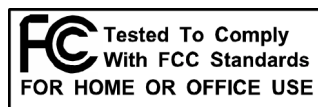




## Owner's Manual Version 1.0 for PC

Mia is designed and manufactured in the U.S. by Echo Corporation



Sending in your registration card – or registering online at <http://www.echoaudio.com/register.html> - allows us to register key information so that we may handle problems faster and inform you of advance information on upgrades and other news. Thanks in advance for filling out your registration card and sending it to us. We hope you enjoy your Echo product.

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Carpinteria, CA 93013**

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# Introduction

Thank you for choosing Mia. We think you'll find Mia to be an extremely flexible, high-performance tool for your computer-based hard disk recording system.

## What You Should Have Received in the Mia Box

When you opened the Mia box, you should have found the following:

- A Mia PCI card wrapped in an anti-static cover
- A CD-ROM containing the Mia Windows 95/Windows 98 Drivers, Syntrillium Software's Cool Edit Pro™— Special Edition multitrack recording and editing software, and demo versions of digital audio recording, editing, and processing software from a variety of manufacturers
- The Mia owner's manual

## System Requirements\*

- Genuine Intel Pentium II/III or AMD Athlon/Duron system running Windows 98/Me/NT/2000
- Genuine Intel chipset of VIA KX-133, VIA KT-133, or AMD 760 chipset (Athlon/Duron)
- 64Mb RAM (more highly recommended)
- A fast, high-capacity IDE or SCSI hard disk drive
- Peripheral audio equipment, such as microphones, studio monitors, musical instruments, mixer, etc.

\* Win NT/2000 drivers are expected to be ready in early 2001.  
Check [www.echoaudio.com](http://www.echoaudio.com) for availability.

## Mia Installation

Complete Mia installation consists of performing a system check, disabling Windows system sounds, installing the Mia PCI card, installing the Mia Windows drivers into your system and, if necessary, installing a multi-track audio recording/editing application.

### System Check

The first thing you should do is check the display settings for your computer. The Mia Echo Console software requires small fonts to display properly, or if large fonts are selected then a minimum resolution of 1024x768 is needed.

To check your display settings, go to the Windows **Control Panel**, which can be found under **Settings** from the **Start** button. In the **Control Panel** window you will find an icon titled “**Display**.” After double clicking on this icon, the **Display Properties** window will appear. Click the **Settings** tab at the top right of this window. At the bottom right of the window you will see a box labeled **Desktop area** or **Screen area**. Inside the box is a slider that allows you to select different resolutions for your monitor. Note your current screen resolution and then click the **Advanced** button on the bottom right of the window. You should see a drop down window labeled

**“Font Size.”** If this is set to **Large Font** and your screen resolution is less than 1024x768 you will either need to change it to **Small Font** or increase your screen resolution.

## **System Sounds**

There is one final step to perform before installing the Mia hardware. We suggest that you turn off your Windows system sounds prior to installing Mia. Because most system sounds are sampled at very low sample rates, typically 8 to 11 KHz, each time they are played it will cause the sample rate clock on Mia to reset to the slower speed. This can cause digital equipment sync'd to Mia to lose synchronization.

To turn off the system sounds, first go to the Windows **Control Panel**, which can be found under **Settings** from the **Start** button. On the control panel you will find an icon titled **“Sounds”**. After double clicking on this icon, you will see a window labeled **“Schemes”** near the bottom of the screen. Click on the small down arrow to the right of the combo-box and select the **“No Sounds”** option. Then click on the Ok button.

## **Installing the Mia Hardware**

Once you have verified that there are no problems with your system, it is time to install Mia into your computer.

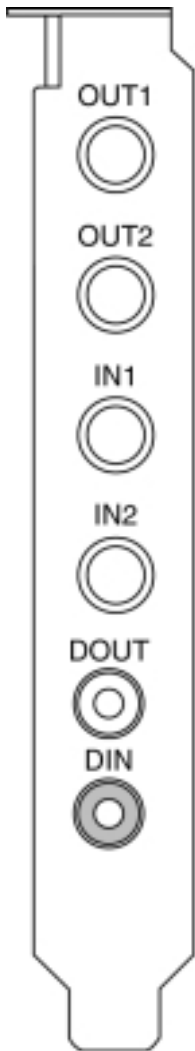
***IMPORTANT - Unplug your computer and detach all peripherals before proceeding with the following steps.***

1. Remove your computer's cover. This operation differs from computer to computer. Refer to your computer's manual for a further explanation of this step if necessary.
2. Select the PCI slot into which you will install the Mia card. Inside your computer you will likely find two types of expansion slots, ISA and PCI. The PCI slots will be shorter and have a higher connector pin density than the ISA slots. You may use any of the available PCI slots in your computer for Mia. Unscrew and remove the bracket covering the expansion slot where you would like to install Mia. Put the screw in a safe place, as you will need it later to complete the installation.
3. Insure that you have fully discharged all static electricity from your body before handling the Mia card. This can be done through the use of a grounding strap or, more simply, by touching your bare hand to the metal casing of the computer's power supply. (For this latter method to work, the computer must be plugged in, though not turned on.) After you've discharged your static, unplug the computer before proceeding to the next step.
4. Remove the Mia card from its protective anti-static bag. Handle the card carefully by its edges and insert it into the selected expansion slot. Insure that the card's edge connector (the protruding edge with the gold leads) is seated firmly into the slot. Centering the card over the slot and using a gentle rocking motion while pushing downward into the slot generally works well. Be careful not to force the card into the slot, or bend or twist it while it is being inserted, as this could result in the card being damaged.
5. Use the screw removed earlier from the protective backplate to attach the metal bracket at the back of the Mia card to the computer's rear panel.



8. Replace the computer cover and secure it. Reattach its power supply cord and reconnect any peripherals that you may have removed prior to beginning the Mia installation.
  
10. You can now attach external audio devices to Mia's connectors. Mia can accommodate two analog input signals and can generate two analog output signals. In addition, Mia provides stereo S/PDIF digital input and output via coaxial RCA connectors. The analog and digital inputs and outputs on Mia are simultaneously active. This allows you to record up to 4 channels of audio (two analog and two digital) while playing back 8 virtual channels (mixed to 4 "physical" channels, two analog and two digital). Additional information on attaching external devices to Mia may be found in the next section.

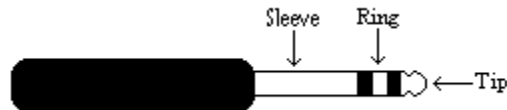
## Connecting to Mia's Connectors



### Analog Inputs and Outputs

Mia has two analog outputs (OUT1 and OUT2) and two analog inputs (IN1 and IN2) on the back. The input and output connections can accept balanced or unbalanced jacks via 1/4" connectors. Both the inputs and outputs are set to receive or send a +4dBu (balanced) signal.

For optimum performance it is recommended that you use balanced signals when connecting to Mia's analog connectors. Mia uses TRS connectors (tip, ring sleeve) for connecting balanced line level signals.



The three sections of a TRS connector are used to transmit the three components of a balanced signal (T = plus, R = minus, S = ground). Mia will also accommodate the two conductor unbalanced style connector.

### S/PDIF Digital Inputs and Outputs

Under the analog connectors is a pair of connectors labeled **DOUT** and **DIN**. These S/PDIF connectors are used to transmit digital data among digital audio devices via an electrical signal. S/PDIF data can use the full 24-bit sample width used internally on Mia.

When connecting devices to the S/PDIF jacks on Mia, the use of standard analog RCA audio cables is not recommended. For reliable S/PDIF operation, 75ohm coaxial (RG59) video cables are recommended.

## Installing the Mia Software Drivers

Now that you have completed the hardware installation, you need to install the software drivers that allow Mia to interact properly with Windows 95/98/Me and your audio recording application.

Turn on the power to your computer's CPU. After Windows 95/98/Me starts up, it will automatically sense the newly installed Mia card and indicate, via a pop-up Install Wizard window, that new hardware has been found. At this point, you should insert the Mia CD-ROM disc.

If you are using the original version of Windows 95:

Within the Install Wizard window are several options. Select the option **Driver from disk provided by hardware manufacturer**. The computer will now prompt you for the location of the driver files. These files are located in the root directory of the Mia CD-ROM. Click the **Browse** button in the Install Wizard; this will cause the **"Install From Disk"** window to appear. In the field labeled **"Copy manufacturer's files from:"**, enter the path **D:\** (depending on your system configuration, your CD-ROM drive may use a letter other than "D"). Click on **OK** to complete the installation. Now skip over the next two paragraphs.

If you are using Windows 95 OSR2:

After you have inserted the Mia CD-ROM disc and clicked **next**, you'll see the message, "Windows found the following updated driver for this device, Mia by Echo." Click on the **Finish** button and Windows will attempt to locate the drivers on a disk labeled "Echo Install Disk." This is caused by a bug in Windows 95 OSR2. So what you'll see is a not-so-nice error message marked with a big red X. Ignore Windows' rude behavior and click on the OK button. This will bring you to the **Copying Files . . .** window. Within the window is a field labeled **Copy Files From:** into which you'll need to enter the path name for the Mia drivers. Type in the letter name of your CD-ROM drive followed by **:\** (for example, **D:\**). Click on **OK**, and Windows will complete the driver installation routine. Now skip over the next paragraph.

### If you are using Windows 98:

After you have inserted the Mia CD-ROM disc and clicked **next**, you'll see the message, "What do you want Windows to do?" Below that are two radio buttons. If it isn't already selected, select the one labeled "Search for the best driver for your device (Recommended)". Click on the **Next** button and a dialog will appear with several check boxes indicating places where Windows will look. Since you are installing from your CD-ROM drive, click on the appropriate box. Be sure all other boxes are unchecked. Click on the **Next** button and Windows will locate the drivers on the install disk and show you the **Copying Files . . .** window as it completes the driver installation.

### If you are using Windows Me:

After you have inserted the Mia CD-ROM disc, make sure the option "Automatic search for a better driver" is selected, and click the **Next** button. Windows will automatically find the driver on the CD-ROM and install it. When you are prompted to, click the **Finish** button.

After the drivers are installed, you should verify that Windows recognizes them. You can do this by checking in the Windows Control Panel as follows:

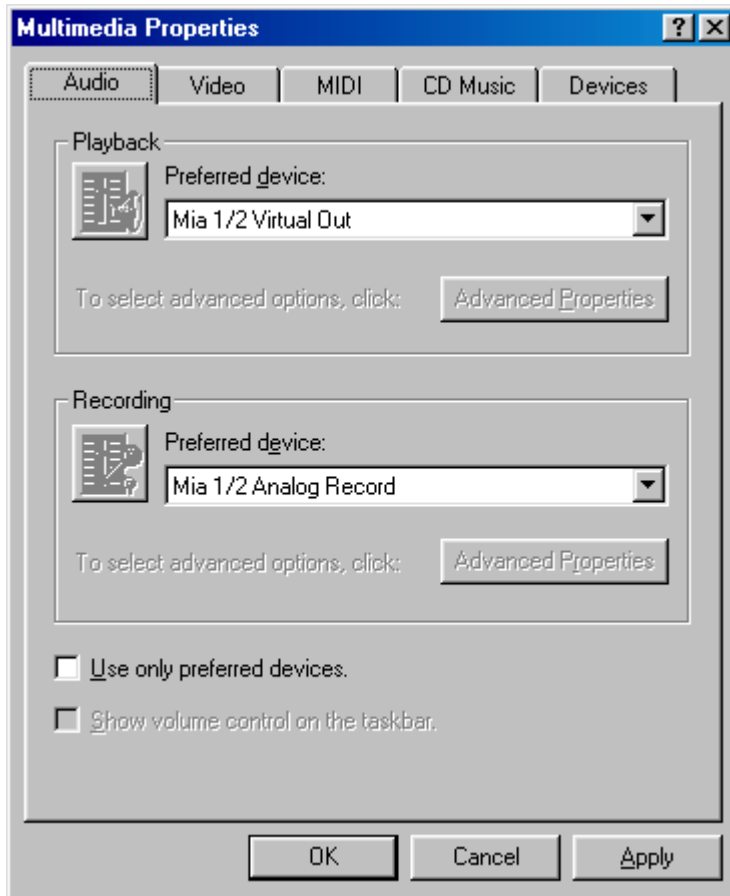
Begin by clicking on the Windows **Start** button. Then select **Settings**, followed by **Control Panel**. Now double-click on the icon labeled **System**. At the top of the **System** window, you will see a tab labeled **Device Manager**; click on the tab. Now locate the line labeled **Sound, Video, and Game Controllers**. Double-clicking on the "+" to the left of the line's associated icon should reveal the line **Mia by Echo**; double-click on that line. If everything is in working order, a message should now appear on your screen that matches the picture below. In the center of the Mia Properties window will be a section called "Device Status." Look for a message that reads: "This device is working properly." If you see it, give yourself a hearty pat on the back for a job well done!



*Proper installation of the Mia drivers will result in the message, "This device is working properly."*

If the message does not appear, check Appendices A, B and C for help in isolating the cause of your difficulties.

You can now exit back to the **Control Panel** window to check the Mia audio input and output devices that are available. In the **Control Panel** window, locate the **Multimedia** icon and double-click on it. This will bring the multimedia **Properties** window into view. Select the **Audio** tab to see a list of available playback and recording devices in the **Preferred Device** fields.



*You can view the Mia input and output devices in the Multimedia Properties/Audio window.*

## Mia Audio Input & Output Devices

The Mia driver installs into your computer as a series of stereo .WAV devices. Pulling down the **Preferred Device** menu in the **Control Panels/Multimedia/Audio Playback** section will reveal the available Mia devices. You will be able to select from:

Mia 1/2 Virtual Out  
Mia 3/4 Virtual Out  
Mia 5/6 Virtual Out  
Mia 7/8 Virtual Out

These represent the eight “virtual” outputs available on Mia which are mixed down within Mia’s DSP to form the actual analog and digital outputs found on the back of the card. Mia’s console (described below) gives you complete flexibility over how these outputs are mixed including routing and volume levels.

In the **Recording** section, the following choices will be available:

Mia 1/2 Analog Record  
Mia S/PDIF Record

You’ll find these same input and output options available when using your audio record/editing software, with the devices assignable on a per-track basis. See your software owner’s manual for details on how to make these device assignments. Instructions for making these assignments in Cool Edit Pro™— Special Edition can be found in the special “**Cool Edit Pro**” section at the back of this manual.

This completes the installation of the Mia hardware and software.

## Mia's Virtual Outputs

Most cards with a pair of analog inputs and outputs will appear to software as having just that, a single pair of inputs and outputs. When one application appropriates the card for its use, all other software is “locked-out” from using the card at the same time.

While there is seldom, if ever, any need to record to multiple applications simultaneously, there are numerous instances where this is desirable for outputs. A good example would be playing back digital audio while at the same time using a software synthesizer for MIDI. Another example would be using multi-track editing software. Before multiple tracks can be played back on a stereo device, they must be mixed down within the software to the two output tracks. This takes up extra CPU cycles that might otherwise be dedicated to software effects or some other task.

Mia gets around this by combining the use of “virtual” outputs with its “multi-client” drivers. Mia appears to software as if it has eight separate outputs. These are mixed together with Mia's on-board DSP to produce the actual or “physical” outputs that connect to external equipment without any CPU intervention. Any virtual output can be sent to any actual output along with any combination of other virtual outputs. The levels and routing of the virtual outputs is fully controllable with Mia's Console, which is described later in this manual.

An example of this would be using Reality from Seer Systems with Cakewalk's Pro Audio. Reality could be set up to play back through Mia's outputs 7 and 8. Cakewalk's Pro Audio, which combines MIDI sequencing with digital playback, could then play back its MIDI output through Reality while using Mia's outputs 1 through 6 for six separate tracks of digital output.

This gives Mia most of the advantages of products with eight separate analog outputs, without the added expense of the extra converters or having to use an external mixer to mix the outputs down to a final pair of stereo outputs.

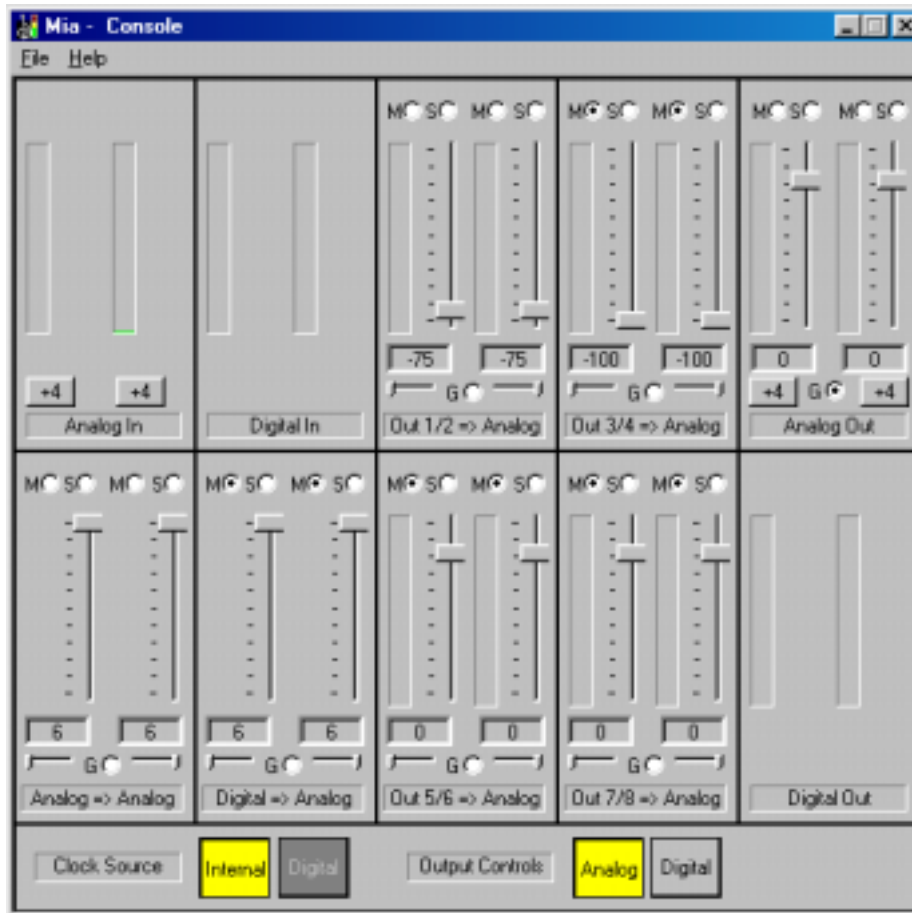
**Note:** To use Mia with multiple applications **Multi-Client Mode** must be enabled in the device property page (see below).



# The Echo Console

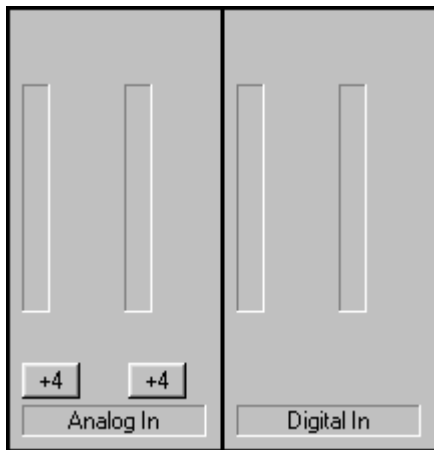
Included with your Mia is a “virtual control surface” application called the Echo Console. Every time you start Windows you will see it flicker across the screen as it loads. Then it will minimize itself to the taskbar. The Console allows you to control the audio I/O and clocking functions of Mia, and it brings these controls to a single easy-to-use location. From the console you can mix the virtual outputs, control the output levels, select clocks, and adjust input monitoring.

The Echo Console software was automatically installed at the same time that you installed the Mia driver for Windows 95/98/Me. If installation was successful, you should see a blue capital letter **M** in your Windows 95/98/Me taskbar (typically in the bottom right-hand corner of your screen). Double-clicking on the “**M**” will activate the console program. It should look like this:



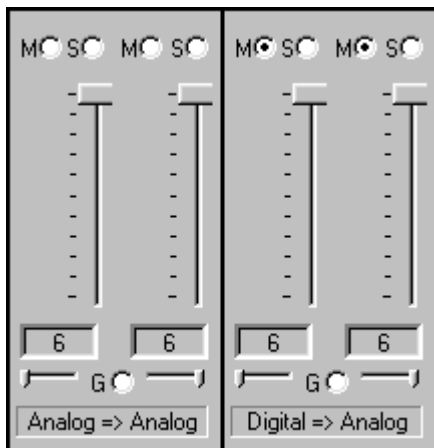
The console functions are grouped into three areas: inputs and monitors (on the left), virtual output mixing controls (in the middle), and outputs (on the right hand side). The controls for a particular function/stereo pair are then further grouped into a box that contains selection buttons, faders, and other controls and displays as determined by the function.

## Input Controls



Let's take a look at the control surface. The input control area is located in the upper left portion of the console surface. For each input device pair you will find a pair of input meters. In addition, the analog inputs have controls that allow you to select between +4dBu (professional) input levels or –10dBV (consumer) input levels. Clicking on the button will toggle back and forth between the two levels.

## Monitor Controls



Below the input channels are the input monitor controls. These allow you to monitor the input signal via any of the outputs on your Mia. Each input channel pair has a corresponding monitor control pair directly below it on the console. At the top of each monitor pair are radio buttons that allow you to selectively mute (M) or solo (S) each channel. In the middle you will find a pair of faders that will allow you to set the levels of the monitor signals. At the bottom

of the control area there is a radio button that allows you to “gang” (G) the faders. Ganging the faders ties them together so that they will maintain their relative placement with regard to each other. Below each fader is its corresponding pan control. In the default pan positions (see example below)

the signal from input 1(left) will be monitored by output 1(left), and the signal from input 2(right) will be monitored by output 2(right). Moving a pan control will determine how much of the input signal is sent to each output channel in the selected output pair. Both pan controls and faders can be reset to default by pressing the **Ctrl** button and left clicking on the control.

Notice that the monitor controls are labeled at bottom indicating which input is being monitored and which output they are going to. In the pictures above, controls for the analog outputs are shown. There is a duplicate set of controls for monitoring through the digital outputs that are hidden from view. Clicking on the large “Output Controls” button labeled “Digital” at the bottom of the console will display the monitor controls for monitoring through the digital outputs. These controls are labeled “Analog => Digital” and “Digital => Digital”.

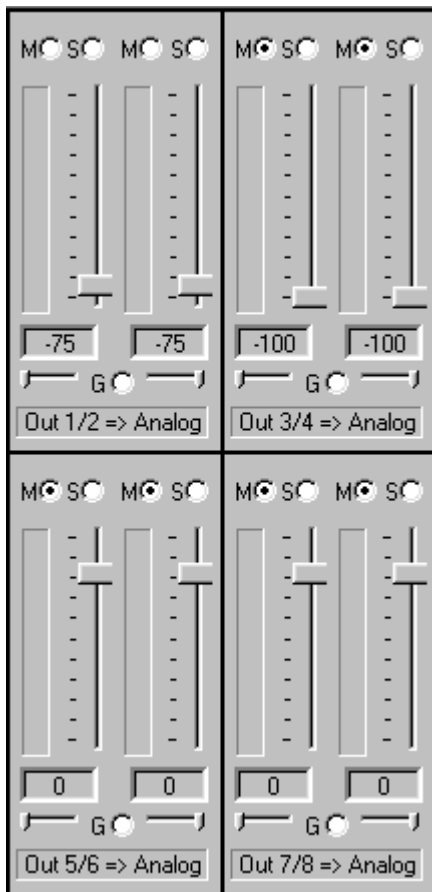
The monitors are one of the most powerful functions of the console. When you are recording, these controls allow you to set the level at which each input signal will be monitored at each of the outputs, independent of the main output level control.

When setting a monitor level, you must first select whether you are adjusting the monitors for the analog or digital outputs by clicking on the appropriate “Output Controls” button on the bottom of the console. Then adjust the input that will be monitored. Selection of the input is really just a matter of using the correct monitor control box. A monitor setting will always affect the input pair that is directly above it. To set the monitor for the analog inputs, for example, simply go to the monitor control directly below the analog inputs and click on one of the buttons found in the center of the control.

Let’s say you want to set the level at which the analog inputs are monitored through the S/PDIF outputs on Mia. You would first click on the “Digital” output control button at the bottom of the console to select the digital controls. Then you would adjust the monitoring levels by using the sliders and buttons within the monitor control labeled “Analog => Digital). The console program remembers any settings that you make, and all settings for all outputs are maintained independently.

Remember that all of the monitor controls remain in effect even when they're not displayed. The degree of attenuation (or muting) of each level is set by the monitor controls. The console program constantly maintains a level setting for each of the monitor paths it controls. Clicking on either the "Analog" or "Digital" output control button simply selects the settings that are displayed.

## Virtual Output Controls

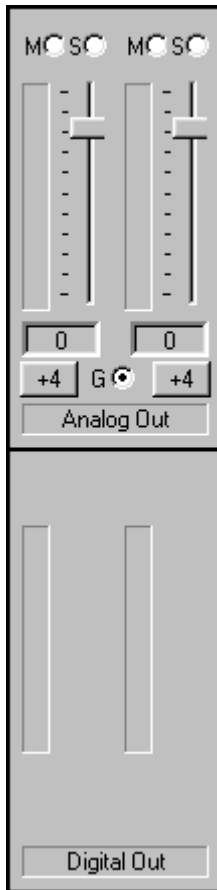


The middle of the console is dedicated to the controls for virtual output channels one through eight. The output controls look like the monitor controls (Gang, Mute, Solo, & faders), except that there are also meters that show the levels for each of the virtual outputs. Just like the monitor controls, the output faders can be reset to default by pressing the **Ctrl** button and left clicking on the fader.

The controls for mixing virtual outputs 1/2 and 3/4 to the analog outputs are shown above. Just like the monitor controls, there are duplicate controls for mixing to the digital outputs that are not shown. To view these controls, select the "Digital" output controls button at the bottom of the console.

All virtual output sliders default to 0 dB when the console is first installed. Since multiple outputs are being added together, you may need to lower these levels to avoid clipping at the analog or digital output. Also, when the console is first installed virtual outputs 1/2 are routed to the analog outputs and virtual outputs 3/4 are routed to the digital outputs.

## Output Controls



The right hand side of the console is dedicated to the controls for the “physical” analog and digital outputs. An output meter pair is included for the two S/PDIF output channels, but these levels are not adjustable. The analog output controls are similar to those found on the virtual output controls (Gang, Mute, Solo, & faders), except that there are no pan controls and in their place there are buttons that allow you to select between +4dBu (professional) input levels or –10dBV (consumer) input levels. Clicking on the button will toggle back and forth between the two levels. Just like the monitor controls, the output faders can be reset to default by pressing the **Ctrl** button and left clicking on the fader.

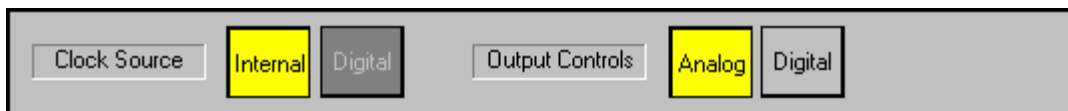
## Adjusting Record and Playback Levels

Mia’s output volume adjustments are made in the digital domain. When you lower a volume slider, you are actually decreasing the number of available bits, thereby taking away from the potential dynamic range of the system. To avoid this, we suggest that whenever possible you leave the output sliders set to their maximum positions, and perform any necessary attenuation on your external mixer. When the Mia playback volume controls are set to maximum and the input signal approaches the maximum pre-clipping level, you can achieve the full 24-bit dynamic range of the system.

## Setting Clock Sources and Output Controls

At the very bottom of the Console there are buttons that allow you to select the clock that is used by Mia. You may choose between Mia's own internal or "on-board" clock or you may synchronize to an external digital input. The console program will detect whether a digital input clock is available, and automatically disable the "Digital" Clock Source button if a digital clock is unavailable.

There are also buttons for selecting controls that affect either the analog outputs or the digital outputs. When "Analog" is selected, the monitors and virtual output controls for the analog outputs are displayed within the Console. When "Digital" is selected, the controls for the digital outputs are shown.



*Clock Source and Output Control buttons are at the bottom of the Console.*

## Synchronizing Multiple Devices

Mia is designed to work alongside other audio equipment. If you are planning on using Mia with other audio equipment, please note the following:

The Mia Windows drivers included in this package support multiple Mias within the same system. In addition, your new Mia will operate alongside other Echo products. Mia can also peacefully coexist with audio equipment from other manufacturers, but be aware that operating *alongside* another product is not the same as operating *with* it. In order for accurate synchronization to occur, the other audio product(s) in your system must support synchronization with Mia's digital input or outputs. Without such synchronization, the individual pieces of equipment will act independently of each other. This scenario may be fine for some musical applications; however, it is not appropriate for situations where sample-accurate synchronization is required or that will be effected by clock drift.

Mia can slave to or generate synchronization signals with its digital (S/PDIF) interface. The S/PDIF (Sony/Phillips Digital Interchange Format) is a serial bit stream that has a clock signal embedded in the data stream. When recording from an S/PDIF source Mia will utilize the synchronization clock that is embedded in the S/PDIF while it decodes the bit stream.

**Note:** When recording from a S/PDIF port, you must select **Digital** as the input clock. For greater flexibility, this is not done automatically. If you find that your S/PDIF recordings contain pops or skips, be sure that you have selected **Digital** as your input clock.

Now let's take a look at some possible configurations and how you might set them up from a synchronization standpoint.

Let's start simple. Suppose that Mia is the only audio device used in your system. Since you have no other devices to synchronize with, simply select "Internal" for Mia's input clock. Mia will then use its own clock to control its operation.

Now a little more complicated set-up: You have two Mias connected. Simply set Mia #1 to "Internal" for its input clock. Now connect the first Mia to the second one via an S/PDIF cable running from DOUT on Mia #1 to DIN on Mia #2. Now select Digital for Mia #2's clock source. Your Mias will now operate in unison.

No matter how many devices you are synchronizing, the concept is essentially the same. You are merely "daisy-chaining" devices together using compatible clocks. One device will operate as the source of the master clock, with each successive device using that clock to sync.

## The File Menu

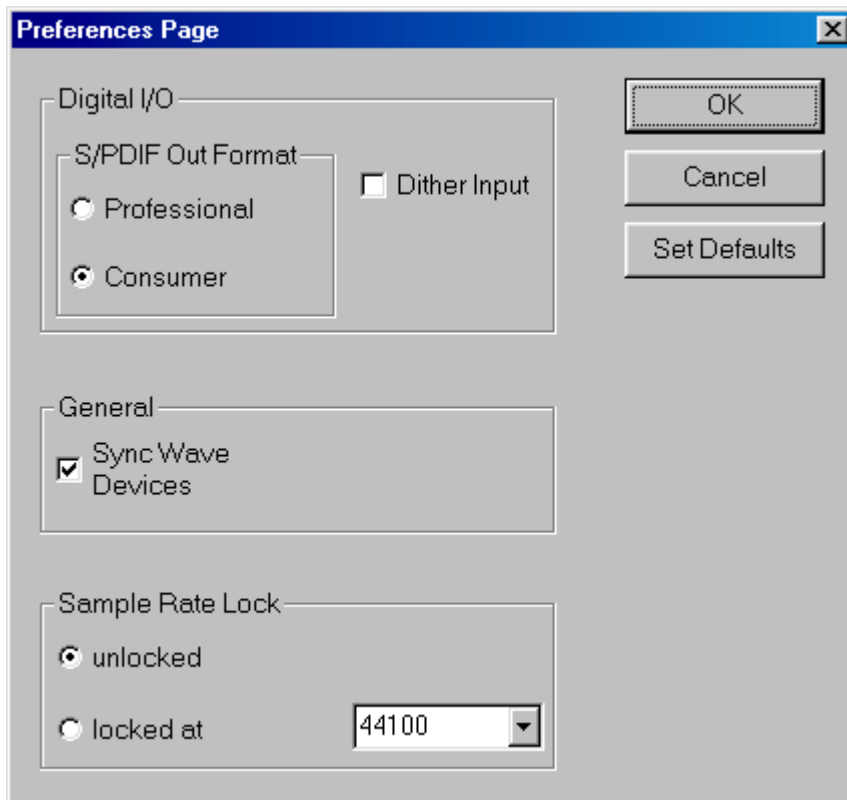
At the top left of the Console window you will find the **File** menu. By selecting the **File** menu, several configuration options become available to you. The first menu option is “**Preferences.**” The **Preferences** option brings up the Console “**Preferences Page**” window. We’ll get to that window shortly, but first let’s go on to the rest of the **File** menu options.

The second option under the **File** menu is “**Hide**” which closes the Console window. You can reopen the Console by clicking on the blue “**M**” in the bottom left of the Windows taskbar.

The third option under the **File** menu is “**Exit**” which closes the current instance of the Console. This will not only close the Console window, but also shut down the Console application and remove it from the system tray. Don’t worry, if you want to bring the Console back you can do it by disabling, then re-enabling the **Show console on taskbar** checkbox in the **Mia by Echo Properties** window (see below under “Additional Configuration Settings”). It will also come back when you restart Windows.



## The Preferences Page



*The Preferences Page is accessible through the Echo Console File menu.*

### Digital I/O - Selecting the S/PDIF Output Format

Mia can transmit digital information in either of two formats, “professional” or “consumer.” The primary difference between the two is in the implementation of the SCMS copy protection bit, which, in the **Consumer** format, prevents the user from making digital copies of a digital copy.

Mia’s S/PDIF output defaults to the **Professional** format. If you are recording from Mia into a consumer DAT deck, the deck may not be able to recognize the signal until you switch Mia’s output to **Consumer**.

We have provided a software switch in the Mia driver that allows you to select which format Mia transmits. In the window that appears you’ll see a pair of check boxes in an area labeled **S/PDIF Out Format**: one box is labeled **Consumer** and the other **Professional**. Select the appropriate format

for your DAT (if you don't know which one to use and are having difficulties, simply try the one that is not currently checked). Mia never transmits the SCMS bit, regardless of which format is selected.

## **Digital I/O - Dither Input**

In the top right is a checkbox labeled **Dither Input**. This checkbox allows you to enable or disable dithering on the digital inputs. It is off by default. Most of the time you will want to leave this setting disabled. The only time you will want to use dithering is when you are receiving a 24 bit signal over the digital inputs, but you want to record it as a 16 bit wave file. In this case, dithering will improve the audio quality.

## **General - Sync Wave Devices**

This is mainly for developers who are using tools like Visual Basic or Delphi and want the inputs and outputs to be totally independent. Unless you have a good reason to turn it off, you should leave this switch on.

If you have a program that is telling you that our hardware isn't full duplex, chances are you can fix this by either disabling this switch or enabling **Multi-client audio** (see below).

## **Sample Rate Lock**

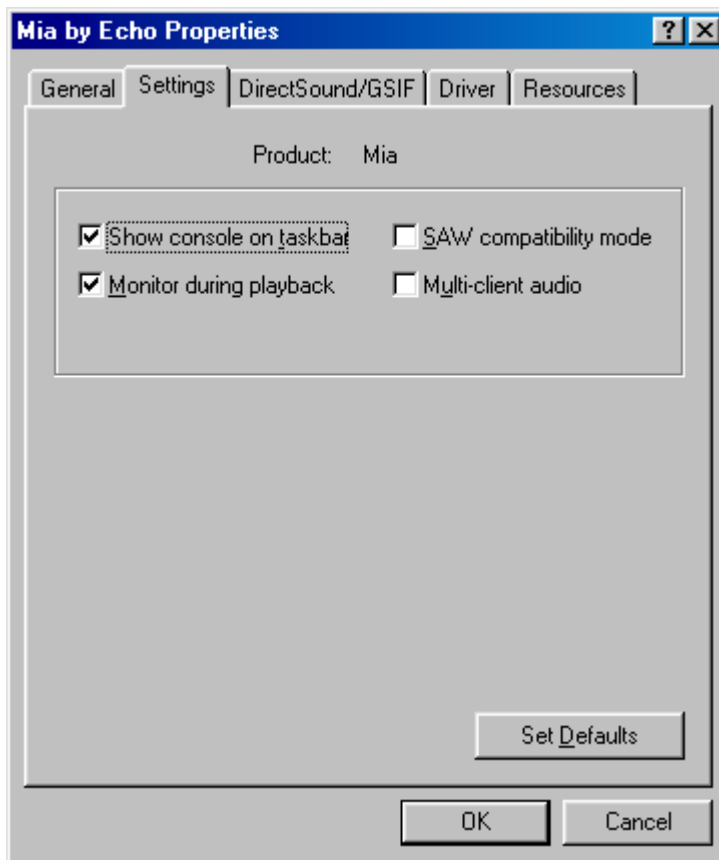
These controls allow you to enable or disable the **Sample Rate Lock** feature, as well as set the sample rate you want to lock to. While the sample rate is locked, all sample rate change requests from applications will be ignored and the card will remain at that sample rate no matter what.

This feature is most useful in **Multi-client audio** mode (see below). Suppose you have locked the sample rate to 44100. If you are recording a project at 44100 and another sound tries to play at, say, 22050, the sample rate won't change. Sample rate locking only applies while Mia is set to Internal clock. This setting defaults to **unlocked**.

## Additional Configuration Settings

In addition to those settings that can be made using the Echo Console program, there are a number of other configuration options available only to users of Windows 95/98/Me. These are found in the Windows Control Panel. To access these controls, begin by pressing the Windows **Start** button. Select **Settings**, then **Control Panel**. In the Control Panel window, locate the icon for **System**, and double-click on it. Click on the tab titled **Device Manager**. Now locate the line titled **Sound, video and game controllers**. Finally, locate the line titled **Mia by Echo**, and double-click. This will bring up the **Mia by Echo Properties** window, which we saw briefly in the “Installing the Mia Software Drivers” section of this manual.

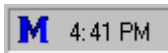
We have previously seen the “General” screen, so let’s move on to the “Settings” screen by clicking on the tab labeled **Settings**.



*Additional settings can be found in the “Mia by Echo Properties” page.*

## Show console on taskbar

The first selection in the **General** section of the **Settings** screen allows you to determine whether the Echo Console program will occupy a space on the Windows taskbar (the blue “**M**” in the bottom right-hand corner of the Windows desktop).



Checking this option enables this feature, while unchecking will disable it.

## Monitor during playback

In the default mode, Mia allows you to monitor your input signal whether you are recording, playing back, or simply idle. In some situations, such as when performing punch-in recording, it may be desirable to have the input signal muted until Record is enabled. In the **Mia by Echo Properties** window that appears you'll see a checkbox labeled **Monitor during playback**. Uncheck the box to disable input monitoring during playback; recheck it to enable input monitoring during playback. The Monitoring controls are found in the **Echo Console** (see above).

## SAW compatibility mode

When using Mia with earlier versions of the Software Audio Workshop (SAW) program from Innovative Quality Software, there are some special considerations that must be accommodated by the Mia driver. SAW expects an equal number of inputs and outputs on Mia. For SAW compatibility, the driver creates several non-functional mirrors of input channels 1 and 2 (making an equal number of ins and outs). To insure that Mia will operate properly with earlier versions of SAW, check the box labeled **SAW Compatibility Mode**.

## **Multi-client audio**

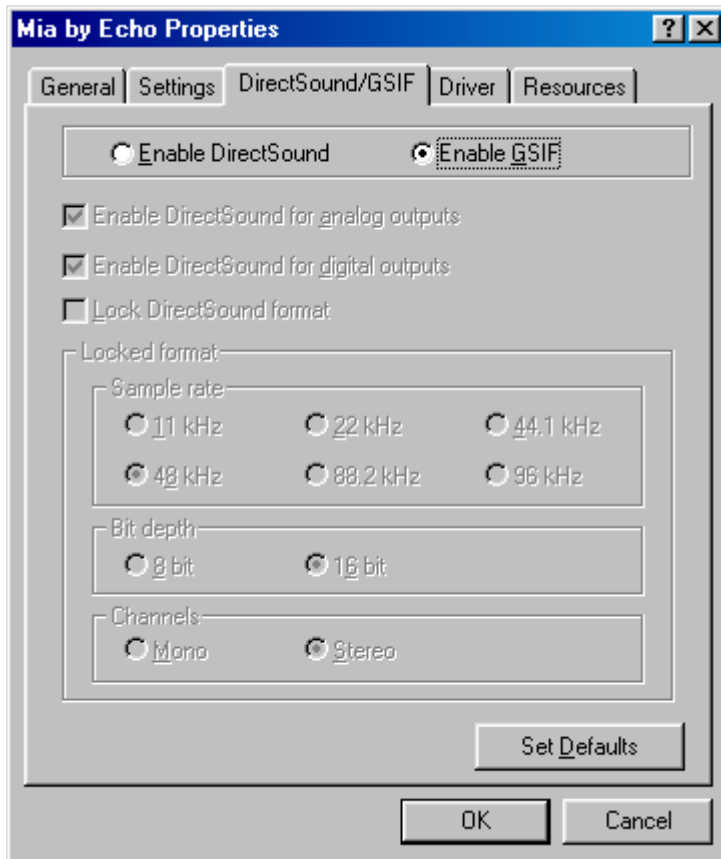
Multi-client audio lets you use different inputs and outputs on Mia with different audio programs at the same time. Otherwise, you would have to use a different soundcard with each audio application.

For example, suppose you own both Cubase VST (multitrack audio) and Reality (software synthesizer). You can now set Cubase VST to play out through outputs 1 through 6, and set Reality to play out through outputs 7 and 8.

The default setting for Multi-client audio is disabled. Although this feature is very useful, it can also be difficult to use properly. We highly recommend that you read the appendix entitled “**Multi-client audio FAQ**,” found later in this manual, before using this feature.

## DirectSound/GSIF Settings

Click on the **DirectSound/GSIF** tab. The window will change to look like this:



The two radio buttons on the top toggle between the **DirectSound** and **GSIF** modes, which are mutually exclusive. While **DirectSound** is enabled, you will not be able to use Mia with the Gigasampler or Gigastudio software samplers. Conversely, when **GSIF** is enabled, you will not be able to use the Mia DirectSound driver. For more information about **DirectSound** please refer to the appendix titled: **DirectSound FAQ**.

The first checkbox is called “**Enable DirectSound for analog outputs.**” This allows you to enable or disable the DirectSound driver for Mia’s analog outputs only.

The second checkbox is called “**Enable DirectSound for digital outputs.**” This allows you to enable or disable the DirectSound driver for Mia’s digital outputs only.

**DirectSound** can only support a limited number of outputs, so if you have several soundcards with a large number of outputs you may not be able to find the output you are looking for. In this situation, you can disable some of the Mia **DirectSound** outputs, and then when you restart you should be able to find the **DirectSound** output that was missing before.

The third checkbox is labeled “**Lock DirectSound format.**” This allows you to force the Mia DirectSound driver to playback files at a certain sample rate and bit depth. It also allows you to lock it to stereo or mono.

This setting only applies if you are using software that uses multiple DirectSound outputs simultaneously, such as the applications offered by Stage Research. For this reason, it defaults as disabled.

**NOTE:** Do not confuse this with the “sample rate lock” feature found in the **Echo Console**.

## Installing Cool Edit Pro™ — Special Edition

Included with your Mia system is a special version of Syntrillium Software's Cool Edit Pro, a powerful multitrack audio recording and editing application. To install the software:

1. Insert the Mia CD-ROM.
2. Press the **Start** button, and select **Run...** from the menu. Now select **Browse...** At the top of the window that appears, you will see a box labeled "**Look In:**". Clicking on this box will result in a list of your disk drives to appear. Select your CD-ROM drive. On the CD-ROM is a folder called Syntrillium; double-click on this directory to open it. Now locate the file in the Syntrillium directory called SETUP. Select this program and run it.

The SETUP program will copy all of the necessary files to your hard drive. It will also add a program group called "Cool Edit Pro – Special Edition" to the **Program** listings available from the **Start** button menu.

Cool Edit Pro – Special Edition comes with very thorough on-line help, so you'll be able to get up and running with a minimum of hassles (hopefully none at all!). We do, however, suggest that you familiarize yourself with the items under the **Quick Reference** heading in the program's **Help** menu.



## Cool Edit Pro: Assigning Mia's Inputs & Outputs

Mia's inputs and outputs are assigned to tracks in two different ways, depending on the view—stereo waveform or multitrack—in which you are working. In the stereo waveform view, select **Options/Settings/Devices**; in the window that appears you can define the **Waveform Playback** and **Waveform Record** devices. Simply highlight the Mia inputs and outputs you wish to use in the appropriate fields. These settings will apply for all files that you play or record when in the stereo waveform view. These device settings are saved as Cool Edit Pro preferences; as such, they will be used for all subsequent sessions until you change them.

In the multitrack view, the inputs and outputs are assigned on a per-track basis. Before making assignments, however, you'll need to set up the **Preferred Multitrack Devices**. To do this, click on either of the small numeral 1s at the far left of the track display; doing so will bring up the **Playback Device** window. Click on the **Device List** button; you'll see a list of **Preferred Multitrack Devices**. In the **Playback** fields, assign Mia virtual output devices 1/2, 3/4, 5/6 and 7/8 into the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> fields respectively. In the **Record** fields, assign Mia Analog Record device 1/2 to the 1<sup>st</sup> field and assign Mia Digital Record to the 2<sup>nd</sup> field. Click Okay on each window to back out to the multitrack view screen. These device assignments are saved as Cool Edit Pro preferences, and will be used each time you open a new session.

To set the playback and record devices for a specific track, click anywhere in the track's blue-gray area at the far left of the track display. This will open the **Track Info** window. Click on the arrows in the **Playback Device** and **Record Device** fields to select the desired inputs and outputs. If you are going to use mono files then make sure to set up two tracks for each Mia device and adjust the **Pan** control hard left or right accordingly.

## Cool Edit Pro: Optimizing Multitrack Performance

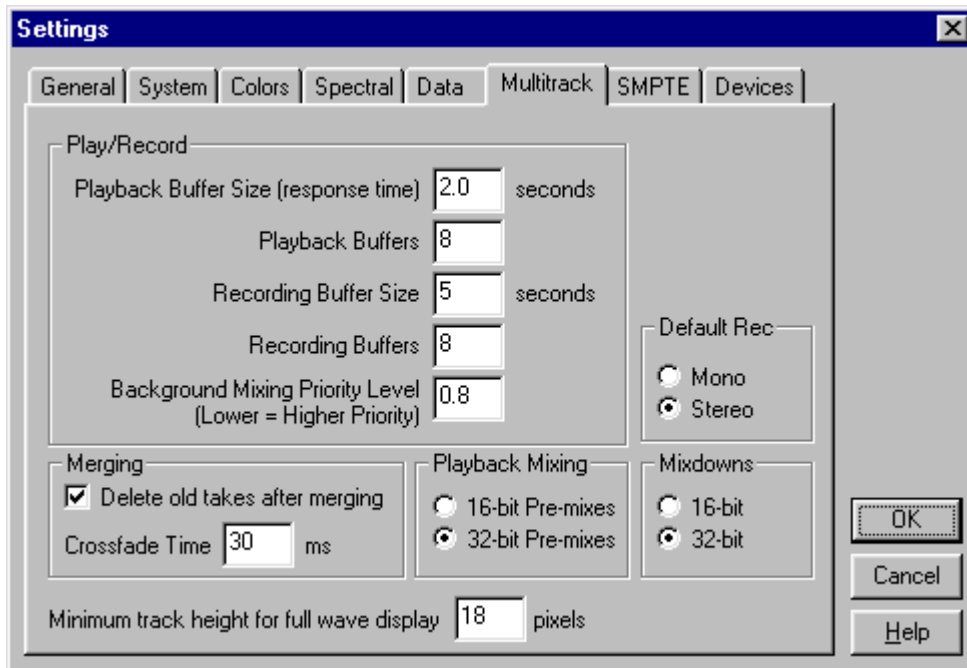
Background mixing—the process Cool Edit Pro uses to allow a large number of tracks to play simultaneously—requires significant processing power from your computer. With larger sessions, your computer may become so occupied with mixing that you experience audio dropouts in multitrack playback. This will usually happen because the background mixing is not sufficiently complete (watch the **Mix Gauge**) before playback is initiated. There are a few things you can do to help remedy this; however, be aware that you may still have to wait for a time before hitting the **Play** button when working with very large sessions.

The settings in **Options/Settings/Multitrack** play a big part in optimizing the background mixing processes. In particular, pay attention to the **Playback Buffer Size** and the **Background Mixing Priority Level**. The key to determining how to adjust these settings is to watch the **Mix Gauge**. As a general guideline, if you notice dropouts occurring even though the **Mix Gauge** seems reasonably complete (the meter is beyond  $\frac{3}{4}$  of the way filled), try reducing the **Playback Buffer Size**, and raising the **Background Mixing Priority Level** (higher values reduce the priority level). Conversely, if you notice dropouts and see that the **Mix Gauge** is hovering around the bottom “empty”), try increasing the **Playback Buffer Size** and lowering the **Background Mixing Priority Level**.

The goal in adjusting these settings is to achieve a balance between values large enough for the program to work properly and low enough to conserve the computer’s resources. The **Background Mix Priority** must be high enough (lower settings produce a higher priority) to keep the mix ahead of playback, but not be so high as to adversely affect performance (by consuming too much of your computer’s resources). In short, the lower you can keep this setting while still keeping the **Mix Gauge** reasonably filled, the better. Raising the buffer size consumes more of your computer’s memory, so setting this too high can negatively affect performance.

When adjusting these settings, do so by small amounts, using decimal increments/decrements. Also, note that the settings will produce different results from session to session. As the number of tracks and the number of

output devices vary, so may the settings you'll need to use to maximize performance.



*Use the Multitrack Settings shown above as a starting place when adjusting your system to optimize the performance of Cool Edit Pro.*

Cool Edit Pro will take more time performing background mixing when you have your tracks assigned to multiple sets of Mia's outputs. In this scenario, Cool Edit Pro creates a separate mix for each output device (each Mia channel-pair). This additional mixing demands more processing power from your computer. This could result in longer mix times and possible skipping during playback. If your system is performing sluggishly, you can temporarily assign all tracks to a single channel-pair while monitoring to speed things up. When doing so, it is recommended that you check **32-bit Pre-mixes** mode in the **Options/Settings/Multitrack** screen. When monitoring to multiple output devices, **16-bit Pre-mixes** is the recommended mode.

Note that the 16-bit and 32-bit modes are playback settings only; that is, the data on your disk remains at the resolution at which it was recorded.

## Contacting Customer Service

If you experience any trouble with your Mia system please go to the support area of our website at [www.echoaudio.com](http://www.echoaudio.com) and check out the troubleshooting FAQ's we have there. If you can't find a solution to your problem there, please fill out the provided technical support email form. This form will be sent to our technical support staff and they will respond to you quickly. **Please fill out the form completely.** The best way to get the help that you need is by giving us plenty of detailed information about your computer system, your audio software and the problem you are having.

We do ask you to please read through this manual and the support area of our website before contacting us. You may find an answer to your problem using the Appendices in the Mia owner's manual and/or Cool Edit Pro's on-screen help.

Thank you for buying Mia!

**Note:** All Cool Edit Pro — Special Edition support issues are handled solely by Echo Digital Audio Corporation. **Please do not call Syntrillium Software for technical support.** If you do, they will simply refer you to Echo Digital Audio Corporation for help.

## Appendix A: General Troubleshooting Guide

**Problem:** After installing Mia, one or more of your peripheral devices no longer functions properly.

**Solution:** During the installation of your Mia, it is possible that an interrupt conflict was created. Please see **Appendix B: Resolving Interrupt Conflicts** for more information on this topic.

**Problem:** You installed Mia and restarted Windows. Now Windows indicates that it has found new hardware and wants you to install a driver for it. This hardware was working perfectly well before you installed Mia and the driver for this hardware was already installed.

**Solution:** It is possible that during the installation process you moved an existing card from one slot to another. Windows keeps track of installed devices, not only by peripheral type, but also by physical location. In moving a card from one slot to another, Windows will no longer recognize the card as one for which a driver is installed. You must re-install the driver for the card that was moved.

**Problem:** You installed multiple Mias, and you get several error messages telling you that Windows is unable to open the Mixer Library.

**Solution:** You can ignore these error messages and click “OK”. Now restart Windows. After you restart, everything should work normally. The error messages only appear when you install an additional Mia. This will be fixed in a future driver release.

**Problem:** You are unable to get your DAT recorder to recognize Mia’s S/PDIF output.

**Solution:** Digital information is transmitted in either of two modes, “professional” or “consumer.” The professional mode is usually implemented in devices that are likely to be used in professional recording

environments, whereas the consumer mode is commonly implemented on equipment designed for home use in the consumer market. The primary difference between the two modes is in the implementation of the SCMS copy-protection bit, which, in the consumer format, prevents the user from making digital copies of a digital copy. In most professional equipment, this copy-protection bit can be turned off or on according to the user's needs. In consumer products, the SCMS bit is always enabled.

Unfortunately there is no way for the transmitting device to automatically detect which format the receiving device is able to accept. If you have a DAT deck that is not able to read the S/PDIF output from Mia, chances are Mia is transmitting in the mode that the deck is not equipped to handle.

We have provided a software switch in the Mia driver that allows you to select which mode Mia transmits. To access this switch go to the Mia **Echo Console**. Select **Preferences** under the **File** menu. In the window that appears you'll see a pair of check boxes in an area labeled **S/PDIF Out Format**; one box is labeled **Consumer** and the other **Professional**. Select the appropriate format for your DAT (if you don't know which one to use, simply select the one that is not currently checked). Now click the **OK** button and again try recording to your DAT.

Important note: Mia never transmits the SCMS bit, regardless of which mode is selected.

**Problem:** When the Windows start-up sound plays, it plays at an altered pitch.

**Solution:** When Mia is set to sync with an external device, it will playback at the rate generated by that device. If the startup sound you are using was sampled at 8kHz, but you are synchronized with a device running at 44.1kHz, the startup sound will play back at this faster rate. You have four choices - ignore the altered pitch, switch to Mia's internal clock, use the sample rate lock feature, or use a different device for the startup sound playback. We suggest that you never use Mia for playback of any of Windows' system sounds.

**Problem:** Mia doesn't seem to recognize the synchronization clock to which it is connected.

**Solution:** Although it may seem obvious, the first thing to check is that there is a physical connection between the device generating the clock and Mia's digital connector. Just because multiple devices are connected to the same computer doesn't mean they are synchronized. Next, be sure that you have selected the Digital input clock source in the Mia **Echo Console**.

**Problem:** Recordings made using the S/PDIF port contain occasional pops or skips.

**Solution:** When recording with the S/PDIF port, you must manually select the Digital clock as the input clock. This can be done using the Mia **Echo Console**.

**Problem:** On Windows startup you hear a high pitched squealing sound or your S/PDIF signal has gone crazy.

**Solution:** Reset the sample rate of Mia. Windows always sets the sample rate to 11kHz at startup. Because S/PDIF doesn't support this rate, you will have problems syncing until you reset Mia's sample rate to one within spec (like 44.1 or 48kHz). You can do this by playing a wave file of the appropriate sample rate through Mia's outputs or by locking the sample rate in the **Preferences** page of the Mia Console. Then you will be able to sync properly.

**Problem:** I installed my older Echo card (Layla, Gina, Darla, Darla24) and it messed up my Mia installation.

**Solution:** The old drivers (5.02 or earlier) for those cards will mess up a Mia install. Just uninstall Mia, then install the older card and reinstall Mia. You will be fine if you always install the older card first, then the newer one. We have fixed this problem with driver versions 5.04 and later.

**Problem:** The sound cuts in and out, or the left or right channel doesn't work.

**Solution:** You may have a bad audio cable. Try using a different cable in the problem channel.

**Problem:** There is no sound unless I pull the audio plug out a little.

**Solution:** Not all 1/4" plugs are made to the exact same dimensions. Try a plug/cable from a different manufacturer.



## **Appendix B: Resolving Interrupt Conflicts**

While Plug-and-Play™ is often called “Plug-and-Pray,” it actually works quite well most of the time. We estimate that 95% of Mia installations will go without a hitch—that Plug-and-Play will properly assign resources to your card without any conflicts. The other 5% of you may experience interrupt problems (mostly caused by non-Plug-and-Play ISA cards or PCI cards that don’t like to share). These problems can manifest themselves by causing your new Mia to not function properly; in some instances, devices will fail that were previously working just fine.

If you are having problems with your computer after installing a new Mia card (or if you are unable to successfully install the card at all), please read the sections below describing what interrupts are, how they are assigned, and how to work around interrupt conflicts. Hopefully, we’ll be able to help you solve your problem without too much trouble.

### **What is an Interrupt?**

A computer has two ways of telling when a device, such as an audio card, is ready to exchange data with a program. One way is to have the computer periodically ask or “poll” the device to see if it’s ready to transfer new data. Since it is important to do the transfer as soon as it is ready, the program must poll the card quite often, which wastes the computer’s resources.

The other method is to have the card “interrupt” the program when it is ready to transfer data. It does this by sending a signal over one of the many interrupt wires connected to the slot into which it is plugged. X86 and Pentium PC’s have 16 possible interrupts (0 to 15), five of which are reserved by the motherboard for the keyboard, system timer, etc.

### **ISA and PCI Interrupts**

There are two types of expansion connectors found on today’s computers. The older style connectors are called ISA (for Industry Standard Architecture) connectors. ISA connectors have 11 of the 16 PC interrupts

wired to them. Some ISA cards (also called “legacy” cards) have you select which interrupt is used by configuring jumpers on the card. Newer Plug-and-Play ISA cards have their interrupts selected by either the computer’s BIOS (the built-in program that starts the computer) or by Windows 95/98/Me.

The newer PCI (Peripheral Connect Interface) bus transfers data faster than ISA and was designed to support Plug-and-Play from the start. PCI connectors have only four interrupts wired to them (A, B, C, and D). However, these interrupts can be shared by more than one PCI connector slot and each connector’s interrupt can be assigned or “steered” to one of the 11 available PC interrupts by either the BIOS or Windows 95/98/Me. As far as the user is concerned, PCI interrupts use the same numbers and are assigned the same way as Plug-and-Play ISA interrupts. Note, however, that a PCI card can share an interrupt with another PCI card but not with an ISA card.

## **Plug-and-Play and Interrupts**

When your computer first starts up, the BIOS will check each connector slot to see if a Plug-and-Play card is installed. Each Plug-and-Play card has built into it a list of what resources it requires including how many interrupts it needs and which ones it can use. The BIOS will then configure each card and, if needed, assign an appropriate interrupt. It does this for both ISA and PCI Plug-and-Play cards. Windows 95/98/Me will also check for and configure Plug-and-Play cards, possibly changing some of the settings to suit its needs.

## **Legacy Cards and Interrupt Conflicts**

Problems can arise when the system contains older “legacy” ISA cards with their jumper-configured (or possibly hard-wired) interrupts. The computer’s BIOS and Windows 95/98/Me have no automatic way to detect these cards and determine which interrupts, if any, are being used. For example, you may have a MIDI card installed with its jumpers configured to use IRQ 9. Since the BIOS cannot detect the legacy card it will consider IRQ 9 to be a free interrupt. Consequently, it may assign IRQ 9 to Mia. The next time you

try and use your MIDI card or play back audio via Mia, neither device will function properly.

Or, maybe you have a SCSI card that had previously been assigned to IRQ 10. The BIOS may now decide to assign IRQ 10 to Mia, and move the SCSI card to IRQ 9. An interrupt conflict now exists between the SCSI card and the older MIDI card.

## **PCI Cards and Interrupt Conflicts**

Some plug & play PCI cards can also cause interrupt conflicts when they try to share an IRQ with another PCI card. Many PCI cards can share an IRQ with no problems at all, but some just don't like to share. For example, you may have a network card installed, and Windows has it configured to use IRQ 10. Since that is the only card assigned to IRQ 10, Windows assumes that it is OK to let it share with the next PCI card that comes along. Consequently, it may assign Mia to share IRQ 10. This network card happens to be unfriendly and doesn't like to share, so the next time you try to use it or Mia, neither device will function properly.

## **Resolving Interrupt Conflicts**

Although there is no way to automatically detect legacy interrupts, Windows 95/98/Me and some BIOS's allow you to reserve specific interrupts for legacy use. Once an interrupt is reserved it will not be assigned by Plug-and-Play to another card. Or, if you have a PCI card that doesn't like to share you may be able to reassign it to a different IRQ.

The first thing to do if you think you have an interrupt conflict is to determine which interrupt and which card is causing the problem. To do this, right-click on the **My Computer** icon on your desktop and select **Properties**, or go to **Start – Settings – Control Panel** and double-click the **System** icon. In the window that appears, select the **Device Manager** tab. Now, highlight **Computer**, and click the **Properties** button. A new window will appear that lists all of the interrupts (IRQs) that Windows 95/98/Me recognizes are in use and the cards or resources to which they are assigned.

Write down the interrupts that are listed and the devices that are assigned to them. Pay particular notice to the interrupt that Mia is assigned to.

Once you know which interrupt Mia is trying to use, you need to locate which card is potentially causing the conflict. To do this you may need to dig out the manuals for whatever ISA cards are installed and examine the jumper settings to determine which interrupts, if any, are used. Hopefully, at this point you will find an offending card that was not listed by **Device Manager**, but is using an interrupt that Windows has assigned to another device. If you don't have any ISA cards, or your legacy ISA card is not causing the conflict, you should take note of which PCI card is assigned to the same IRQ as Mia.

If you have lost your manuals and are having trouble figuring out which card may be causing a problem, you can try the brute force approach. Remove all cards from your system and then re-install them one at a time until the system quits working. The card that makes the computer stop working correctly will be the one that needs to be dealt with.

Once the offending card has been identified you have a few different options. One option is to simply remove the card from your system. However, you've likely got the card in there for a reason, so unless it's an old sound card you don't care about keeping, you'll probably want to use an approach to remedying the problem that allows the card to remain in the system.

If the offending card is a legacy ISA card, another option is to change the IRQ on the card to an IRQ that isn't currently being used as reported by the Reporter program. While this may fix the problem at hand, the next time you add another new Plug-and-Play card you may wind up with another conflict. If you choose this option it is still a good idea to reserve the IRQ as described below.

If the offending card is a PCI card, you may want to skip to the section on "Reconfiguring an IRQ within Windows 95/98/Me - PCI" a few pages down.

## Reserving an IRQ within the BIOS – Legacy ISA

Other than removing the offending legacy card, the next most effective method is to reserve the IRQ for legacy use within your BIOS. To do this you will need to enter the BIOS configuration screen when your computer first starts up. This is usually done by pressing the **Delete** key or **F1** key right after the memory test during the boot-up routine. Once you're in the BIOS control panel, check to see if you are given the option of manually configuring your interrupts. Some BIOS's, such as those from Award, allow you to choose between "Plug-and-Play" and "legacy ISA" for each interrupt. If you select "legacy ISA" for the interrupt that is being used by your legacy card, the BIOS will know not to assign that interrupt to a Plug-and-Play card.

Unfortunately, some BIOS's don't support this capability. If your BIOS is one of those, don't worry: You still have another option.

## Reserving an IRQ within Windows 95/98/Me – Legacy ISA

Windows 95/98/Me also allows you to reserve interrupts for legacy use. In most cases this works just as well as reserving the IRQ in the BIOS. However, you may still have problems if you boot up an older version of DOS from a floppy where Windows 95/98/Me can't do its Plug-and-Play magic. To reserve an IRQ within Windows 95/98/Me do the following:

1. Click on the **Start** button and select **Control Panel** under the **Settings** option.
2. Double click on the icon labeled **System**.
3. Select the tab labeled **Device Manager** and click the **Properties** button.
4. Select the tab labeled **Reserve Resources** and make sure that **Interrupt Request** is selected.
5. Click on the **Add** button and enter the IRQ that is being used by your legacy card.
6. Windows may prompt you that the IRQ is currently in use by another device. Click on **Details** to see which device Windows currently thinks is using this IRQ. It should be Mia or whatever device is currently conflicting with your legacy card. If that is the case, go ahead and reserve the IRQ.

7. When Windows asks, reboot your machine. When Windows restarts your Plug-and-Play cards will not be assigned to the reserved IRQ.

Hopefully, your system will now be functioning properly. If not, please refer to the “Contacting Customer Service” section of this manual. We’ll do our best to help you solve your problem.

## **Reconfiguring an IRQ within Windows 95/98/Me - PCI**

Now that you have identified the offending card and the IRQ in contention, you will want to try to reconfigure its IRQ setting. To do this, you must open the Device Manager. Select **Start – Settings – Control Panel – System**, and click the **Device Manager** tab. Find the entry for the PCI card that is causing the problem, highlight it, and click the **Properties** button. In the properties window that appears, select the **Resources** tab. Make sure that “Use automatic settings” is unchecked, highlight “Interrupt Request,” and click the **Change Setting** button. Some cards will allow you to change the IRQ setting at this point, while others will give you a message saying, “This resource setting cannot be modified.” If you are allowed to change the IRQ, a window will appear that lets you choose from several different values. Scroll through the different values until you find one that says, “No devices are conflicting.” Choose that one and keep selecting **OK** until Device Manager is closed, then restart Windows.

If you are unable to reconfigure the IRQ and you have a free PCI slot, you may want to try moving Mia or the offending card to a different slot. Make sure your computer is off first, and follow the safety instructions in this manual for hardware installation. Sometimes this can help, because Windows will assign a different IRQ depending on which slot the PCI card is in.

Hopefully, your system will now be functioning properly. If not, please refer to the “Contacting Customer Service” section of this manual. We’ll do our best to help you solve your problem.

## **Appendix C: DirectSound FAQ**

### **Q: What is DirectSound?**

DirectSound is an alternate method for a Windows application to access audio hardware. Previous Echo card drivers (for Layla, Gina & Darla) only supported wave (or multimedia) and ASIO. DirectSound typically provides much lower latencies than wave mode.

While DirectSound was designed to be used by games, a number of professional audio applications now take advantage of it.

### **Q: What are the limitations of DirectSound?**

DirectSound can only use 8 or 16 bit samples. Also, our DirectSound driver is only for output; that is, you cannot record via DirectSound.

### **Q: Do I need anything special to take advantage of DirectSound?**

You need to download the latest version of DirectX from [www.microsoft.com/directx](http://www.microsoft.com/directx) and install it. Older versions of DirectX will probably work, but we have only tested with DirectX 6.1 and 7.

If you are using an application that uses multiple DirectSound outputs, please refer to the section below on the DirectSound format lock.

### **Q: How do I enable DirectSound support?**

It's disabled by default. If you want to turn it on, go to the property pages for the card and select the DirectSound/GSIF page. Click the radio button labeled "Enable DirectSound."

### **Q: Does this mean I can play games through Mia?**

Sure. The only snag is that many games use CD audio for their background music. Since the Mia card does not have a CD audio connector, you won't hear the music. If you are really determined; it would be fairly straightforward to run a cable from the headphone jack on your CD-ROM drive to the inputs on Mia and set up the monitors in the console.

Radio Shack sells a handy cable for this – 1/8” stereo connector to a pair of RCA male connectors. You will also need a pair of female RCA to male quarter-inch adapters.

### **Q: What's the story with the DirectSound format lock?**

This setting only applies if you are using software that uses multiple DirectSound outputs simultaneously, such as the applications offered by Stage Research.

It appears that DirectX 6.1 and 7 get confused when they see multiple DirectSound outputs. The first output pair gets set up correctly, but the rest of them don't. To work around this problem, just enable the DirectSound format lock and select the appropriate sample rate. In almost every case, you will want to leave the format set to 16 bit and stereo.

We are told that future versions of DirectX will resolve this problem, but for now just lock the format.

Note that this is not the same as the “sample rate lock” feature, which is documented in the **Echo Console** section of this manual.



## **Appendix D: Multi-client audio FAQ**

### **Q: What is “Multi-client audio”?**

Multi-client audio is a feature that lets you use different inputs and outputs on your Echo card with different applications at the same time. This way, you can use several different audio applications with just one Echo card. Otherwise, you would have to use a different soundcard for each audio application.

For example, suppose you own both Cubase VST (multitrack audio) and Reality (software synthesizer). You can now set Cubase VST to play out through Mia outputs 1 through 6, and set Reality to play out through Mia outputs 7 and 8. In previous Echo card drivers, you had to choose between one software program and the other.

Note that all of the various interfaces are multi-client. You could have an ASIO application, a wave application, and a DirectSound application all running at the same time. It's very flexible.

If you want to use multi-client audio, you need to enable it in the main driver properties page. See the section entitled “Additional Configuration Settings” in this manual.

Multi-client audio can be difficult to use, depending on what combination of software applications you are using.

### **Q: So what's the catch?**

The catch is this: all the apps using the Echo card at the same time must be set at the same sample rate. This is a limitation of the hardware.

Say that you didn't follow this rule in the previous example. Say that you initially had Cubase VST and Reality set up for 44.1 kHz- so far, so good. Then you load a song into Cubase that is set up for 48 kHz. Since Reality is already running at 44.1 kHz, the new song will play back at this slower rate.

The first program to start recording or playing back through Mia will set the sample rate. As long as an application continues playing or recording (software synths are typically always playing, even if it is just silence), then subsequent applications won't be able to change Mia to a new sample rate.

If you're planning to use multi-client audio, the best thing you can do is to sit down and plan it out. Make a chart of each input and output on the Echo card and write down what application is going to use what input or output. Go through all the applications you plan to use this way and set them all up for the same sample rate and set up their inputs and outputs correctly.

You should also turn off your system sounds. Most system sounds tend to be at 11 kHz or 22 kHz. If you have a digital device slaved to Mia's clock, playing a system sound will cause it to lose sync (S/PDIF runs at 32kHz and above) and possibly produce an annoying output. If Mia is locked to a higher sample rate, then the system sounds won't sound right anyway.

If you really want system sounds, go buy a \$30 cheapo sound card and play them through that. Set the preferred device in the Multimedia control panel to the cheapo sound card and check "Use preferred devices only."

### **Q: What are the rules that I should follow if I want to use multiple audio applications at the same time?**

- Set all your applications to the same sample rate. (You can also use the "sample rate lock" feature in the Echo Console to help with this.)
- Turn off your system sounds.
- Figure out ahead of time which inputs and outputs each application is going to use. Inputs and outputs cannot be shared between applications.

**Q: What I really want to do is use a software synthesizer or sampler like Gigasampler, Reality, or Retro AS/1. What's the best way to use this with an audio and MIDI sequencer like Cubase VST or Cakewalk?**

The best thing you can do is run the synthesizer/sampler application first, then run the sequencer. Make sure that each application is set to use a different set of inputs and outputs.

Cubase VST is somewhat harder to get going in multi-client mode. For more information, please refer to the Cubase VST section of the “Audio Software FAQ” in this manual.

**Q: Can I run a Direct Sound program, an ASIO program, and a wave program all at the same time?**

Sure. If you don't understand the question, don't worry about it.

**Q: What's the downside to all this?**

The main downside is that your computer may very well have a hard time keeping up! If you fire up three different audio apps at once, your computer is probably going to struggle unless you have a really hot machine. The key here is memory, more memory, and a fast CPU.

# Appendix E: Audio Software FAQ

## Cubase VST and ASIO

### **Q: Can I use all Echo cards together at the same time in Cubase?**

No. There are two different Echo ASIO drivers. One is for the Echogals cards (Layla, Gina, Darla & Darla24). The other is for the new Echo24 cards (Mona, Layla24, Gina24 & Mia).

### **Q: Wow, can I really use a buffer size of 128 samples in Cubase?**

You're welcome to try. The smallest buffer size we have been able to use reliably is 1024 samples on a Pentium III 450 with 128 MB of RAM. Buffer sizes of 1024 or less should be considered experimental.

### **Q: What does ASIO 2.0 support do for me?**

ASIO 2.0 added control of “hardware” monitoring from within Cubase. Since Cubase sends its output to Mia’s virtual outputs rather than its physical outputs, there is no way for Cubase to directly control monitoring the inputs directly to the physical outputs. This needs to be done using Mia’s Echo Console.

### **Q: What about using multi-client mode with Cubase VST?**

Yes, this is quite possible. However, VST can be kind of cranky when it finds that the audio hardware it wants is already in use. This can easily happen if you also have a MIDI synthesizer/sampler application installed that is also set up to use our hardware. For more information on multi-client mode, please refer to the “Multi-client audio FAQ” in this manual.

### **Q: OK, so how should I deal with this?**

Cubase VST comes with a program called “Setup MME”. You can find it if you select Start/Programs/Cubase VST. Run the “Setup MME” program.

Look at the list of MME outputs. Disable each entry that does not represent an actual piece of hardware. Specifically, if you see Retro AS/1, Reality, or Gigasampler listed, disable them (select the entry with the mouse, and then click the “Set inactive” button).

Go ahead and run Cubase. Make sure you can select our ASIO driver and that it works. So far so good, now exit Cubase.

The next step depends on what other software you have installed:

### **Reality and Cubase VST**

If you want to use Reality with Cubase VST and our hardware, run the “Setup MME” program again. Set Reality as an active output.

Now, before you run Cubase VST, make sure you run Reality first. Then, make sure that Reality is not using outputs 1 and 2 of your card. Cubase will always try to use outputs 1 and 2. If some other program is using these two outputs already, Cubase will not be able to start the ASIO driver and you will get many error messages.

Once you've got Reality running and set up properly, go ahead and run VST.

### **Gigasampler and Cubase VST**

**NOTE:** *You must have “GSIF enabled” selected in the Mia properties page in order to use Gigasampler with Mia.*

This is very similar to the directions for using Reality. Run the “Setup MME” program again. Set Gigasampler as an active output.

Now, before you run Cubase VST, make sure you run Gigasampler first. Then, make sure that Gigasampler is not using outputs 1 and 2 of your card. Cubase will always try to use outputs 1 and 2. If some other program is using these two outputs already, Cubase will not be able to start the ASIO driver and you will get many error messages.

Once you've got Gigasampler running and set up properly, go ahead and run VST.

If you want to use both Gigasampler and Reality, you'd better have a really good computer. If you do, just make sure you start both of them before VST.

### **Retro AS/1 and Cubase VST**

Unfortunately, we haven't been able to get Retro AS/1 to work with Cubase at the same time. This is mainly because we couldn't find a way to tell Retro AS/1 to use any outputs other than 1 and 2. Even if you start Retro first, both Retro and Cubase end up fighting over outputs 1 and 2 and nobody's happy.

We'll keep looking into this. You could easily use them both if you had two sound cards (either two of our cards or one of our cards & one from someone else).

### **Gigasampler**

**Q: I'm a Gigasampler user. Anything I should know about?**

Yes. We recommend that you always use the latest version of Gigasampler or Gigastudio. You can download any available upgrades from their website at [www.nemesysmusic.com](http://www.nemesysmusic.com)

**Q: Once I get the update, is there anything else I should know about?**

Yes. Gigasampler will not work if you have **DirectSound** enabled. You will need to go into the **DirectSound/GSIF** property page and enable **GSIF**. If you have more than one of our cards, you need to enable **GSIF** separately for each card.

## **Reaktor**

### **Q: I'm a Reaktor user. Anything I should know about?**

Be sure that you enable multi-client audio in the driver property page, or Reaktor will tell you that the hardware can't handle full-duplex audio.

# Appendix F: An Introduction to Digital Recording

## Converting Sound into Numbers

In a digital recording system, sound is represented as a series of numbers, with each number representing the voltage, or amplitude, of a sound wave at a particular moment in time. The numbers are generated by an *analog-to-digital converter*, or ADC, which converts the signal from an analog audio source (such as a guitar or a microphone) connected to its input into numbers. The ADC reads the input signal several thousand times a second, and outputs a number based on the input that is read. This number is called a *sample*. The number of samples taken per second is called the *sample rate*.

On playback, the process happens in reverse: The series of numbers is played back through a *digital-to-analog converter*, or DAC, which converts the numbers back into an analog signal. This signal can then be sent to an amplifier and speakers for listening.

In computers, *binary numbers* are used to store the values that make up the samples. Only two characters, 1 and 0, are used. The value of a character depends on its place in the number, just as in the familiar decimal system. Here are a few binary/decimal equivalents:

<u>BINARY</u>	<u>DECIMAL</u>
0000000000000000	0
0000000000000001	1
0000000000000010	2
0000000000000100	4
0000000000001000	8
1111111111111111	65,535

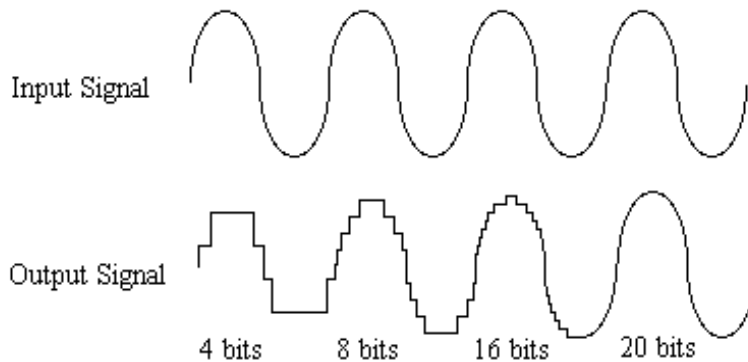
Figure A. Binary numbers and their decimal equivalents

Each digit in the number is called a *bit*, so the numbers in *Figure A* are sixteen bits long, and the maximum value which can be represented is 65,535.

## Sample Size



The more bits that are used to store the sampled value, the more closely it will represent the source signal. In an 8-bit system, there are 256 possible combinations of zeroes and ones, so 256 different analog voltages can be represented. A 16-bit system provides 65,535 possible combinations. A 16-bit signal is capable of providing far greater accuracy than an 8-bit signal. *Figure B* shows how this works.



*Figure B. The more bits there are available, the more accurate the representation of the signal and the greater the dynamic range.*

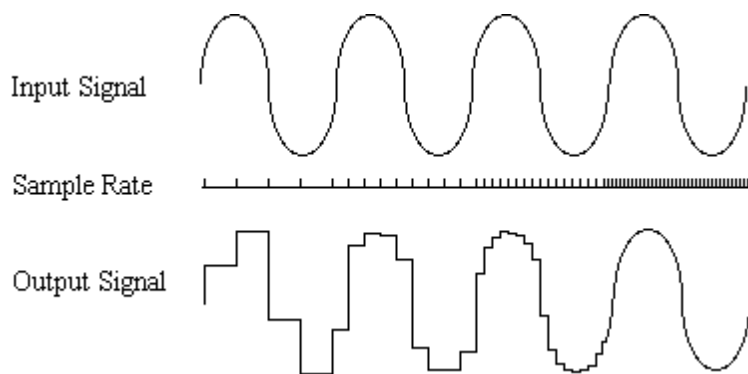
Mia's analog inputs use 24-bit ADCs, which means that the incoming signal can be represented by any of over 16 million possible values. The output DACs are also 24-bit; again, over 16 million values are possible. The S/PDIF inputs and outputs also support signals with up to 24-bit resolution. Mia processes signals internally with 24-bit resolution to insure that there is no degradation to the audio signal as it is processed through the system.

The number of bits available also determines the potential dynamic range. Moving a binary number one space to the left multiplies the value by two (just as moving a decimal number one space to the left multiplies the value by ten), so each additional bit doubles the maximum value that may be represented. Each available bit provides 6dB (see decibel section below) of dynamic range. For example, a 24-bit system can theoretically provide 144dB of dynamic range.

## Sample Rate

The rate at which the ADC generates the numbers is equally important in determining the quality of a digital recording. To get a high level of accuracy when sampling, the sample rate must be greater than twice the frequency being sampled. The mathematical statement of this is called the Nyquist Theorem. When dealing with full-bandwidth sound (20Hz–20kHz), you should sample at greater than 40,000 times per second (twice 20kHz). Mia allows you to sample at rates up to 96,000 times per second.

If the sampling rate is lower than the frequency you are trying to record, entire cycles of the waveform will be missed, and the result will not resemble the proper waveform. When the sample rate is too low, the resulting sound has diminished high frequency content.



*Figure C. Increased sample rates yield a more accurate reproduction of the source signal.*

By the way, the circuits that generate the sample rate must be exceedingly accurate. Any difference between the sample rate used for recording and the rate used at playback will change the pitch of the recording, just as with an analog tape playing at the wrong speed. Also, any unsteadiness, or jitter, in the sample clock will distort the signal as it is being converted from or to analog form.

## Storing Digital Data

Once the waveform has been transformed into digital bits, it must be stored. When sampling in stereo at 48kHz using a 20-bit word size, the system has to accommodate 1,920,000 bits per second. Though this is a lot of data, it is well within the capabilities of personal computers.

Most computer-based digital recording systems record the data directly to the computer's hard disk. Today's hard disks are capable of storing large amounts of data, though the performance of hard drives can vary substantially. The speed and size of your hard drive will be a major determining factor in how many tracks of audio you will be able to simultaneously record and playback.

## Decibels

Audio signal levels are generally expressed in units called "decibels" which are abbreviated as "dB". This is a "logarithmic" scale where each doubling of signal level is represented by an increase of 6dB. Therefore a signal of 6dB is twice as big as a 0dB signal and a signal of 12dB is four times as big as a 0dB signal.

Since digital audio signals are represented by binary data, each bit of audio information represents 6dB. A 16-bit number can represent a total range of 96dB and a 24-bit number can represent a total range of 144dB (6 times the number of bits). It's much easier to say that one signal is 72dB less than another instead of saying it is 1/4096 the size of the other one. It also more accurately represents the way we hear sounds, since the smaller signal in the above example will still be audible and not appear to be only 1/4096 as loud when we listen to it.

Just as there are different types of degrees used to represent temperature (Fahrenheit, Celsius, etc), there are different types of decibels used to represent the level of analog audio signals. The most common are dBu and dBV decibels. Both of these represent voltage levels and still double for every increase of 6dB. It is only the reference point, or 0dB level that is different. A 0dBV signal has a voltage level of 1.0 volts. A 0dBu signal has a voltage level of .775 volts. Since .775 is approximately 2dB less than

1.0, converting dBV levels into dBu levels is as simple as subtracting 2dB (2.21 to be exact).

Signals are also occasionally represented with units of dBm. This is an older unit that measures power instead of voltage levels with 0dBm representing 1 milliwatt. Earlier tube-based audio equipment used standardized input and output impedances of 600 ohms, so a 0dBm signal was produced with a voltage of .775 volts. Since most of today's equipment uses impedances other than 600 ohms, it is more useful to represent signals by voltages rather than power and the dBu unit was introduced. A signal level of 0dBu is identical to a level of 0dBm.

Digital signals, after they are recorded, no longer directly represent any physical quantity such as voltage or power and 0dB is generally used to represent a "full-scale" or maximum signal level. All other signal levels are lower and are expressed as negative decibels. Most meters on digital equipment have 0dB at the top and range downward from there. A signal that is 30dB below full scale would simply be referred to as a -30dB signal.

## **Nominal Signal Levels and Headroom**

Today's equipment is generally referred to as +4dBu equipment (professional) or -10dBV equipment (consumer). These levels are the typical or "nominal" signal levels you can expect to see with professional (studio) equipment such as mixers or with consumer equipment such as home stereos and CD players. A +4dBu signal has a voltage level of 1.23 volts and a -10 dBV signal has a voltage level of .316 volts.

The above nominal levels represent typical or average levels that are often exceeded when recording loud signals such as drum beats. The difference between the nominal level and the loudest signal that can be recorded without clipping is called "headroom". Mia provides approximately 14dB of headroom allowing an 18dBu signal (6.2 volts or 17.5 volts peak to peak) to be recorded.

## Unbalanced and Balanced Inputs and Outputs

An unbalanced signal, commonly used for guitars and consumer electronics, contains two components, a ground signal and a “hot” or active signal. The ground is the barrel of a ¼” connector and the shell of an “RCA” style connector.

A balanced signal contains two active signals instead of one in addition to the ground. These are referred to as the “plus” and “minus” signals. A balanced input amplifier amplifies the difference between these two signals. Any extraneous noise picked up from power lines or other sources will appear equally on both the plus and minus inputs. This is called “common mode” noise since it is common to both signals and the input amplifier will subtract the noise on the minus input from the noise on the plus input.

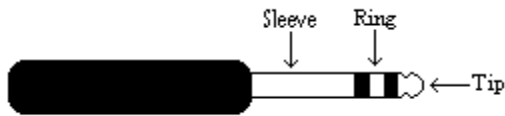
If the input amplifier is perfectly balanced and the noise on both plus and minus is precisely equal, the noise will completely cancel out. In the real world this is not the case and some of the common mode noise will still make it through, although at a much reduced level. How well an input amplifier rejects this common mode noise is called the “common mode rejection ratio” (abbreviated as CMRR) and is expressed in dB.

Balanced outputs typically drive the plus and minus components of a balanced signal in one of two ways:

A “differentially” balanced output signal is one where the minus output is the mirror image of the plus output. That is, if the “plus” output is at +1 volt, then the “minus” output is at -1 volt.

An “impedance” balanced output, which is used in Mia, is different in that only the plus component actually carries the signal. The minus component is tied to ground through a resistor so that the output impedance matches that of the plus component. Since the impedances are matched, any noise added to the minus component will still be approximately the same as that picked up by the plus component and will be subtracted out by the input amplifier.

Balanced signals connect with either XLR connectors or TRS (tip, ring sleeve) connectors. Mia uses TRS connectors for connecting balanced line level signals.



The three sections of a TRS connector are used to transmit the three components of a balanced signal (T = plus, R = minus, S = ground). Mia will also accommodate the two conductor unbalanced style connector.

## Dynamic Range

Dynamic range represents the difference between the maximum signal that can be recorded and the “noise floor”, or level of noise with no signal present. A system with a high dynamic range will be quieter than one with a lower dynamic range. Dynamic range is a very important specification and Mia uses converters that have very high dynamic range.

Theoretically, a 24-bit system has a dynamic range of 144dB and a 16-bit system has a dynamic range of 96dB. Two questions immediately come to mind:

- 1) Why does Mia only have a dynamic range of 106dB?
- 2) For mastering 16-bit CDs with a dynamic range of 96dB, isn't anything more than 96dB just overkill?

First, today's analog-to-digital converters typically produce a full-scale input voltage with an input of +7dBu. If they were to have 144dB of dynamic range, they would have to be capable of resolving signals as small as -137 dBu (7dBu - 144dBu) or approximately 10 nano-volts. That's 10 *one-billionths* of a volt! Transistors and resistors produce noise in this range just by having electrons moving around due to heat. Even if the converters could be perfectly designed to read these levels, the low noise requirements of the surrounding circuitry such as power supplies and amplifiers would be so stringent that they would either be impossible or too expensive to build.

In answering the second question, consider the fact that music is often compressed or amplified after it is recorded, and that some headroom is necessary when recording to avoid clipping. The only way that 96dB would be adequate is if all music were recorded so that the peaks were just under full-scale and no compressing or amplification was going to be applied after recording. Any time recorded music is amplified, so is the noise at the low end. Mia has enough dynamic range to allow sufficient headroom and post-processing to be applied while still keeping the noise either off the CD completely or down as far as possible.

# Appendix G: Specifications

## Audio Performance

Analog Inputs (x2 balanced TRS):

- Frequency Response: 10Hz – 22kHz,  $\pm 0.5$ dB
- Dynamic Range: 106dB A-weighted
- THD+n:  $<0.001\%$ , 20Hz–22kHz
- Nominal Input Level: +4dBu
- Maximum Input Level: +18dBu
- Input Impedance: 10K

Analog Outputs (x2 balanced TRS):

- Frequency Response: 10Hz – 22kHz,  $\pm 0.5$ dB
- Dynamic Range: 106dB A-weighted
- THD+n:  $<0.002\%$ , 20Hz–22kHz
- Nominal Output Level: +4dBu
- Maximum Output Level: +18dBu



## **Hardware**

- Host Interface: PCI bus card
- PCI bus master interface
- Two balanced 1/4" analog inputs with precision 24-bit 64x oversampling analog-to-digital converters
- Two balanced 1/4" analog outputs with high performance 24-bit 128x oversampling digital-to-analog converters
- S/PDIF digital I/O with up to 24-bit resolution
- On-board 24-bit Motorola DSP
- 24-bit data resolution maintained throughout entire signal path
- Multiple sample rates from 8kHz to 96kHz

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