or **Hi** Cycles through various filters (and bypass) for selected EQ

SET + NULL Toggle EQ bypass switch status

You can also use the **PARAEQ 2-BAND** effect in the top insert position, in which case only the **LO** and **LOMID** bands are available.

Insert Parameter Controls

Pressing **SET + F1** lights the **F1** LED indicating that insert parameter control mode is active. In this mode you can control parameters for insert B, C, D or E for the leftmost selected track. The topmost insert slot (A) is reserved for the **PARAEQ 4-BAND** insert and direct control by the normal EQ functions described in the previous section:

- Select a track (when multiple tracks are selected, the leftmost/lowest is used)
- Insert an effect in one of the lower four slots for that track
- Press **SET + F1** (F1 led will light)
- Press **LO, LOMID, HIMID**, or **HI** to select an insert slot. The effects window will appear for the selected insert.

Now the **Data Wheel** will increment/decrement parameter 1 for the selected effect. Holding **Set** while turning the data wheel will change the parameter faster. Press F3 to move up a parameter number, or press F2 to move down a parameter number. This will allow you to access any effect parameter.

The **Q** knob controls the parameter one above the **DATA WHEEL**. **FREQ** controls the parameter two above it, and **GAIN** controls the parameter three above it. This gives you simultaneous access to four consecutive parameters. These knobs also respond to holding the **SET** button for faster changes.

Pressing **SET + NULL** will toggle the bypass for the selected insert effect.

You can exit insert parameter control mode by pressing **F1** or any **AUX** button.

You can also press any of the EQ buttons to change which effect on a track you're controlling. You can also select a different track and parameter slot.

Automation Controls

SET + RECORD Cycle selected tracks through automation record modes

SET + PLAY Cycle selected tracks through automation play modes

SET + STOP Turn automation off for selected tracks.

To change the automation state for a master fader, hold the **REC** button down to select it before pressing the above buttons.

In Latch modes, the movement of a control (fader, pan, knob, wheel) starts updating that parameter. In Touch mode, the **SELECT** button acts as the touch sensor for that track. Holding a **SELECT** button "touches" that track's parameters and begins updating; releasing **SELECT** stops the updating. The **REC** buttons act as touch sensors for the master fader.

The **BANK, EQ** and **DATA WHEEL** buttons (**AUX 1-4, ASGN** and **F1-3**) are disabled when any **SELECT** button is being held down. This prevents disruptions while automation data is being used.

Two notes related to using the US-428 for automation and the **BASICS / AUTOMATION SET-UP** dialog box:

If you wish to disable a Global Automation Enable type (e.g., Pan), you must do it for both Audio and MIDI.
The Enable Automation Types under Track Automation Configuration should be set to All. It is not possible to enable/disable automation on a track-by-track basis.

Note that using the **SELECT** button when in a touch mode touches all the tracks' automation types. If you have automation data recorded for a track and want to update just the pan, for example, latch mode may be easier. Also, Send Level and Mute automation moves are only made visible on the mixing board screen if the send's output is assigned.

8.6 Cakewalk and Sonar

As of this writing, Cakewalk have not yet completed their support for the US-428 in either Cakewalk Pro Audio 9 or Sonar. They have assured us and their users that they intend to do so soon. For information on the current status of official support, please contact Cakewalk directly.

You will, however, find StudioWare panels created by Doctor Dale, a US-428 owner and long-time Cakewalk/Sonar user. While these StudioWare panels are not officially supported by TASCAM, they have been an overwhelmingly popular download on the US-428 Users' Page, and we have included them on the CD with the author's permission. You can also find them on our website (and we suggest you check there for available updates), and Doctor Dale is available to support them directly. Documentation is also included.

8.7 eMagic Logic

eMagic have supplied an environment for the US-428, which is included on the CD. They have also been supplying regular updates to this environment, so we suggest you check the TASCAM and eMagic websites for current info.

For specific information on using the US-428 with the Logic environment, please refer to the accompanying documentation.

8.8 Propellerheads Reason

This chapter will show you how to use the TASCAM US-428 as the audio output and control input for Propellerhead's Reason software synthesizer. It assumes that you have version 3 drivers (or newer) for the US-428 installed, and is based on version 1.0.1 of Reason. For more on Reason, please go to www.propellerheads.se. The screenshots used here are from a PC, but the Mac versions are essentially identical.

Mac Only Note: To use the US-428 for Reason's audio output, make sure you have copied your current US-428 ASIO drivers into the "ASIO Driver" folder where the Reason program is located.

Bring up the US-428's control panel, and select "Four Control Banks (Pots)" under Control Surface/Protocol. This protocol is recommended since it gives you *lots* of virtual controls that Reason can understand, namely 33 faders, 96 knobs, and 71 buttons. Please see separate documentation on this control protocol for details on its use.

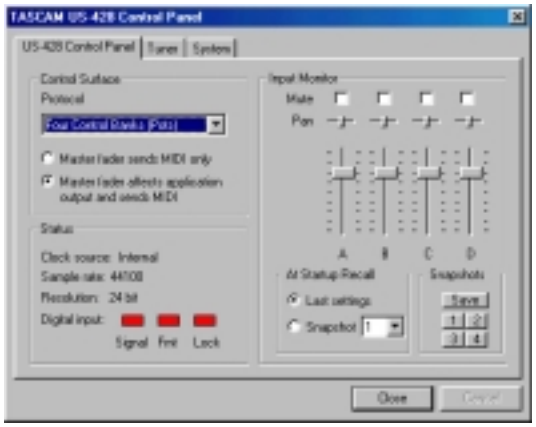


Illustration 8.03 – US-428 Control Panel (Main Page)

If you intend to control Reason's master mixer fader from the US-428 (using the 428's master fader, or any other continuous control), the select "Master fader sends MIDI only." Otherwise select "Master fader affects application output and sends MIDI."

Next, go to the "System" tab of the control panel. In most computer set-ups, you will be able to run at the lowest latency with Reason. This depends on your computer, and on the complexity of your Reason performance. If you notice any click-like distortion in your output from Reason, you should try quitting Reason, increasing the latency setting in the control panel, and then restarting Reason.

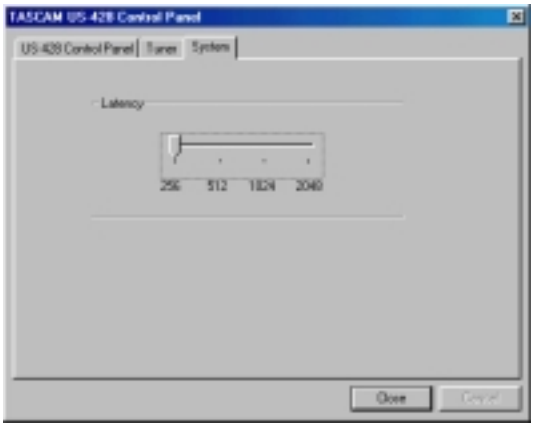


Illustration 8.04 – US-428 Control Panel (System Page)

Start Reason and select the Edit/Preferences… menu item. Now select the "Audio" page. Under "Audio

Driver" select "ASIO US-428 ASIO Driver…" either the 24-bit or 16-bit version. Also set your sample rate.

Now go to the "Advanced MIDI" page of the Preferences, and select "US-428 Control Port" under "Remote Control." This tells Reason to receive US-428 control surface input to control Reason knobs, faders, and buttons. You can now close the Preferences window.

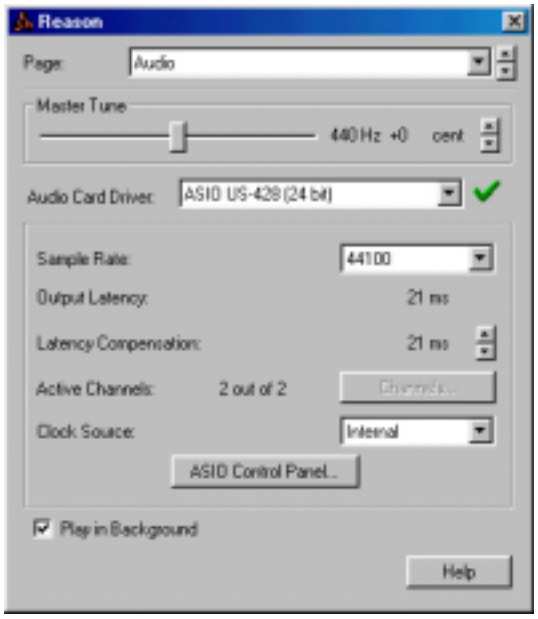


Illustration 8.05 – Reason (Audio Page)

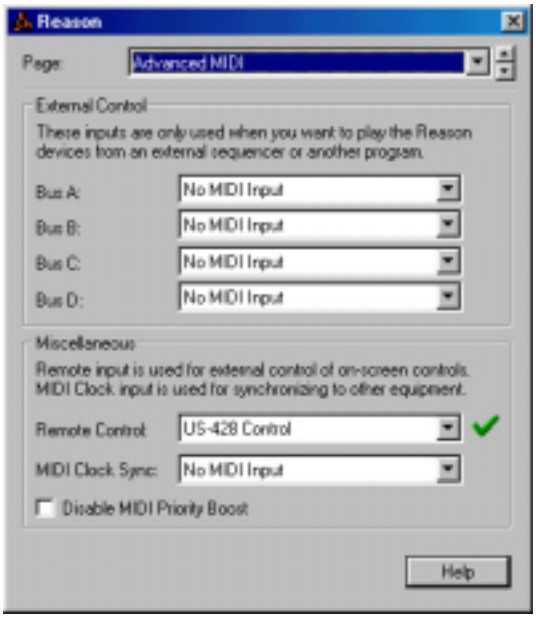


Illustration 8.06 – Reason (Advanced MIDI Page)

Under the Options menu, make sure that "Enable MIDI Remote Mapping" is checked, or select it once if it isn't. This lets control surface input affect the Reason controls. To set-up the mapping between US-428 buttons, faders, and knobs, and the virtual Reason controls, make sure that "Edit MIDI Remote Mapping" under the Options menu is also checked.

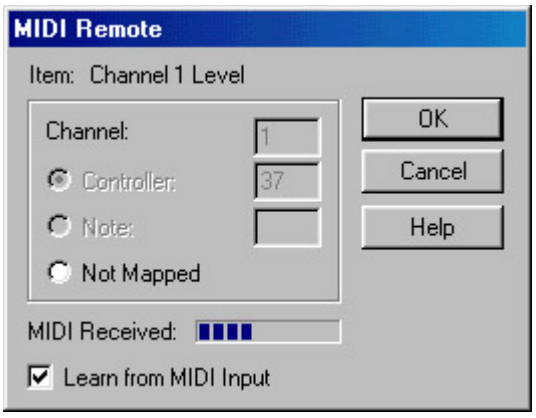


Illustration 8.07 – Reason (MIDI Remote Page)

To map a US-428 control to a particular Reason control, first use your mouse to click on the control. The "MIDI Remote"

window will pop up. The first time you do this in a session, you will need to check the “Learn from MIDI’ box. Now simply move the US-428 control you want to use (fader, knob, button) and Reason will automatically identify it and map it to the Reason control the you previously selected. You can select “OK” and now Reason’s screen will show the channel number and controller/note number over the newly-mapped screen control.

Once we have set-up all the controls, you can uncheck Options/Edit MIDI Remote Mapping (which will leave the screen cleaner). You can also save this set-up file and use it as a template for other projects.

8.9 Native Instruments B4

The US-428 Control Panel now includes the addition of another Control Surface Protocol in the drop-down box: "Native Instruments B4", for mapping the US-428's control surface to Native Instruments' B4 virtual organ. (NOTE: A demo version of the B4 can be downloaded from the Native Instruments website at www.native-instruments.com).

NOTE: The following setup procedures must be done with the B4 running as a standalone application, rather than in VST Instrument mode.

AUDIO SETUP:

In the B4 system menu:

- Under "Audio Port" choose ASIO
- Under "Audio Settings" choose "ASIO US-428 (24 bit)"
- Also under "Audio Settings" use the buffer size slider to set a value that is EQUAL TO the value chosen in the US-428 Control Panel. Ideally, best results will be achieved with a buffer size setting of 256 to 512.
- Note that if you change the setting in the US-428, you will have to update the setting in the B4 the next time you start the program. Failure to do this will result in noise.
- Under "Audio Routing" click the Audio In "All Off" button, and click the Audio Out "Default" button.

MIDI SETUP:

- Under "MIDI Settings" make sure that you've selected the proper MIDI IN ports. (For example, if you're feeding a keyboard into US-428 MIDI In 1, choose:
  - US-428 Port 1
  - US-428 Control

(You MUST include "US-428 Control" port, or the faders and other surface control will not work)

- Also in this dialog, select
  - Upper manual = Channel 1
  - Lower manual = Channel 2
  - Pedal = Channel 3
  - Leave MIDI Input filtering disabled.

Control Surface Mapping:

TIP: If you click on the characters “B4” at the upper right of the B4 program, you can rapidly switch between Keyboard and Control views.

Keyboard View: Here you can access the drawbars, rockers, expression pedal, and Leslie speed. There are three banks, accessible with the BANK L and BANK R buttons on the US-428.

Bank 1:

- **Faders 1-8 + master = DRAWBARS 1-9 ON THE UPPER MANUAL**
- **Mute 1 = VIB LOW ON/OFF**
- **Mute 2 = VIB UP ON/OFF**
- **Mute 3 = ROTATOR SPEED FAST/SLOW**
- **Mute 4 = PERC ON/OFF**
- **Mute 5 = DRIVE ON/OFF**
- **Mute 6 = ROTATOR ON/OFF**
- **Mute 7 = VELOCITY ON/OFF**
- **Data Wheel = EXPRESSION PEDAL**

Bank 2:
With EQ High activated:

- GAIN = TREBLE SLOW
- FREQ = TREBLE FAST
- Q = TREBLE ACCEL
- PAN = TREBLE TONE

With EQ Hi Mid activated:

- GAIN = TUBE AMP DRIVE
- FREQ = TUBE AMP VOL
- Q = TUBE AMP BODY
- PAN = TUBE AMP BRIGHT

With EQ Lo Mid activated:

- GAIN = MIC BALANCE
- FREQ = MIC PAN
- Q = MIC SPREAD
- PAN = MIC DISTANCE

With EQ Low activated:

- GAIN = BASS SLOW
- FREQ = BASS FAST
- Q = BASS ACCEL
- PAN = BASS TONE

With Aux 1 activated:

- GAIN = PERC VOLUME
- FREQ = PERC DELAY
- Q = PERC HARMONIC
- PAN = KEYCLICK AMT

With Aux 2 activated:

- GAIN = VIBRATO MIX
- FREQ = VIBRATO DEPTH
- Q = PERC HARMONIC
- PAN = KEYCLICK AMT

(Similar to Bank 1 except):

- **Faders 1-8 + master = DRAWBARS 1-9 ON THE LOWER MANUAL**

Bank 3:
(Similar to Bank 1 except):

- **Faders 1-6 = DRAWBARS 1-6 ON THE PEDAL MANUAL**

Control View: All the previous controls operate as before, and the EQ switches and controls also allow these settings:

8.10 Syntrillium Cool Edit

As this manual is being completed, the current version of Cool Edit is 1.2a. While there is no controller surface support for the US-428 in this version, Syntrillium has confirmed that the version 2.0 update will contain full support for the US-428.

If you are a Cool Edit user, you can still run the US-428 as a high-quality audio and MIDI interface even now. And since Syntrillium expects to release the next update very soon, chances are by the time you read this support for the US-428 will have been implemented. Check with Syntrillium for current information on the status of US-428 support. When it is available, we will also post information and setup documentation on our website.

8.11 Notes on Other Applications

The US-428's functionality can be expanded even further in a number of ways. **Section 8.11.1** details the US-428's Four Control Banks Mode – this special mapping of the US-428's control protocol allows it to send out a significantly increased number of controller messages by creating four distinct layers of controls, switchable with a single modifier key. This is very useful for controlling such complex multi-layered applications as Propellerheads' Reason (detailed in section 8.8), as well as many of the currently-available virtual synths.

Section 8.11.2 details using the US-428 with keystroke emulation to address applications which do not support standard MIDI controller commands. While these applications are not officially supported by the US-428, many additional uses for the US-428 have been developed by creative users worldwide. We have set up an area on the TASCAM website, the US-428 Users' Page, where users can share resources and information on new and creative uses for the US-428.

Please note that the applications described in Section 8.11.2 and on the US-428 Users' Page are not officially supported by TASCAM. Support is offered by the individuals who have created these individual controller maps. Please bear in mind that these are private individuals, sharing their knowledge and creativity voluntarily – if you need to contact any of the individuals listed here or on the Users' Page, be considerate of their time and their generosity, and reasonable in your requests.

8.11.2 Four Control Banks Mode

These two control protocols are intended to provide better control of software synthesizers and samplers by allowing the US-428 to generate scores of MIDI controller messages, not just a dozen or so. It does this in several ways, most importantly by supporting four independent "banks" of control surfaces.

The two protocols, which are listed in the US-428 control panel as "Four Control Banks (Pots)" and "Four Control Banks (Encoders)", are almost identical. They only differ in how the rotary encoders are interpreted. Each protocol is described in detail below. There is also a .GIF file included which summarizes controller and note numbers, and gives a graphical representation of the control banks.

The purpose of this protocol is to provide an operational mode in which users can program the US-428 to work with software synths and other applications requiring the mapping of a large number of messages. The ability of the US-428 to work in this mode will enable users to create their own templates for use with virtual synths and other applications.

Banks

There are four banks, or sets, of controls. Think of each bank as a "layer"….the US-428's control surface sends out a different set of messages for each bank. The active bank is

indicated by its associated AUX LED (e.g., AUX1 is lit for Bank1; AUX2 is lit for Bank2, etc.). Banks can be selected directly by pressing one of the AUX buttons; they can also be selected sequentially with the BANK button.

(When you first select the Banks protocol, it opens with Bank1 active.)

MIDI Notes and Controllers - Nomenclature used in this document

Some button presses result in the US-428 sending a MIDI Note On message to the application via the US-428 Control Port, while other actions may send a MIDI Controller message. The note or controller number sent depends, in most cases, on the currently active bank. For example, Fader 1 is listed as:

Fader 1 MIDI Controller (0 + 32*B)

The "B" here means the Bank number minus 1. When Bank 1 is active, B = 0; when Bank 4 is active, B = 3. This means that moving Fader 1 sends the current fader position as a MIDI controller message (a value of 0…..127), with the MIDI controller number being 0 in Bank1, 32 in Bank2, 64 in Bank3, and 96 in Bank4. This allows the single physical Fader 1 to act as four different controllers, one in each bank.

MIDI messages are always sent and received on channel 1 of the US-428 Control Port, except for "Global Controls" (described below), which are sent and received on channel 2.

MUTE Buttons

Pressing a MUTE button sends a MIDI Note On message with a velocity of 127. Releasing the button sends a Note On message with a velocity of 0. The SOLO button acts like a shift/modifier key for the MUTE buttons. Pressing the SOLO button (SOLO LED is lit) causes the MUTE buttons to transmit a different note than when the SOLO LED is not lit.

When SOLO LED is off:

MUTE 1 button	*sends*	MIDI note (0 + 32*B)
MUTE 2 button	*sends*	MIDI note (1 + 32*B)
MUTE 3 button	*sends*	MIDI note (2 + 32*B)
MUTE 4 button	*sends*	MIDI note (3 + 32*B)
MUTE 5 button	*sends*	MIDI note (4 + 32*B)
MUTE 6 button	*sends*	MIDI note (5 + 32*B)
MUTE 7 button	*sends*	MIDI note (6 + 32*B)
MUTE 8 button	*sends*	MIDI note (7 + 32*B)

When SOLO LED is on:

MUTE 1 button	*sends*	MIDI note (8 + 32*B)
MUTE 2 button	*sends*	MIDI note (9 + 32*B)
MUTE 3 button	*sends*	MIDI note (10 + 32*B)
MUTE 4 button	*sends*	MIDI note (11 + 32*B)
MUTE 5 button	sends	MIDI note (12 + 32*B)
MUTE 6 button	*sends*	MIDI note (13 + 32*B)
MUTE 7 button	*sends*	MIDI note (14 + 32*B)
MUTE 8 button	sends	MIDI note (15 + 32*B)

SELECT Buttons

In much the same manner as with the MUTE and SOLO buttons, the SELECT buttons can also send one of two possible MIDI note messages. The REC button acts like a shift/modifier key for the SELECT buttons. The note sent depends on whether the REC button is lit or not.

When REC LED is off:

SELECT 1 button	*sends*	MIDI note (16 + 32*B)
SELECT 2 button	*sends*	MIDI note (17 + 32*B)
SELECT 3 button	*sends*	MIDI note (18 + 32*B)
SELECT 4 button	*sends*	MIDI note (19 + 32*B)
SELECT 5 button	*sends*	MIDI note (20 + 32*B)
SELECT 6 button	*sends*	MIDI note (21 + 32*B)
SELECT 7 button	*sends*	MIDI note (22 + 32*B)
SELECT 8 button	*sends*	MIDI note (23 + 32*B)

When REC LED is on:

SELECT 1 button *sends* MIDI note (24 + 32*B)
SELECT 2 button *sends* MIDI note (25 + 32*B)
SELECT 3 button *sends* MIDI note (26 + 32*B)
SELECT 4 button *sends* MIDI note (27 + 32*B)
SELECT 5 button *sends* MIDI note (28 + 32*B)
SELECT 6 button *sends* MIDI note (29 + 32*B)
SELECT 7 button *sends* MIDI note (30 + 32*B)
SELECT 8 button *sends* MIDI note (31 + 32*B)

In any given bank, the last active SELECT button will be remembered. If you last used SELECT 3 in Bank 1, and then changed to Bank 4, when you return to Bank 1 SELECT 3 will be active.

Channel Faders

Moving any of the 8 channel faders sends the current fader position as a MIDI controller message:

FADER 1 *sends* MIDI controller (0 + 32*B)
FADER 2 *sends* MIDI controller (1 + 32*B)
FADER 3 *sends* MIDI controller (2 + 32*B)
FADER 4 *sends* MIDI controller (3 + 32*B)
FADER 5 *sends* MIDI controller (4 + 32*B)
FADER 6 *sends* MIDI controller (5 + 32*B)
FADER 7 *sends* MIDI controller (6 + 32*B)
FADER 8 *sends* MIDI controller (7 + 32*B)

In any given bank, the last known fader positions for all 8 channel faders will be remembered. When switching between banks, the FADER NULL function may be used to align the fader positions just as it is in Native Mode.

The Pan Knob

Turning the PAN knob sends a controller message. The MIDI controller number used depends on the selected bank, but also on the currently lit SELECT LED. If "S" represents the currently lit SELECT LED number, then the PAN knob sends:

MIDI controller (7 + S + 32*B)

Again, the "B" here means the Bank number minus 1. This means that moving the PAN with SELECT LED 1 lit sends a MIDI controller message (a value of 0…..127), with the MIDI controller number being 8 in Bank1, 40 in Bank2, etc.

PAN/SELECT 1 *sends* MIDI controller (8 + 32*B)
PAN/SELECT 2 *sends* MIDI controller (9 + 32*B)
PAN/SELECT 3 *sends* MIDI controller (10 + 32*B)
PAN/SELECT 4 *sends* MIDI controller (11 + 32*B)
PAN/SELECT 5 *sends* MIDI controller (12 + 32*B)
PAN/SELECT 6 *sends* MIDI controller (13 + 32*B)
PAN/SELECT 7 *sends* MIDI controller (14 + 32*B)
PAN/SELECT 8 *sends* MIDI controller (15 + 32*B)

Each bank simulates 8 fixed-position pan pots initially centered at MIDI value 64. Turning the PAN knob one click left decreases the value by 8, down to 0; turning it to the right increases the value by 8, up to 127.

Holding the SET button places the PAN knob in fine mode, and the increments increase and decrease in values of 1. (Note that once SET is released and PAN returns to coarse mode, the values will re-align to multiples of 8. For example, if the current value is 60 when SET is released, the next two clicks will be 64 and 72.)

EQ Knobs

Much like the PAN knob, the EQ knobs simulate fixed-position pan pots. In each of the four banks, each of the three EQ knobs sends a different MIDI controller message depending on which EQ band LED is lit. (Three EQ knobs times four EQ bands times four banks.) Pressing

an EQ bank button lights the associated LED, and the last selected EQ band for each of the four banks is remembered.

To describe the MIDI controller numbers used for the EQ knobs, we will number the EQ bands from bottom to top; LO=0, LO MID=1, HI MID=2, HI=3. “E” represents the currently-active EQ band/LED:

GAIN knob *sends*
MIDI controller (18 + 3*E + 32*B)
FREQ knob *sends*
MIDI controller (17 + 3*E + 32*B)
Q knob *sends*
MIDI controller (16 + 3*E + 32*B)

The values sent follow the same rules as described for the PAN knob, including coarse and fine control with the SET button.

Data Wheel

The DATA wheel will also send 4 different MIDI controller number messages in each of the four banks. The controller number sent depends on whether the ASN, F1, F2 or F3 LED is lit.

If we label the currently-lit LED as"F", and number the buttons as ASN=0; F1=1; F2=2; and F3=3, then the DATA wheel sends MIDI controller number:

DATA Wheel *sends*
MIDI controller (28 + F + 32*B)

Again, the same rules apply as with the PAN and EQ knobs, including the coarse and fine increment modes as modified by the SET button.

Global Controls

Some of the US-428 controls have the same behavior in all four banks. These include the MASTER fader, LOCATE buttons, and transport buttons. All of these global controls are transmitted on MIDI channel 2 of the US-428 control port (as opposed to all the bank-related controls, which transmit on channel 1 of the control port).

MASTER fader	*sends*	MIDI controller 7
REW button	*sends*	MIDI note 0
FFWD button	*sends*	MIDI note 1
STOP button	*sends*	MIDI note 2
PLAY button	*sends*	MIDI note 3
RECORD button	*sends*	MIDI note 4
<LOCATE button	*sends*	MIDI note 5
LOCATE> button	*sends*	MIDI note 6

Controlling LED’s

Some LED's may be controlled by the application. LED's are turned on with a Note On message with a velocity of 127, and turned off with a Note On message with a velocity of 0. Four banks of MUTE and REC LED's can be controlled by sending messages to channel 1 of the Control port. Transport LED's can be controlled by sending messages to channel 2.

MUTE 1 LED	MIDI note (0 + 32*B)
MUTE 2 LED	MIDI note (1 + 32*B)
MUTE 3 LED	MIDI note (2 + 32*B)
MUTE 4 LED	MIDI note (3 + 32*B)
MUTE 5 LED	MIDI note (4 + 32*B)
MUTE 6 LED	MIDI note (5 + 32*B)
MUTE 7 LED	MIDI note (6 + 32*B)
MUTE 8 LED	MIDI note (7 + 32*B)
REC 1 LED	MIDI note (8 + 32*B)
REC 2 LED	MIDI note (9 + 32*B)
REC 3 LED	MIDI note (10 + 32*B)
REC 4 LED	MIDI note (11 + 32*B)
REC 5 LED	MIDI note (12 + 32*B)
REC 6 LED	MIDI note (13 + 32*B)
REC 7 LED	MIDI note (14 + 32*B)
REC 8 LED	MIDI note (15 + 32*B)
REW LED	MIDI note 0
FFWD LED	MIDI note 1
PLAY LED	MIDI note 3
RECORD LED	MIDI note 4

Four Controller Banks (Encoders)

This protocol is nearly identical to the "Four Controller Banks (Pots)" protocol. The only difference is the treatment of the rotary encoders (GAIN, FREQ, Q, PAN and DATA Wheel).

Instead of emulating potentiometers, a turn one click to the right would send a MIDI value of 68 (or 65 if SET is held down). A turn one click to the left would send a MIDI value of 60 (or 63 is SET is held down). The result makes changing banks "seamless" to the user.

Initialization

When one of these protocols is first selected, SEL 1, LO and ASN are selected in all four banks, and BANK1 (AUX1) is selected. In "Four Controller Banks (Pots)" mode, all rotary controls in all four banks are set to the physical fader positions. The channel faders in the other three banks are set to 0 value.

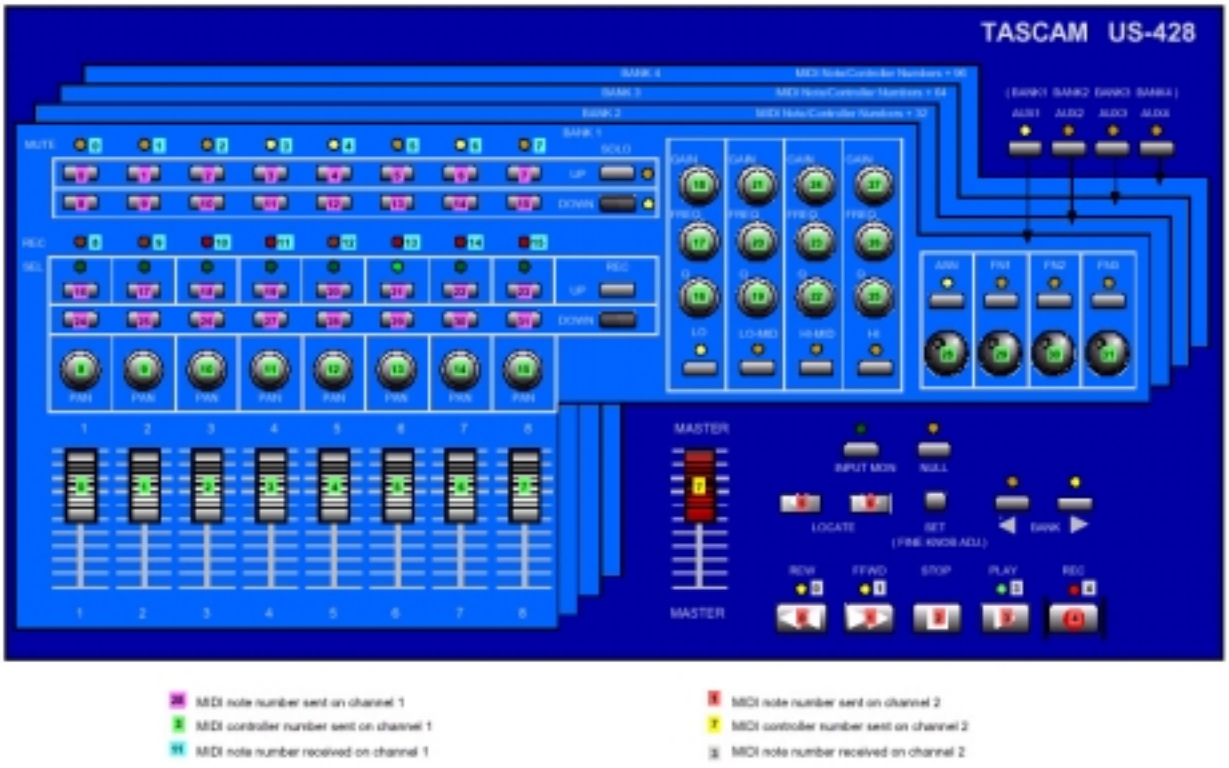


Illustration 8.02 – US-428 Four Controller Layers

8.11.2 Keystroke Emulation

As we've mentioned throughout this manual, the US-428 is a very versatile device, capable of controlling a wide variety of software applications. The list of applications that have been tested by TASCAM and approved for use with the US-428 can be found on the US-428 News area of the TASCAM web site.

But beyond these approved software applications, the US-428 can also be used for slightly less comprehensive control of a number of other applications, by utilizing keystroke emulation.

IMPORTANT NOTE: The files and documents in this section have not undergone full TASCAM quality control testing. Use these resources at your own risk. TASCAM assumes no liability for any damage to the US-428, your computer, peripheral devices or stored files of any variety as a result of your use of files or documents that are referenced on this page. Also, TASCAM does not assume any responsibility for other content that may be viewable or downloadable from any of the links on the US-428 Users' Page.

Many of these files and documents have been created by US-428 users. While TASCAM has made every effort to check their reliability, the support of these applications is not guaranteed. our primary source for questions and general support will be the individuals supplying the applications. Many of these applications may be under continuing development, so we recommend you check the US-428 Users' Page on a regular basis.

Once again, an important reminder: Support for the following applications is offered by the individuals who have created these controller maps. Please bear in mind that these are private individuals, sharing their knowledge and creativity voluntarily – if you need to contact any of the individuals listed here or on the Users' Page, be considerate of their time and their generosity, and reasonable in your requests.

Some Info On Keystroke Emulation

In its Native mode, the US-428 communicates with the host application by sending MIDI controller messages to the program's GUI (Graphic User Interface). While this is certainly the preferred method of communication, a number of software applications still do not recognize MIDI controller commands. The US-428 can still communicate with many of these programs though, by means of keystroke emulation. Essentially, this involves the host computer using a small applet to translate the US-428's incoming MIDI controller commands to keystrokes, which are then recognized by the software.

This applet, Florian Bome's MIDI Translator, is available from the author's website, www.bome.com; we recommend you check there to obtain the current version and additional information. With the author's permission, the current version has been included on the US-428 driver CD-ROM. The author has also been kind enough to provide documentation, which you will also find on the CD-ROM.

You will also need an application to route the MIDI signal within your PC. (If you're running any DAW software and using virtual synths, chances are you've already got one installed.) With the author's permission, we've included Jim

Johnson's MIDI Thruway (www.technotoys.com), a MIDI merge/thru/filtering/channelization utility. There are several other good virtual MIDI port emulators available on the web, such as:

Hubi's Loopback Device (http://members.nextra.at/hubwin//midi.html)
MIDI Yoke (http://www.midi-ox.com)

A Word About Backup: The world of computer recording is a complex one. Particularly on the Windows platform, the sheer number of possible configurations of hardware and software almost guarantee inconsistent results between users of the same products.

It is with this in mind that we repeat the time-honored adage: "If it matters, back it up." Backup programs come in many shapes and sizes. Especially in systems optimized for audio, we recommend drive imaging software as the best backup solution. Drive imaging software creates an actual image of your hard drive; in the event of a crash (or if, for example, you've installed a new driver which is conflicting with your existing setup), a disk imaging application will allow you restore your system to the last (presumably working) configuration you've saved.

The US-428 Users' Page

As we've said, your best and most current source of information on the US-428 is the TASCAM website. Linked to the US-428 Downloads page, you'll find driver updates, compatibility information, troubleshooting documents, and our Online Users' Forums. You'll also find the Users' Page, where US-428 owners can share their own custom controller maps for various applications.

The Users' Page is located at: http://www.tascam.com/products/us428/DAW_page.cfm, or linked from the main US-428 downloads page. We recommend you check the Users' Page for the current list of submissions.

Important note: TASCAM makes no guarantees for the support of these applications. Your primary source for questions and general support will be the people supplying the applications. We recommend you check their websites for information, and that you email the authors directly with any questions. Be sure to read the accompanying documentation before asking for help.

On the Users' Page you'll find mapping protocols, created by US-428 Users, which utilize **Bome's MIDI Translator**. As this manual goes to press, support exists for such applications as Adobe Premier, Win Amp, Sonic Foundry's Vegas and Acid, Windows Media Player, and several others. As this list is updated regularly, we recommend you check the Users' Page for current information and updates.

9. Technical Support

9.1 Troubleshooting

When installing the US-428 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), find the Audio control panel. It's called **SOUND, VIDEO AND GAME CONTROLLERS** in Win98SE, or **SOUND & MULTIMEDIA** in W98ME and Win2K. You should see two entries for the US-428:

- TASCAM US-428
- US-428 WDM Interface

In **CONTROL PANEL / MULTIMEDIA**, select the **AUDIO** tab.

- Under **PLAYBACK**, **US-428 OUT** should appear in the drop down menu
- Under **RECORDING, US-428 A:B** and **C:D** 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-428 Port 1
- US-428 Port 2
- US-428 Control

In **CONTROL PANEL / MULTIMEDIA**, select the **DEVICES** tab. Under **AUDIO DEVICES**, you should see:

- Audio for US-428

Under **MIDI DEVICES AND INSTRUMENTS** you should see:

- MIDI for US-428. Expand by clicking on the plus (+) sign and you should see:
  - US-428 Port 1
  - US-428 Port 2
  - US-428 Control

(Ports 1 and 2 correspond to the US-428's physical MIDI I/O ports. US-428 Control is the "virtual" USB MIDI port with which the US-428 and its control surface communicate with your application.)

BEFORE CONTACTING US

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 breaking news.
- Also on our website, you'll find our always lively Online User Forums, where you can read posts from other users and get answers from other users and TASCAM moderators.
- You can also email us at US428team@tascam.com, or contact our telephone support.

Please see the Contact page of our website for worldwide contact information.

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-428 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.

9.1 Troubleshooting FAQs

NOTE: While this manual contains some basic FAQ's, you will find a much more detailed FAQ document on the US-428 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-428 in Cubasis' Audio Control Panel.
A. Check to see if the US-428 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-428 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-428, 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-428, 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-428 ASIO driver (16 or 24 bit) is selected.

Q. I can hear audio, but I see no response to the US-428 on screen.
A. Make sure you've got the US-428 selected in the VST Remote menu. Make sure you're looking at the correct BANK of faders on screen.

9.2 Tech Support Contacts

If you've got questions on the US-428, your best source of help is to post them to our US-428 Online Users' Forum, located on our website at www.tascam.com. 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-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.

If you've got a hardware or other problem and need to speak to us, you'll find a full list of contacts for TASCAM worldwide on our website.

9.3 Software Downloads

Since US-428 support is continually expanding, the chances are good that by the time you read this there will be updates available. We strongly recommend you check back regularly at www.tascam.com for news, driver updates and other important information.

9.4 Programming the US-428

The US-428 has been one of TASCAM's most popular new products, and has built up a tremendous base of users since its release. Many of these users have helped to "push the envelope" and create an ever-growing list of uses for the US-428. And while programming MIDI controller information isn't for everyone, we've felt certain since its release that the development of new and different applications for the US-428 is of interest to many users. In an effort to foster the creative development of the US-428's application base, TASCAM has made the programming specifications for the US-428 publicly available. You'll find basic information on the US-428's Control Protocol on the TASCAM website. It is also included in the appendices of this manual.

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
Mode 3 : OMNI OFF, POLY
Mode 4 : OMNI OFF, MONO

O:Yes
X: No

Appendix B – Control Protocol

Purpose

Provide simple, effective integration between the US-428 and host software applications.

Introduction

The US-428 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-428 requires a set of messages to be defined which permits two-way communication of control information between the host application and US-428.

Functional Groups

The US-428's control surface are divided into several major functional groups:

a) Transport and Locate switches and status LED's
b) Per-channel controls (faders, switches, and LED's)
c) Bank switching buttons and LED's
d) EQ switches, continuous EQ and pan knobs, and associated status LED's
e) 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-428. In many cases, the commands transmitted by the US-428 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-428. As an example, here is how a change in transport state from STOP to PLAY might be communicated:

1. User presses PLAY button on US-428.
2. Play-button command is sent via USB to host application as MIDI .
3. Application receives Play message from the "US-428 Control" Midi input device.
4. Application switches to PLAY mode, just as if user had performed the operation with a mouse-click.
5. Application sends Transport Update message to "US-428 Control" Midi output device, which is sent via USB to the US-428.
6. US-428 interprets transport-update command, and responds by activating the PLAY LED.

In this example, the US-428 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-428 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-428 to Host Messages (transmitted at button-down):

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

Host to US-428 Messages (transmitted when host transport-state changes:

- UPDATE_TRANSPORT_LED:
  - State is REWIND: F0 4E <UNIT> 12 01 13 <STATE> F7
  - State is FFWD: F0 4E <UNIT> 12 01 14 <STATE> F7
  - State is STOP: F0 4E <UNIT> 12 01 15 <STATE> F7
  (Note: US-428 has no STOP LED: message is defined for future devices)
  - State is PLAY: F0 4E <UNIT> 12 01 16 <STATE> F7
  - 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-428 includes a set of 8 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-428 to Host Commands:

1. FADER_POSITION: BF 4x vv x = [0..7], vv = [0..7F]
2. MUTE_SWITCH:
    a. Button-down: BF 0x 7F
    b. Button-up: BF 0x 0 x=[0..7]
3. SELECT_SWITCH:
    a. Button-down: BF 2x 7F
    b. Button-up: BF 2x 00 x=[0..7]
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

Host to US-428 Messages:

Note: In these messages, <STRIP #>is a number in the range [0..7], 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-428 to send current fader position messages to host via the Us-428 Control Port

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

Bank-Switching Command Set

The US-428 has two switches that allow the user to select the bank of application channels that is addressed by the eight channel-strips. For example, an application with 32 virtual tracks would define 4 banks of eight channel strips each. The Bank-L and Bank-R switches let the user quickly shift the control surface to address any bank of eight 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-428 to Host Commands

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

Host to US-428 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.

EQ Knobs and Band Selection Command Set

Three continuous-turn rotary encoders allow the user to set the Gain, Frequency, and Bandwidth of a band of parametric EQ. The controller numbers used are the same as the JL Cooper CS-10, however instead of an absolute 0..7F value, the increment/decrement of the encoder is transmitted. The application must understand when the logical limit of the EQ control has been reached, and provide on-screen feedback to let the user know that he is at the minimum or

maximum setting for the control. This prevents "wrapping" and discontinuous changes in the values of the parameters being sent. A pan encoder knob is also defined; its operation is similar to the EQ encoders.

US-428 To Host Commands:

1. SELECT_EQ_HI
    a. Button-down: BF 2C 7F
    b. Button-up: BF 2C 00
2. SELECT_EQ_HIMID
    a. Button-down: BF 2D 7F
    b. Button-up: BF 2D 00
3. SELECT_EQ_LOMID
    a. Button-down: BF 2E 7F
    b. Button-up: BF 2E 00
4. SELECT_EQ_LO
    a. Button-down: BF 2F 7F
    b. Button-up: BF 2F 00
5. EQ_GAIN_CHANGE:
    a. BF 48 vv, vv = 2's complement using 7 data bits
6. EQ_FREQ_CHANGE
    a. BF 49 vv, vv = 2's complement using 7 data bits
7. EQ_BW_CHANGE
    a. BF 4A vv, vv = 2's complement using 7 data bits
8. MASTER_FADER
    a. BF 4B vv, vv=2's complement using 7 data bits
9. PAN_CHANGE
    a. BF 4D vv, vv = 2's complement using 7 data bits

Host to US-428 Messages:

1. UPDATE_EQ_HI_LED: F0 4E<UNIT> 12 09<STATE> F7
2. UPDATE_EQ_HIMID_LED: F0 4E<UNIT> 12 0A<STATE> F7
3. UPDATE_EQ_LOMID_LED: F0 4E<UNIT> 12 0B<STATE> F7
4. UPDATE_EQ_LO_LED: F0 4E<UNIT> 12 0C<STATE> F7

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

Function switches, LED's, and continuous data wheel

A row of four AUX buttons is used to select an effect (aux-send) level for the selected channel(s). When the user selects and AUX1-4 button, this fact is transmitted to the host, indicating that future movements of the data wheel will affect that parameter.

Another row of four switches includes an ASN (track-source assign) button, and three application-definable function buttons. A typical use of the function buttons would be to enable/disable effects, or to mimic the function of the computer's arrow keys, to allow the user to switch from track to track, switch between controls in a dialog, etc. The ASN button is intended to allow the user to quickly determine the input-source for a track, by selecting this button and then using the data wheel to cycle through the possible input-sources for the selected track.

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

US-428 to Host Commands:

1. AUX_SWITCH
    a. Button-down: BF 3x 7F
    b. Button-up: BF 3x 00, where x=[0..3] (for AUX1, AUX2, AUX3, AUX4)
2. ASN_SWITCH
    a. Button-down: BF 34 7F
    b. Button-up: BF 34 00
3. FN_SWITCH
    a. Button-down: BF 3x 7F
    b. Button-up: BF 3x 7F, where x=[5..7] (for FN1, FN2, FN3)
4. DATA_WHEEL (identical to JL Cooper CS-10)
    a. BF 60 vv, vv = 2's complement using 7 data bits

Host to US-428 Messages:

1. UPDATE_AUX_FN_LED: F0 4E<UNIT> 12 0D<AUX#> <STATE> F7
2. UPDATE_FN_LED: F0 4E<UNIT> 12 0E <FN#> <STATE>F7
3. UPDATE_ASN_LED: F0 4E<UNIT> 12 0F<STATE> F7

where

<AUX> is in the range [0...3] corresponding to LED's [AUX1·AUX4]
<FN#> is in the range [0...2] corresponding to LED's [FN1·FN3]
<UNIT> Transmit as 0 for now.
<STATE> is either 0x00 (LED OFF) or 0x7F (LED ON)

Appendix C - US-428 Technical Specifications

General

Frequency Response
20 Hz - 20KHz, /0.5 dB / -0.3 dB
LINE A/B to LINE OUT
LINE TRIM max, -28dBu input
LINE OUT Level -10dB position

Noise Level
Better than -82dBu Din Audio
Better than -88dBu A Weight
MIC A/B to LINE OUT
LINE TRIM min, 150 ohm terminated
LINE OUT Level -10dB position

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

THD
Within 0.07%
MIC A/B to LINE OUT

LINE TRIM max, -28dBu input
LINE OUT Level -10dB position
Crosstalk: Better than -80 dB at 1KHz
LINE TRIM max, -28dBu input
LINE OUT Level -10dB position
Click: Less than -35 dBu
Fader Attenuation: Better than -90 dB at 1 KHz
Mute Level: Better than -90 dB at 1 KHz

Dimensions:
14" x 11.5" x 3.25" (35.5 x 29.5 x 8 cm)
Weight: 2.05 Kg (4.5 lbs)

Power Consumption:

Version	Voltage	Hz	Power Consumption
DM	100	50/60	7.5 (50Hz)
T/C	120	60	7.5 (60Hz)
EUR	230	50	7.5 (50Hz)
UK	240	50	7.5 (50Hz)
AUS	240	50	7.5 (50Hz)

Input / Output Connectors

MIC INPUT A/B (Analog)
Connector: XLR-3-31
(1:= GND, 2:= Hot, 3:= Cold) : Balanced
Input Impedance: 2200 ohm
Nominal Input Level (Trim max.): -63 dBu
Nominal Input Level (TRIM min.): -16 dBu
Maximum Input Level: 0 dBu (TRIM min)

LINE INPUT A/B (Analog)
Connector: 1/4" TRS
(Tip:Hot; Ring:Cold, Sleeve:GND)
Input Impedance: 22kOhm
Nominal Input Level (Trim max.) -43 dBu
Nominal Input Level(TRIM min.): +4 dBu
Maximum Input level: +20 dBu (TRIM min)

LINE INPUT C/D (Analog)
Connector: 1/4"
(Tip:Hot; Ring:GND; Sleeve:GND) Unbalanced
Input Impedance 47Kohm at MIC/LINE
680Kohm at GUITAR
Nominal Input Level (Trim max.): -46 dBu
Nominal Input Level(TRIM min.): -10 dBV (-7.8 dBu)
Maximum Input Level: +6 dBV (+8.2 dBu) (TRIM min)

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: +16 dBV (+18.2 dBu)
(LINE LEVEL max)

PHONES OUTPUT (Analog)
Connector: 1/4" TRS Stereo
(Tip:L, Ring:R, Sleeve:GND)
(when nominal impedance 40 Ohms loaded)

DIGITAL IN
Connector: RCA pin jack
Format: IEC958 TYPE2
Input impedance: 75ohm
Input Level: 0.5Vp-p

DIGITAL OUT
Connector: RCA pin jack
Format: IEC958 Type 2
Output Impedance: 75 ohm
Output Level: 0.5Vp-p
MIDI IN 1,2
Connector: 5P DIN
Format: Standard MIDI Format
MIDI Out 1,2

Connector: 5P DIN
Format: Standard MIDI Format
USB
Connector: USB Down stream connector
Format: USB

ADC / DAC

A/D Converter
24Bit, 64 times oversampling
Delay: 30 samples
D/A Converter
24Bit, 128 times oversampling
Delay: 30 samples

Audio Performance

MIC Input (A,B XLR Analog Input to Digital Output)
Nominal Level (TRIM max.)
-65.2dBu +1dB / -1dB
TRIM max, 1KHz, (-48dBu input)
Nominal Level (TRIM min.)
-16.2dBu +0.5dB / -0.5dB
TRIM min, 1KHz, (9dBu input)
Frequency Response
20 Hz - 20KHz + 0.2dB / - 3dB
TRIM max, -48dBu input
20 Hz - 20KHz + 0.1dB / -2dB
TRIM min, 0dBu input
Noise Level
Within -81dBFs Din Audio
Within -83dBFs A Weight
TRIM max, 150 ohm terminated
Within -95dBFs Din Audio
Within -98dBFs A Weight
TRIM min, 150 ohm
T.H.D.
Typical 0.04% at 1KHz
TRIM max, -48dBu :
Better than 0.005% Typical 0.003% at 1KHz
TRIM min, 0dBu
LINE Input (A,B 1/4" Analog Input to Digital Output)
Nominal Level (TRIM max.)
-45.7dBu, +1dB / -1dB
TRIM max, 1KHz, (-28dBu input)
Nominal Level (TRIM min.)
-16.2dBu, +0.5dB / -0.5dB
TRIM min, 1KHz, (9dBu input)

Frequency Response
20 Hz - 20KHz, + 0.2dB / - 3dB
TRIM max, -28dBu input
20 Hz - 20KHz, + 0.1dB / -2dB
TRIM min, 0dBu input
LINE Input (C,D Analog Input to Digital Output)
Nominal Level (TRIM max.)
-46.6dBu, +1.5dB / -1.5dB
TRIM max, 1KHz, (-30dBu input)
Nominal Level (TRIM min.)
7.09dBu, +0.3dB / -0.3dB
TRIM min, 1KHz, (9dBu input)
Frequency Response
20 Hz - 20KHz, + 0 .5dB / - 2dB
TRIM max, -30dBu input
20 Hz - 20KHz, + 0.3dB / -0.3dB
TRIM min, 9dBu input
Noise Level
Within -82dBFs Din Audio
Within -83dBFs A Weight
TRIM max, 150 ohm terminated
Within -95dBFs Typical -97dB Din Audio
Within -98dBFs Typical -99dB A Weight
TRIM min, 150 ohm terminated
T.H.D
Better than 0.03% Typical 0.01% at 1KHz
TRIM max,-30dBu :
Better than 0.04% Typical 0.03% at 1KHz
TRIM min, 8dBu
LINE OUT (Digital Input to LINE OUT)
Nominal Output: 6dBV, +1.2dB / -1dB
D IN 0dBFs input, LINE OUT Level -10dB position
Frequency Response:
20 Hz - 20KHz, + 0.2 dB / -0.4 dB
D IN 0dBFs input, LINE OUT Level -10dB position
T.H.D.: Better than 0.003% Typical 0.0025% at 1KHz
D IN 0dBFs input, LINE OUT Level -10dB position
Noise Level:
Within -95dBV Din Audio
Within -99dBV A Weight
D IN 0dBFs input, LINE OUT Level -10dB position
PHONES Output
Maximum Output: More then 28mW + 28mW
Typical 32mW + 32mW
Within 1% distortion, at 1KHz, 40 ohm loaded
T.H.D.: Within 1 %
1KHz, Output 25mW + 25mW, 40 ohm loaded
Frequency Response:
100 Hz - 20KHz, + 0.5dB / - 0.5 dB
Nominal level, 40 ohm loaded
20 Hz - 100 Hz, +0.5dB / - 5dB
Nominal level, 40 ohm loaded