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Introduction

Congratulations on your purchase of the Delta 66 Digital Recording Interface designed and built by M Audio. Even if you are experienced in digital recording, please take the time to read this manual. It will give you valuable information on installing your new card and the supporting software, plus help you to fully understand the function and usability of the Delta 66. Once you're up and running, you will quickly discover the power and brilliance, both in sound and design, of your Delta 66 Digital Recording Interface.

What's in the Box?

Your Delta 66 box contains:

- This instruction manual.
- The Delta 66 break-out box.
- The Delta 66 PCI host adapter card.
- 15-pin D-sub to 15-pin D-sub cable.
- Diskette containing Windows 95/98 drivers & Delta Control Panel software.
- M Audio Warranty Registration card.

About the Delta 66 Digital Recording Interface

The Delta 66 functions as a 6-input, 6-output digital recording interface. Four analog inputs and outputs plus coaxial S/PDIF I/O give you the highest quality digital I/O available — all up to 24-bit data width and any sampling rate from 8kHz to 96kHz. Connect a line-level signal from your instrument, mixer, or pre-amp to the Delta 66's TRS jacks on the break-out box. Match the operating levels of your input and output signals using the +4, 'Consumer,' or -10 signal level software switches. Record a digital audio signal from your DAT, MiniDisc, CD, or external A/D converter via the Delta 66's S/PDIF input located on the PCI Host card. Control all routing and hardware settings with the Delta's comprehensive control panel software.

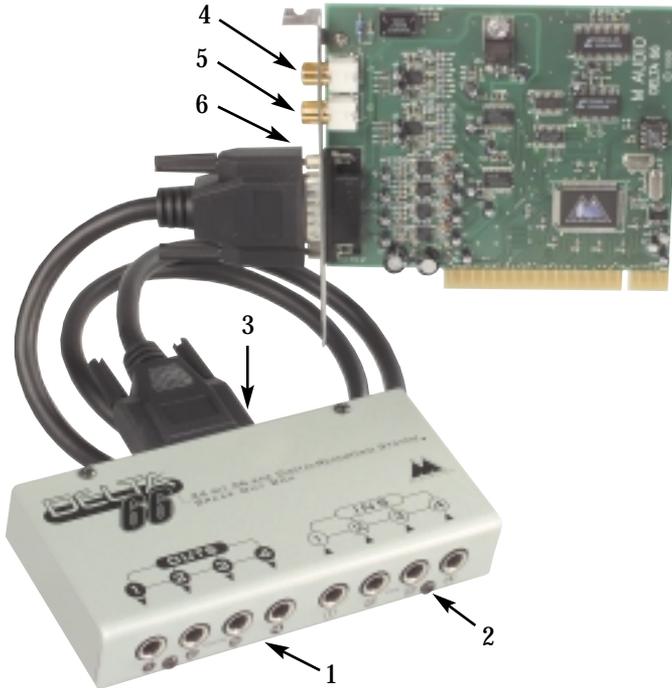
Within the Delta 66's PCI chip is a hardware digital mixer. Controlled by the included Delta Control Panel software, it may handle all of your routing needs, give you extra control of all left, right, and stereo levels, in addition to control of pans, solos, and mutes.

Product Features & Specifications

- 6x6 24-bit/96khz full-duplex recording interface.
- PCI host card with external break-out box.
- 4x4 analog I/O accepts balanced or unbalanced connections on 1/4" TRS jacks.
- Analog I/O configurable for +4dBu, Consumer, and -10dBV signal levels.
- Analog dynamic range exceeding 103dB.
- All data paths support up to 24bit/96kHz performance, no upgrades necessary.
- Comprehensive digital mixing, routing, and monitoring capabilities with included Delta Control Panel software.
- Hardware sample-accurate sync will allow linking of multiple Delta units (expected November 1999).
- Windows 95/98, Windows NT, and ASIO drivers included. Mac OS drivers coming soon.

Minimum System Requirements

- Windows 95 or Windows 98.
- Pentium II 266MHz for 96kHz operation. Pentium 200 MMX for 48kHz or less.
- 128 MB of PC100 RAM for 96kHz operation. 64MB SDRAM for 48kHz or less.
- UDMA EIDE or SCSI HDD recommended.



Break-Out Box Front Panel:

1. Analog OUTS 1-4: These jacks output analog audio to a variety of external sources. Each jack is 1/4" TRS (Tip-Ring-Sleeve) and is compatible with 1/4" TRS (balanced) or TS (Tip-Sleeve unbalanced) connections.
2. Analog INS 1-4: These jacks input analog audio from a variety of external sources. Each jack is 1/4" TRS (Tip-Ring-Sleeve) and is compatible with 1/4" TRS (balanced) or TS (Tip-sleeve unbalanced) connections.

Break-Out Box Back Panel:

3. Host Cable connector: This 15-pin D-sub connector is used to attach the external break-out box to the PCI host card, using the supplied host cable.

PCI Host Adapter Card:

4. Coaxial S/PDIF Input: This RCA connector receives an S/PDIF stereo signal from your coaxial S/PDIF digital source such as a DAT, MiniDisc player or external A/D converter.

5. Coaxial S/PDIF Output: This RCA connector sends an S/PDIF stereo signal to your coaxial S/PDIF digital target device such as a DAT, MiniDisc player or external D/A converter.
6. Host Cable connector: This 15-pin D-sub connector attaches to the supplied host cable to allow communication between the PCI host card and the break-out box.

Quick Guide to Getting Started

Here is a list of the steps required to get your Delta 66 up and running:

1. Physically install the card in your computer and connect it to the Delta 66 break-out box (see ‘Hardware Installation’).
2. Start Windows and allow Windows’ Plug-and-Play to prompt you for the Delta 66 drivers via the Add New Hardware wizard.
3. Install drivers and support software (see ‘Windows Software Installation’).
4. Configure your digital recording software to use the Delta 66 as its active audio device (see ‘Using the Delta 66 with your Software Application’ and also your software application’s manual).
5. Hook up your digital and analog audio gear (see ‘Delta 66 Recording Tutorials’). Configure your Delta Control Panel software for proper monitoring and playback.

Hardware Installation

To mechanically install the Delta 66, do the following:

1. Turn off your computer.
2. Remove the computer’s cover and position the computer so that you may easily access its PCI slots.
3. Select the PCI slot where you will install your Delta 66 PCI host card. Make sure the slot is a PCI slot. If you don’t know what “PCI slot” means, check the owner’s manual for your computer. PCI slots are distinguishable from ISA slots by being shorter and set back farther from the outside of the computer, however some newer computers have only PCI slots.
4. Before removing the Delta 66 PCI host card from its protective anti-static bag, touch the metal power supply case of the computer in order to dissipate any static electricity your body may have accumulated. You might want to pick up a grounding wrist strap (available from electronics stores like Radio Shack) if you want to be doubly sure you aren’t carrying a static charge that could damage the card.
5. Remove the metal bracket that covers the access hole on the back of the

- computer. This bracket is usually fastened to the computer with a single screw.
6. Position the Delta 66 PCI host card over the target PCI slot and fit the card loosely over it with the card in the upright position. Press the card gently but firmly downward into the slot until the card is completely and squarely seated in the slot. If the card seems difficult to seat, a slight rocking motion may help.
 7. Screw the Delta 66 PCI host card's metal bracket down into the screw hole on the back of your computer using the screw you removed in step 5 above.
 8. Place the cover back on your computer.

Now it is time to connect the Delta 66 break-out box to the PCI host card that you have just installed. With your computer turned off:

1. Place the Delta 66 break-out box on a desktop in a convenient but secure place, or mount the unit in a 19" rack-mount chassis. Rack mounting may be accomplished with a universal rack-mount tray, using a 5mm screw through the tray and into the mounting hole on the bottom of the Delta 66 break-out box.
2. Connect one end of the supplied host cable to the 15-pin D-sub connector on the break-out box.
3. Connect the other end of the host cable to the 15-pin D-sub connector on the Delta 66 PCI Host card that now resides in your computer.

Windows Software Installation

The Delta 66 system includes a Windows 95/98 diskette containing the Windows drivers, ASIO drivers, and Delta Control Panel software. To install these on your system, please follow these steps:

Windows 98 Installation

1. After installing the Delta 66 hardware, boot your system and start Windows. During the Windows boot procedure, the new hardware will be automatically detected by the 'Add New Hardware Wizard', as shown here. Click 'Next>'.



2. The 'Add New Hardware Wizard' will now ask how to locate the driver. "Search for the best driver for your device" is already selected. Click 'Next>'.
3. Windows will give you a selection of locations to search. Make sure that 'Floppy disk drives' is checked, or click on the check box to do so. Insert the Delta 66 Windows 95/98 Driver Software disk into your floppy drive. Click 'Next>'.
4. The 'Wizard' reports that its Windows driver file search has found the M Audio Delta 66. Click 'Next>'.
5. Windows is now ready to install the driver files from the specified location. Click 'Next>'. Windows will start to copy the files and show you a progress report screen.
6. The Wizard reports that Windows has finished installing the software. Click 'Finish'. Your Delta 66 is ready for action.

After completion of the driver installation, Windows may require you to restart Windows. If it does request a restart, remove the Delta Disk from the floppy disk drive and respond by clicking "Yes". The system will restart and your Delta 66 is ready for play.

Windows 95 Installation

1. After installation of the Delta 66 hardware, boot your system and start Windows. During the Windows boot procedure, new hardware will be automatically detected.
2. Choose the Install of "driver from disk provided by hardware manufacturer," then click OK.
3. An 'Install From Disk' dialog will prompt you to copy files from the A:\ drive (if your floppy drive is a different drive letter, change it at this time). Insert the Delta 66 95/98 Driver Software disk into the drive, then click OK.
4. Windows will start to copy files, with a progress indicator on the screen. Once this process completes itself, your Delta 66 will be ready for action.

After completion of the driver installation, Windows may require you to restart Windows. If it does request a restart, remove the Delta Disk from the floppy disk drive and respond by clicking "Yes". The system will restart and your Delta 66 is ready for play.

Windows NT Installation

1. Power up your computer after physically installing the Delta 66 card.
2. Go to Start | Settings | Control Panel and double click on 'Multimedia.' Click the 'Devices' tab, then click the 'Add' button.
3. "Unlisted or Updated Driver" will be highlighted at the top of the list. Click OK.
4. The 'Install Driver' box will prompt you to insert the driver disk, and the A:\ prompt will appear as the path. Insert the disk titled "Delta 66 NT Drivers and

Software,” and click OK. Note that if your floppy drive is something other than the “A:” drive, type in that drive path (type “B:” for instance, if that is your floppy drive path).

5. The “M Audio Delta Interface Card” driver will appear in the Add Unlisted or Updated Driver dialog box. Click OK.
6. Windows NT will require you to restart your computer for the changes to take effect. Choose “Restart Now.” Upon restart, your Delta 66 will be ready for use.

Verifying Windows Driver Installation

Windows displays the Delta 66 driver status in the Device Manager page of the System Properties dialog box. The Device Manager page is opened via the Windows Start button: select Start | Settings | Control Panel | System | Device Manager. With the Device Manager displayed, click on the ‘+’ next to “Sound, video and game controllers” to open a list of devices, the Delta 66 being a device of that nature. Below is an example view of the Device Manager.



This example shows the M Audio Delta 66 and Midiman WINMAN 4x4/S (another product shown here only as an example) entries in the Windows Device Manager device list. The Delta 66 is properly installed with no conflicts, as is the WINMAN 4x4/S. If you do not see your M Audio Delta 66 in your Device Manager in this fashion, please jump ahead to the “Troubleshooting” section of this manual.

Verifying Delta Control Panel Software Installation

Open the Windows Control Panel (do so via Start | Settings | Control Panel). If your Delta 66 hardware and Delta Control Panel software are properly installed, the Windows Control Panel should display an “M Audio Delta H/W” icon. By double-clicking on that icon, you may launch the Delta Control Panel software. Also for convenience, you may create a shortcut on your desktop by dragging a copy of the “M Audio Delta H/W” icon from the Control Panel to your Windows desktop using your mouse or trackball. After completing the drag operation, a dialog box will ask you if you wish to create a shortcut — click on ‘Yes’. Once the shortcut is installed, all you have to do is double-click on the shortcut icon on your desktop to launch the Delta Control Panel software.

Delta System Overview

Delta’s Analog Input/Outputs

The Delta 66 Digital Recording Interface’s analog inputs and outputs are compatible with a wide variety of audio products. The Delta Control Panel software allows you to configure the signal level of each analog input individually, and all analog outputs as a group. Signal level settings of +4/Consumer/-10 are available. Selecting the ‘+4’ radio button configures the channel(s) for use with +4dBu signal levels, compatible with most musical instruments and professional mixers. Selecting the ‘-10’ setting sets up the channel(s) for -10dBV nominal signal levels, commonly used with consumer equipment such as CD, MiniDisc, cassette tape and DAT players. The ‘Consumer’ setting is preferred for semi-pro audio equipment and some consumer equipment that is too ‘hot’ for the ‘-10’ setting. The ‘Consumer’ setting offers approximately 6dB more headroom than does the ‘-10’ setting. Semi-pro and consumer devices’ signal levels vary from manufacturer-to-manufacturer and even product-to-product, so a little experimentation between Consumer and -10 settings may be required for optimal results.

NOTE: In order to preserve its high dynamic range and minimize distortion, the Delta 66 does not have microphone pre-amplifiers built into it. Therefore direct connection to a microphone is not recommended. Instead run the microphone signal through a microphone pre-amp (such as the Midiman "Audio Buddy™") and then connect the pre-amp output to the input of the Delta 66.

All analog jacks on the Delta 66 break-out box are of the 1/4” TRS (Tip-Ring-Sleeve) variety. The TRS jacks allow connection to either balanced (typically professional) or unbalanced (typically consumer or semi-pro) equipment. +4dBu balanced configurations provide the highest performance and should be used whenever possible. However, the Delta 66’s analog connections support combinations of balanced and unbalanced, +4dBu, consumer, and -10dBV level signals.

The Digital Monitor Mixer

The Delta 66 Digital Recording System has a hardware digital audio mixer built into its PCI controller chip. It accepts digital audio streams from all hardware inputs and all outgoing software audio devices, mixes them with 36-bit internal precision and then provides the mixed output to one or more locations. For the purpose of monitoring, the output of the mixer may be routed to the first set of Delta 66 analog outputs (H/W OUT1/OUT2 as a stereo pair) and/or the S/PDIF digital output. At the same time the mixer may be used for stereo mix-down, with the mixer's output recorded into the user's application software. The digital audio mixer is configured and controlled by the included Delta Control Panel Software.

The Patchbay / Router

In addition to the built-in monitor mixer, the Delta 66 Digital Recording Interface includes an output patchbay/router. The patchbay/router allows each output (analog or digital) to be connected to a variety of input sources. The Delta 66's outputs may accept audio from software sources (the output devices visible in your audio software applications) or from hardware sources such as the analog and digital inputs or the monitor mixer. This capability makes the Delta 66 quite flexible for WAV output, monitoring, or directly connecting inputs to outputs for "system test" purposes.

Synchronization

For proper operation, the entire Delta 66 system is always synchronized to a single master clock. The master clock is chosen via the Delta Control Panel software and this clock may be derived from either the Delta 66's internal crystal oscillators or S/PDIF In. Most of the time the master clock is taken from the internal crystal oscillators. However, the S/PDIF option is used in situations where the Delta 66 must be synchronized to external digital audio or sample rates.

As stated, most of the time the master clock is derived from the internal crystal oscillators. Operation in this mode is similar to that of a generic sound card — for instance, when a WAV file is played through the Delta drivers, the software application playing the WAV file is responsible for setting the sample rate in the sound card hardware. The Delta 66 supports these sample rates by using either of its internal crystal oscillators and dividing the rate of that oscillator by some value to derive the proper sample rate.

In situations where S/PDIF In is being used, the Delta 66 should be configured to get its master clock from the S/PDIF In data stream. The reason for this is simple — even if the sample rates are set the same, an S/PDIF data stream coming from an external source is rarely going to be in sync with the Delta 66 (or other digital audio devices in the system for that matter). If the master clock were set to use the internal crystal, then the incoming S/PDIF audio would have "pops," "crackles," and other undesirable audio artifacts present in it. Instead, setting the master clock to "S/PDIF In" will synchronize the Delta 66 to the S/PDIF input data and its digital audio will be transferred properly.

Finally, the S/PDIF In option may be used to operate the Delta 66 at non-standard sample rates. When this option is selected, the Delta 66's sample rate will automatically match that of the incoming S/PDIF data stream.

NOTE: When the S/PDIF In is selected as the master clock source, the Delta 66 mixer's frequency response will be affected by whatever sample rates you inject at the S/PDIF In. This is because (1) the digital mixer operates at the same sample rate as the rest of the board, and (2) sample rate and frequency response are directly correlated.

Using the Delta 66 with your Software Application

Once the Delta 66's hardware and driver software are properly installed, it is ready for use with your music application software. Some of these applications may require you to highlight or enable the Delta 66 drivers within the program, and others may have a utility that analyzes or profiles the audio cards in your system and enables the drivers. Your software should have an audio device driver setup page.

WINDOWS MME AUDIO INPUT DEVICES: All Delta 66 analog and S/PDIF inputs may be used simultaneously for a total of 6 input channels. Within your software application(s), the names of the Delta 66 audio input devices are:

- PCM In 1/2 Delta-66
- PCM In 3/4 Delta-66
- S/PDIF In Delta-66
- Mon.Mixer Delta-66

The PCM In devices allow recording a stereo stream directly from the specified analog input pairs. The S/PDIF In device allows you to record a stereo stream directly from the S/PDIF input. The Mon.Mixer device allows stereo recording from the digital "monitor" mixer built-into the Delta 66. The audio data recorded from this device is the mix of input and output streams set up in the Delta Control Panel software (see Delta 66 Control Panel Software section).

Note that all of the input devices are stereo. Your application software may break these down further to "left" and "right" mono devices. Therefore you may see them as "Left PCM In 1/2 Delta-66, Right PCM In 1/2 Delta-66", "Left S/PDIF In Delta-66, Right S/PDIF In Delta-66", or "Left Mon. Mixer Delta-66, Right Mon. Mixer Delta-66," etc. from within your recording software.

WINDOWS MME AUDIO OUTPUT DEVICES: All Delta 66 analog and S/PDIF outputs may be used simultaneously for a total of 6 output channels. Within your software application(s), the names of the Delta 66 audio output devices are:

WavOut 1/2 Delta-66
WavOut 3/4 Delta-66
WavOut S/PDIF Delta-66

WavOut devices allow playing a stereo audio stream to the analog hardware outputs (for WavOut 1/2, 3/4), the S/PDIF hardware output (for WavOut S/PDIF), or into the hardware router or mixer. Your application software may break each of these stereo devices down further to “left” and “right” mono devices. Therefore you may see them as “Left WavOut 1/2 Delta-66, Right WavOut 1/2 Delta-66”, or “Left WavOut S/PDIF Delta-66, Right WavOut S/PDIF Delta-66”, etc. from within your music software. Most software will handle the outputs as stereo pairs but allow you to pan audio left or right within the pair. Therefore to send a mono output to OUT1 (for example), choose WavOut 1/2, then pan that track hard left.

Note that each device name begins with “WavOut.” This is to remind you that these devices are not always connected directly to output hardware. Instead they are connected to the Delta 66’s internal patchbay/router and may be sent to one of several destinations. For more on the patchbay/router, see the Patchbay/Router section of the Delta Control Panel software discussion.

ASIO DRIVER INPUT DEVICES: When using the ASIO audio drivers with programs that support ASIO-style audio, the input devices are displayed as mono devices. Within ASIO software applications, the names of the Delta 66 audio input devices are:

Analog In1 Delta-66
Analog In2 Delta-66
Analog In3 Delta-66
Analog In4 Delta-66
S/PDIF In L Delta-66
S/PDIF In R Delta-66
Mon.Mixer L Delta-66
Mon.Mixer R Delta-66

Notice the S/PDIF In and Monitor Mixer names include “L” and “R” characters. “L” indicates the left channel of the stereo stream, while “R” indicates right channel.

ASIO DRIVER OUTPUT DEVICES: The Delta 66’s ASIO output devices appear in stereo pairs. Because each device is stereo, you may see “left” and “right” references within your software application. This allows the application to pan audio left and right under software control. To send a signal to a Delta ASIO output 1 (for example) as a mono output send, one would choose “Analog 1/2 Delta-66” for that track’s output port, and then pan that output hard left. The ASIO outputs are named as follows:

Analog 1/2 Delta-66
Analog 3/4 Delta-66
S/PDIF L/R Delta-66

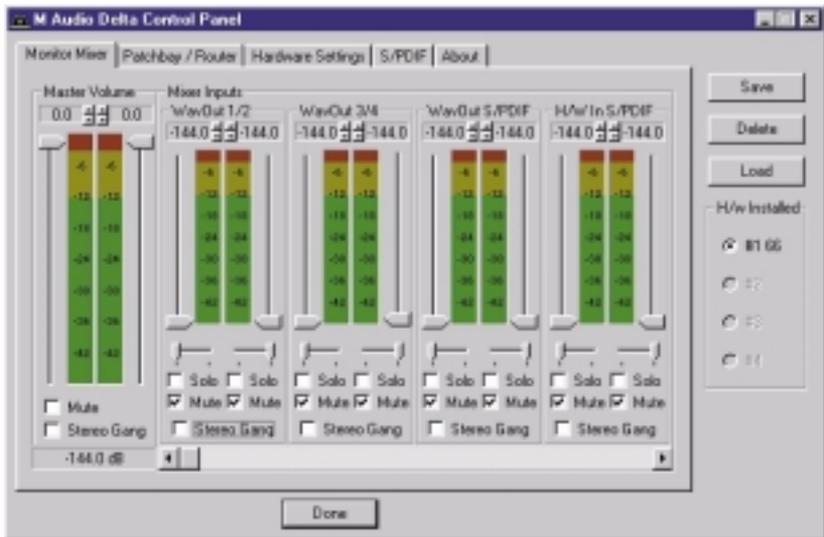
WINDOWS MULTIMEDIA SETTINGS: Windows may be set up to use the Delta 66 as its default audio device, allowing system sounds to be sent out the Delta 66. This also enables you to use the Delta 66 with the sound applets included with Windows. To set this up, go to Control Panel | Multimedia. In the Audio Properties page, set the Playback and Recording devices to the Delta 66 input and output devices of your choice.

Delta 66 Control Panel Software

Once the Delta 66 is properly installed, an “M Audio Delta H/W” icon will be displayed in your Windows Control Panel. By double-clicking on that icon, you will launch the Delta Control Panel software. You may also launch the Delta Control Panel software from the desktop if you have previously created a shortcut there (see “Verifying Delta Control Panel Software Installation” section for instructions on how to do this). Once the Delta Control Panel software has been opened, you will see the main panel and its several tabs. To display a desired page, click on its tab. Below are functional descriptions of each page.

Monitor Mixer Page

The Monitor Mixer is the first page that appears when the Delta Control Panel is opened, and controls the digital mixer built into the Delta 66’s PCI controller chip. As described in previous sections, the output of this mixer may be assigned to the OUT1/OUT2 analog outputs and/or the S/PDIF Out digital output. At the same time, the mixer outputs may be recorded in stereo by software.



The Monitor Mixer Page is essentially a collection of volume level faders, audio level (or ‘peak’) meters, and solo/mute controls. For each mixer output and input channel there is one of each: a volume fader, a peak meter, a solo control, and a mute control.

LEVEL FADERS: Each volume fader may be controlled by dragging its fader ‘handle’ vertically with the mouse, or by clicking on the ‘handle’ to make it active and then adjusting it with the up/down cursor keys of your computer keyboard. Because the mixer has no gain, these faders only attenuate (reduce) the signal levels. The highest setting is 0dB, or ‘Unity Gain.’ The default fader setting is the quietest setting, -144dB, which essentially mutes the audio. A pair of level faders may be “ganged” so that both channels may be adjusted together as a stereo pair.

Also, at the top of each fader and meter is a fader level “fine adjustment” control. Clicking on the small “up” and “down” arrows will adjust the corresponding fader setting in 0.5dB increments. Next to each fine adjustment control is a numerical fader readout that is always current and active.

PEAK METERS: Each peak meter indicates an audio signal level in “dB relative to full-scale.” This means that a full-scale signal is referred to as “0 dB” and a signal that is 12dB ‘quieter’ than full-scale is referred to as “-12dB.” The meters are vertically color-coded into three sections: green, yellow and red. The green section represents a safe zone, ranging from approximately -48dB to -12dB. Most audio signals should appropriately fill this section of the meter. The yellow section ranges from -12dB to -3dB as the signal approaches a ‘hotter’ level. For best capture resolution, recording in this area is both safe and advised. The red section of the meter ranges from -3dB to 0dB. On the input level meters, a 0dB condition indicates overload and audio clipping may occur. Therefore be careful to adjust the incoming audio levels so that they do not peak in the red section too long (you might use the monitoring capability of the Delta 66 to let your ears be the judge). On all output level meters, 0dB indicates full-scale output. Unlike the inputs, hardware clipping is impossible on the outputs because of the 36-bit resolution built into the mixer hardware. However, please note that it is possible to mix multiple tracks within your software application and cause clipping to occur in the output stream before it reaches the Delta output hardware or monitor mixer.

MASTER VOLUME: At the left side of the Monitor Mixer page, you will see the ‘Master Volume’ faders and peak meters. These faders have the longest ‘throw’ and highest meter resolution of any level controls in the mixer page. They control the overall stereo level of the mixer output. The peak meters indicate the output signal levels with respect to full-scale and are directly affected by the settings of the master volume faders.

MIXER INPUTS: The ‘Mixer Inputs’ are inputs to the monitor mixer. These inputs accept hardware audio streams (directly from the Delta’s analog and digital input

ports) and software audio streams (digital audio generated in software to be output). This combination of streams makes the monitor mixer extremely flexible. Each mixer input channel has its own level fader and may be panned anywhere in the left/right stereo field. Each input also has its own peak meter. The peak meters indicate the incoming “pre-fader” levels of the incoming audio and are therefore not affected by the fader settings. However, the input faders do affect the levels of the signals exiting the mixer and you will see the effect of the input faders on the output “Master Volume” peak meters.

Because of the large number of mixer inputs, not all inputs are displayed simultaneously. You may use the scroll bar at the bottom of the Delta Control Panel to scroll the view left or right. From far left to right, the inputs are labeled “WavOut 1/2,” “WavOut 3/4,” then “WavOut S/PDIF.” These inputs accept the digital audio streams being sent from your software application (or Windows) to the driver devices with those same names. Each name begins with “WavOut” to remind you that these are software streams and may not necessarily be routed to any physical outputs (see Patchbay/Router Page). Further to the right are more channels, labeled “H/W In S/PDIF,” “H/W In 1/2,” and “H/W In 3/4.” These mixer inputs are audio streams from the physical Delta 66 hardware inputs, hence the “H/W” at the front of each label.

PAN: Each mixer input may be individually panned anywhere in the stereo output mix. A pan control is positioned directly under each input channel peak meter and has the appearance of a small vertical pointer. To make a coarse adjustment, click on the pan control with your mouse and drag it to the desired position. For finer adjustment (in 1% increments), you may click on the pan control to make it active, and then use the left/right or up/down cursor keys on your computer keyboard. Either way, while the pan setting is being adjusted, its value will appear numerically in the Master Volume’s status box (below the Master Volume Stereo Gang control) as a percentage from left pan to right pan: -100% represents far left, +100% represents far right, and 0% represents the center.

SOLO: Each mixer input channel has a “Solo” checkbox associated with it. Clicking on and activating a Solo box will solo the selected channel by essentially muting all other signals. When more than one channel has Solo selected, all solo channels will be summed to the solo ‘buss’ (path), which is what one might consider an ‘in place’ solo as opposed to a PFL, or pre-fader listen (levels and pans still apply). Deactivating all solo boxes will return all input channels to their previous mute/unmute states.

MUTE: Every mixer input channel has a “Mute” checkbox associated with it. Clicking on and activating the Mute box will remove that signal from the stereo buss. Deactivating the Mute box will add the signal back into the stereo buss.

STEREO GANG: All input channel pairs have a “Stereo Gang” capability. Clicking on and activating the Stereo Gang checkbox will link (or “gang”) the left/right faders so that both channels may be adjusted together as a stereo pair.

Patchbay/Router Page

The Patchbay/Router page allows you to connect each of the Delta 66's hardware outputs (2 pairs of analog outputs and 1 pair of digital output channels) to specific audio sources within the Delta 66 board. To display this page, click the "Patchbay/Router" tab of the Delta Control Panel.

The leftmost vertical column of Patchbay/Router page, "H/W Out 1/2," connects this hardware analog stereo pair to one of six stereo sources:

1. The default setting, "WavOut 1/2", connects ports OUT1 and OUT2 to your music software or Windows multimedia applet. In other words, when music software plays audio to the device named "WavOut 1/2 Delta-66" it will be routed directly to the "hardware" analog outputs 1 & 2 of your Delta 66's break-out box.
2. The second option, "Monitor Mixer," connects ports OUT1 and OUT2 to the outputs of the Delta 66 monitor mixer. For more information of the capabilities of the monitor mixer, please see the section "Monitor Mixer Page."
3. The third option, "S/PDIF In," connects ports OUT1 and OUT2 directly to the hardware S/PDIF input on the Delta 66 PCI host card. The left channel of the S/PDIF In is routed to OUT1 and the right channel of the S/PDIF In is routed to OUT2.
4. The fourth option, "S/PDIF In (L/R Rev.)," functions identically to the third option, except that the left and right channels are swapped. Therefore in this mode, the left channel of the S/PDIF In is routed to OUT2 and the right channel of the S/PDIF In is routed to OUT1. Note that this option is solely for monitoring/mixing purposes — the S/PDIF In will not record in reverse when this option is checked.
5. Selections five and six connect the hardware analog inputs 1 & 2 or 3 & 4 (respectively) directly to the Delta 66's hardware analog outputs 1 & 2. For example, if "H/W In 1/2" were selected, any signal present at the IN1 port will be copied to OUT1, and any signal present at the IN2 port will be copied to OUT2. This same behavior applies to "H/W In 3/4" when selected.

The next vertical column of the Patchbay/Router page "H/W Out 3/4," connect this hardware analog stereo pair to one of five stereo sources.

1. The default setting, "WavOut 3/4", connects ports OUT3 and OUT4 to your music software or Windows multimedia applet. In other words, when music software plays audio to the device named "WavOut 3/4 Delta-66" it will be routed directly to the "hardware" analog outputs 3 & 4 of your Delta 66's break-out box.
2. The second option, "S/PDIF In", connects ports OUT3 and OUT4 directly to the hardware S/PDIF input on the Delta 66 PCI host card. The left channel of the S/PDIF In is routed to OUT3 and the right channel of the S/PDIF In is routed to OUT4.

3. The third option, “S/PDIF In (L/R Rev.)”, functions identically to the second option, except that the left and right channels are swapped. Therefore in this mode, the left channel of the S/PDIF In is routed to OUT4 and the right channel of the S/PDIF In is routed to OUT3.
4. Options four and five connect the hardware analog inputs 1 & 2 or 3 & 4 (respectively) directly to the Delta 66’s hardware analog outputs 3 & 4. For example, if “H/W In 1/2” were selected, any signal present at the IN1 port will be copied to OUT3, and any signal present at the IN2 port will be copied to OUT4. This same behavior applies to “H/W In 3/4” when selected.

The rightmost vertical column of Patchbay/Router page, “H/W Out S/PDIF,” connects the Delta 66’s hardware S/PDIF output to one of six stereo sources:

1. The default setting, “WavOut S/PDIF,” connects the S/PDIF Out port to your music software or Windows multimedia applet. In other words, when music software plays audio to the device named “WavOut S/PDIF Delta-66” it will be routed directly to the hardware S/PDIF output on your Delta 66’s PCI host card.
2. The second option, “Monitor Mixer,” connects the S/PDIF Out port to the outputs of the Delta 66 monitor mixer. For more information on the capabilities of the monitor mixer, please see the section “Monitor Mixer Page.”
3. The third option, “S/PDIF In,” connects the S/PDIF Out port directly to the hardware S/PDIF input on the Delta 66 PCI host card. The left channel of the S/PDIF In is routed to the left channel of S/PDIF Out and the right channel of the S/PDIF In is routed to the right channel of S/PDIF Out.
4. The fourth option, “S/PDIF In (L/R Rev.)”, functions identically to the third option, except that the left and right channels are swapped. Therefore in this mode, the left channel of the S/PDIF In is routed to the right channel of S/PDIF Out and the right channel of the S/PDIF In is routed to the left channel of S/PDIF Out.
5. Selections five and six connect the hardware analog inputs 1 & 2 or 3 & 4 (respectively) directly to the Delta 66’s S/PDIF Out port. For example, if “H/W In 1/2” were selected, any signal present at the IN1 port will be sent to the left channel of the S/PDIF Out, and any signal present at the IN2 port will be sent to the right channel of the S/PDIF Out. This same behavior applies to “H/W In 3/4” when selected.

At this point, you may begin to realize the versatility of the Monitor Mixer and the Patchbay/Router, and the relationship between the two. You may want to re-read this section and make some practice adjustments within the Delta Control Panel software to become proficient in routing and mixing. If somewhere in the process you become confused, you may always restore the default settings to use the card as a straight 6-in 6-out device — just choose the topmost option in each of the Patchbay/Router columns.

Hardware Settings Page

The Hardware Settings page of the Delta Control Panel gives you control over miscellaneous features of the Delta 66. To display this page, click the “Hardware Settings” tab of the Delta Control Panel.

MASTER CLOCK: This section allows you to select the source of the board’s master clock: Internal Xtal (crystal) or S/PDIF In. Master clock operation is outlined in the Synchronization section of this manual. Internal Xtal is the default setting. Be sure to select “S/PDIF In” if you will be recording or monitoring an S/PDIF stream.

NOTE: If “S/PDIF In” is selected as the master clock source, be sure to supply a valid S/PDIF signal to the board’s active S/PDIF input. Otherwise, erratic timing and/or improper sample rates will be experienced.

Once a master clock source has been selected, its synchronization status is continually monitored and displayed below the master clock radio buttons. If internal crystal is selected, the status display will always say “Locked.” On the other hand, if S/PDIF In is selected as the master clock source, the control panel will display “Locked” only when a valid S/PDIF signal is detected. It will display “Unlocked” when there is no signal at the S/PDIF input, or when the signal is corrupt or invalid for any reason.

CODEC SAMPLE RATE: This section indicates the present board sample rate, as set by application software. The sample rate displayed here is used to drive the digital mixer and all outputs. The “Rate Locked” checkbox is used to force a sample rate upon the system. It is disabled by default to allow software access to all supported sample rates. When checked, it causes the driver to only operate at the selected sample rate. This means that any application that attempts to open the Delta 66 driver at a sample rate other than the one selected here will fail to do so and will post an error message. “Reset Rate When Idle” is selected when you want the sample rate to return to a particular setting when a software application is not actively using the board. This is particularly handy for keeping the digital mixer running at a specific sample rate.

NOTE: Because the digital monitor mixer runs at the sample rate of the rest of the board, and because sample rate directly affects frequency response, it may sometimes be desirable to keep the sample rate at or above 44.1 kHz while using the monitor mixer. This is accomplished by enabling “Reset Rate When Idle” and selecting a sample rate of 44.1 kHz or greater.

S/PDIF SAMPLE RATE: When using S/PDIF In as your master clock, this section tells the driver what the expected S/PDIF input sample rate is. The section is only

displayed when the board is set to use S/PDIF In as the master clock source. From the list, select the sample rate closest to that of the S/PDIF input data. The sample rate selected here will be the only sample rate available to the software applications. Therefore, you must set your audio software application to this same sample rate or else the application will display an error message.

NOTE: When S/PDIF In is the master clock source, the digital monitor mixer will run at the sample rate received at the S/PDIF In. Since frequency response and sample rate are directly related, the mixer frequency response will be directly related to the sample rate of the S/PDIF input data.

MULTITRACK DRIVER DEVICES: The Delta 66 drivers may intelligently synchronize the beginning of recording and playback across all audio devices on the board. When using application software that is capable of using multiple channels simultaneously, select “Single and In-Sync” to ensure that all audio channels will begin playback and/or recording at the same time. Otherwise select “Independent” to allow the audio channels to play independently — this setting may be desirable if more than one application needs to access the Delta 66 simultaneously.

DMA BUFFER SIZES: This section specifies the amount of system memory dedicated to digital audio buffering. Setting a buffer size that is too small may result in clicks or pops in the audio stream as some data may be lost. Larger buffers cause slightly more latency but prevent the pops and clicks that might occur with smaller buffer sizes — the default settings are recommended but you may desire to tweak these default settings to suit your tastes.

VARIABLE SIGNAL LEVELS: The software switches in this section allow the user to match individual input levels and global (as in ‘all’ or ‘across the board’) output levels to the operating signal levels of the external audio equipment. Three level selections are available: +4dBu, ‘Consumer,’ and –10dBV. The ‘+4dBu’ setting is the least ‘sensitive’ of the three settings, and ‘–10dBV’ the most sensitive. Therefore, the ‘+4dBu’ setting has the most headroom and can accept the hottest signals of the three settings.

Consult the user guide of your external audio equipment regarding your equipment’s line level. If for instance your audio equipment is consumer or semi-pro, and you find that its input level is a little too hot for the Delta 66’s ‘–10dBV’ setting, try switching to the ‘Consumer’ setting. Conversely, if your –10dBV gear is receiving a signal from the Delta 66 that is too hot, try switching the Delta 66’s output levels from ‘Consumer’ to the ‘–10dBV’ setting.

The S/PDIF page of the Delta Control Panel configures the S/PDIF output format and displays the status of the S/PDIF input. To display this page, click the “S/PDIF” tab of the Delta Control Panel software.

DIGITAL INPUT: This group box displays the current S/PDIF input status. The Delta 66’s S/PDIF receiver is capable of recognizing a valid input signal versus an invalid, corrupt or non-present one. When a valid signal is detected at S/PDIF In, this group box displays “Valid Input Detected.” When an invalid signal is detected or no signal is present, the group box displays “Invalid or Not Present.” Below this message are two ‘grayed-out’ buttons: “Coax(RCA)” and “Optical.” These are functions of the Delta DiO 2496, another product in the M Audio Delta line, one with both optical and coaxial S/PDIF inputs. These controls do not apply to the Delta 66.

DIGITAL OUTPUT FORMAT: Within the “Digital Output Format” group, you choose the digital audio format of the S/PDIF output. The default setting, “Consumer,” is a true S/PDIF format and is recognized by all consumer devices. The alternate “Professional” setting is an AES/EBU type data stream, but electrically S/PDIF. This is a work-around that is recognized by some but not all AES/EBU devices.

For both consumer and professional output formats, the “Advanced” checkbox will allow you to force a few particular status bits in the outgoing S/PDIF signal. The advanced option is for expert users only; however, if you decide to go exploring, change a few bit settings and get lost, you can always select the “Restore Defaults” button to restore the outgoing status bits to their factory settings. When “Consumer” and “Advanced” are both selected, the group “Consumer Format Advanced Settings” will appear. When “Professional” and “Advanced” are both selected, the group “Professional Format Advanced Settings” will appear. These groups are described below:

Consumer Format Advanced Settings (Copy Mode): Copy protection, also known as Serial Copy Management System (SCMS), is written into the S/PDIF subcode, a reserved part of the S/PDIF digital stream that is independent of the actual audio data being transmitted. It can be used to inhibit the amount of copies that can be made, or allow for unlimited copying. Three SCMS modes are available. “Original (Copy Permitted)” indicates that the source material may be copied by a receiving device. “1st Generation” indicates that the source material is a first generation copy. Most devices that are capable of recording will reject material with this SCMS mode set. The final option is “No SCMS” which may be used to override the other two modes and allow a recording device to successfully record the audio data. Different manufacturers’ products may interpret these codes differently and require you to set these bits by “trial-and-error” until proper operation is achieved.

Consumer Format Advanced Settings (Emphasis): This status bit is used to indicate if pre-emphasis has been applied to the outgoing digital audio signal. The default is “None” and rarely will any user want to set the value to “50/15uSec” unless the transmitted audio has been encoded with 50/15uSec pre-emphasis.

Professional Format Advanced Settings (Data Type): The user may assign the outgoing data as audio or non-audio data. Many devices ignore this setting. The obvious default is “audio.”

Professional Format Advanced Settings (Emphasis): The user may choose to indicate or not indicate if pre-emphasis has been applied to the outgoing digital audio signal. The default is “None” and rarely will any user want to set the value to “CCITT” or “50/15uSec” unless the transmitted audio has been encoded with one of those types of pre-emphasis.

About Page

The “About” page, while displaying the handsome M Audio logo and applicable copyright information, also reports the driver version and control panel software version. If you have Internet browsing capabilities and are currently connected to the Internet, clicking on the Midiman copyright will link you to the M Audio / Midiman web site.

Save, Delete, Load Buttons; H/W Installed

At the rightmost side of the Delta Control Panel are the Save, Load and Delete buttons as well as an “installed hardware” set of radio buttons. These controls appear regardless of what Delta Control Panel page is being displayed.

SAVE, DELETE, LOAD: The Delta Control Panel always retains the last settings entered. However the Save, Delete, and Load functions expand this capability to store different sets of control panel settings using different configuration file names. These configurations are then available for recall at a later date and time.

Clicking the ‘Save’ button brings up a dialog box prompting you to name the current configuration. Once you have done this, click ‘OK’, and your current configuration has been saved to disk. If you decide that you no longer need a particular configuration, click the ‘Delete’ button. Highlight the name of the configuration file that you wish to delete, and click the ‘OK’ button. To recall or reload a saved configuration, click the ‘Load’ button. Highlight the name of the configuration file that you wish to recall, and click ‘OK’. Those settings will now appear in the Delta Control Panel and the driver will automatically update the hardware.

H/W INSTALLED: Up to four Delta cards may be installed in a system at one time. (Note: this option may not exist in the Delta software drivers at the time of the first release.) This section displays all installed Delta cards, and allows you to select which particular card is under the control of the control panel software. To select a card for configuration, click the radio button to the left of that particular card in the “H/W Installed” list.

Delta 66 Recording Tutorials

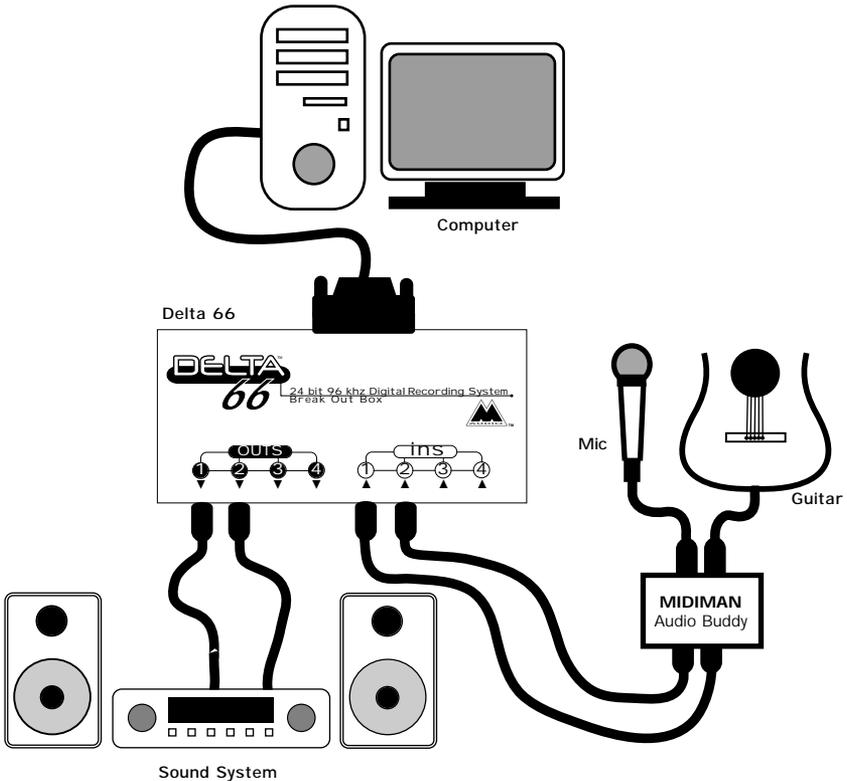
In this section we will explore a few sample setups for recording and playback using the Delta 66 Digital Recording Interface. This is by no means an exhaustive tutorial but its intent is to help you understand most of the Delta 66’s feature set. Before beginning, you should open your music software and profile the Delta 66, enable its drivers, or otherwise setup the software for operation with the Delta 66.

NOTE: All of these examples refer to the Windows MME driver names. If you’re using ASIO drivers, you’ll need to substitute the appropriate driver names when referring to software inputs or outputs.

Typical Setup #1

Let’s assume for this setup that we’re recording a single guitar and vocal, then overdubbing another guitar and vocal track while listening to the first tracks. The following diagram shows a microphone pre-amp and direct box being used (in this case, the Audio Buddy™ by Midiman), and a stereo sound system. The pre-amp and direct box are required for the mic and guitar. Many instruments, such as MIDI modules or keyboards, may be connected directly to the Delta 66’s inputs.

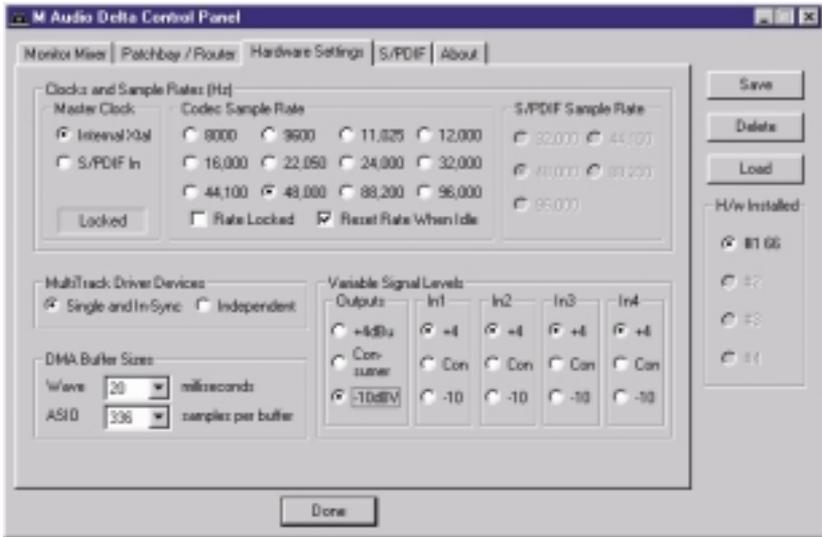
NOTE: Because improper connections may potentially make very loud noises, it’s a good idea to have all monitor levels set low or muted while hooking up audio equipment — you may even choose to turn your computer off before making the connections.



1. Plug the guitar into the channel-1 Line input of the pre-amp. Plug the microphone into the channel-2 Mic input.
2. Plug the outputs 1 & 2 of the pre-amp into the Delta 66's analog inputs 1 & 2. Both are balanced outputs and inputs (respectively), so use a high quality TRS cable. Most balanced lines run at +4dB line level, so let's set our +4/Consumer/-10 switches to +4dB on inputs 1 & 2. Open the Delta Control Panel by double clicking the icon in your Windows Control Panel, and then click on the 'Hardware Settings' tab. Locate the 'Variable Signal Levels' section. The +4 setting requires that the +4 radio button be selected.
3. Plug the hardware outputs 1 & 2 of the Delta 66 to a sound system or power amp with speakers. If your sound system is a consumer type, set the +4/Consumer/-10 switch in the Hardware Settings page to the -10 setting. The -10 setting requires that the -10 radio button be selected, setting all of the outputs to the -10dBV setting. Now minimize the Delta Control Panel.
4. Turn on your equipment in this suggested order: pre-amp, computer, then sound system.

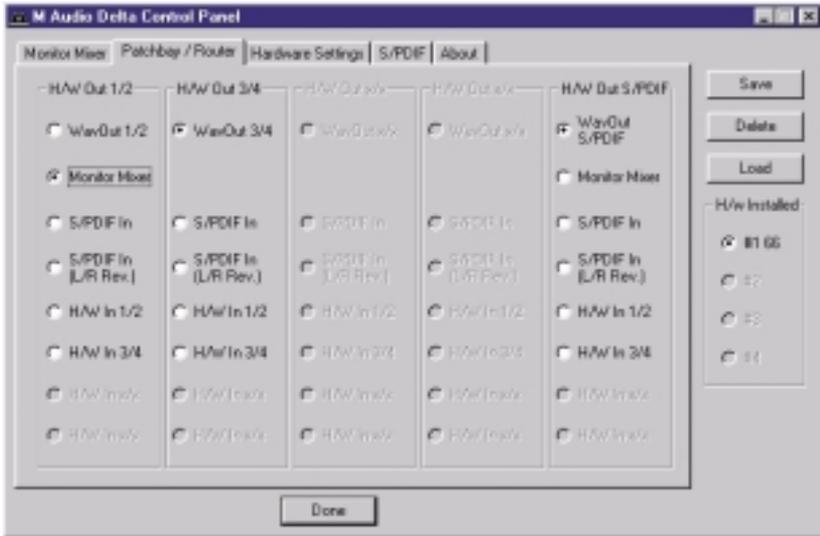
We're now physically set up to monitor, record, and play back audio. The next steps involve further configuring the Delta Control Panel software and also the

music software into which you will be recording. We'll start with the Delta Control Panel's "Hardware Settings" page, then the "Patchbay/Router" page, and finally the "Monitor Mixer" page. We're not using S/PDIF in this example so we'll ignore the S/PDIF page.

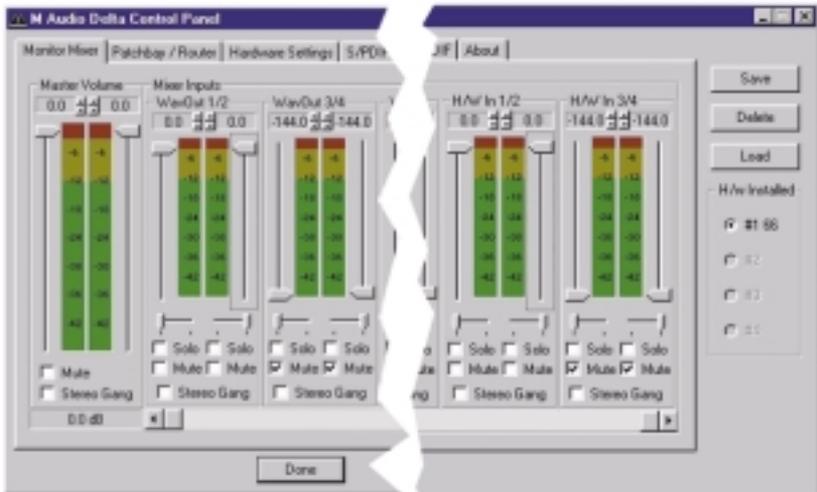


5. Click on the Delta Control Panel on your Windows taskbar to maximize it. Click on the 'Hardware Settings' tab.
6. Select 'Internal Xtal' as the master clock source. This allows the Delta 66 to derive its sample rates from its internal clock oscillator. 'Internal Xtal' is the default setting for the Delta Control Panel, so selecting it may not be necessary (it may already be selected).
7. Under "CODEC Sample Rate," verify that the "Rate Locked" checkbox is not activated. This will allow your application software to set the Delta 66 sample rate as it pleases.
8. Since this example will include the use of the monitor mixer, we will activate the "Reset Rate When Idle" feature. This will make sure the monitor mixer is running at a decent sample rate while the system is idle — this prevents the mixer sample rate from being set too low and therefore lowering its frequency response. Select a sample rate in the "CODEC Sample Rate" group to use as this idle sample rate. Choose a 44,100 Hz or higher setting for best results, and select the same sample rate you will be using in your application if possible. We've chosen 48,000 Hz for this example.

Now click on the Delta Control Panel's "Patchbay/Router" tab. In the first column of the Patchbay/Router page, click the radio button "Monitor Mixer" to connect the monitor mixer's stereo output directly to Delta analog outputs OUT1 and OUT2. Now, everything that we hear at outputs 1 & 2 will reflect our settings in the Monitor Mixer page.



Select the “Monitor Mixer” tab of the Delta Control Panel. The default Master Volume fader settings are 0dB and un-muted, and all other faders are set to full attenuation (-144dB) and muted. We will need to adjust these to our preference. The screen capture below shows the settings that we wish to achieve.



9. In the Mixer Input column labeled “WavOut 1/2,” click on each fader handle and drag it up to the 0dB setting. Also, deactivate (uncheck) each WavOut 1/2 mute box to unmute the channels. This will allow us, once we’ve recorded into a music software program, to hear those software outputs upon playback.
10. Using the scroll bar at the bottom of the control panel, scroll to the right until you see the column labeled “H/W In 1/2.” Strum the guitar, and you should see an indication in the left meter, which represents signal levels from the Delta analog input 1. Test the mic, and you should see an indication in the right meter, which represents signal levels from Delta hardware input 2.
11. Adjust the gain on the pre-amp so that you’re seeing a good level on the input meters, about -6dB to -3dB in the loudest parts (this is playing it a safe because you don’t want to hit 0dB and clip). Make similar adjustments for the microphone, using the right fader. These are the levels at which the signals will be recorded.
12. Now let’s set the levels at which you will monitor the mic and guitar while recording. These are not to be confused with the levels that are recorded by the software — these levels are merely monitor levels that appear in the mixer outputs (in this case at Delta 66 analog outs 1 & 2). Click on the left fader handle of H/W In 1/2, and drag it about halfway up. Strum the guitar. If it’s not loud enough, bring it up all of the way. If it is still not loud enough, you will have to raise the listening level of your sound system. Make similar adjustments for the microphone, using the right fader.
13. Now fine-tune your monitor levels. Sing and play guitar, adjusting your listening levels using the H/W In 1/2 faders so that you have a comfortable blend of guitar and mic levels.

Now is the time to launch your music software and set it up to record and playback audio tracks. We’re going to speak in general terms here, since setup within software programs will vary somewhat. Minimize your Delta Control Panel so that you can easily access it from your Windows taskbar. Then open your music software program.

14. First set up the sample rate in the software application. This operation will depend on the software. Choose a sample rate that is high enough to capture the frequency response of the guitar and vocals. A general rule of thumb is to multiply the highest frequency you would like to capture by two and add maybe a little on top of that — that gives you a suitable sample rate. Also keep in mind that if the final results of your work will end up on a CD-ROM burned from your WAV file, you probably want to use 44.1kHz, the native sample rate of “redbook” CD audio.
15. In your software application, set the ‘source’ or ‘input port’ to “Left PCM In 1/2 Delta-66” on track one, and “Right PCM In 1/2 Delta-66” on track two. Arm the tracks for recording. Track one is now set up to record the guitar, and track two the microphone. If your software requires this, set the software’s clock source to ‘Audio.’

16. Press record on your software's transport bar. Record a take of your guitar and vocals. Understand that while recording, you are monitoring the Delta inputs by way of the Monitor Mixer settings for H/W In 1/2, and according to the selection of 'Monitor Mixer' within the Patchbay/Router page. At the same time, your software is recording from H/W In 1/2 but at the levels that were set up with the pre-amp.
17. When you are done playing, stop the recording software and rewind the take. Before playing back what you've recorded, you will need to assign the recorded tracks to output devices on the Delta 66.

Note: For efficiency's sake, this step could have taken place while you were setting up the recording track assignments. However, since this step only affects playback and does not affect the recording setup in any way, we've placed it here to lessen confusion.

Assign software track one to output device "WavOut 1/2 Delta-66" and pan the track (within your software) all the way to the left (hard left). Then assign track two to output device "WavOut 1/2 Delta-66" and pan the track all the way to the right (hard right). Now, when you start playback, track one (guitar) will be sent to the Delta software (WavOut) output 1, and track two (mic) to the Delta software (WavOut) output 2. These two software outputs are inputs to the monitor mixer, therefore the recorded guitar and mic channels will be sent to the monitor mixer, levels will be modified by the mixer and the output of the mixer will be heard at analog outputs 1 & 2.

18. Start playback from your software's transport bar. Open the Delta Control Panel and go to the Monitor Mixer page. Observe the meters at "WavOut 1/2" – these are the playback levels of your guitar and mic. Adjust the faders and mute controls so that you may hear the guitar and mic at the appropriate levels and mix. These are the levels at which you may monitor the pre-recorded tracks while you overdub (record other tracks while listening to the first) additional parts.

Let's assume that you like this take, and wish to overdub an additional guitar and a harmony vocal. We can still use hardware inputs 1 & 2 of the Delta. We're set up to do so and there's no reason to change these inputs. Let's set ourselves up to overdub these next two tracks. We will record the next two tracks of material to tracks 3 & 4 of the software:

19. Back in your music program, set the 'source' or 'input port' to "Left PCM In 1/2 Delta-66" on track three, and "Right PCM In 1/2 Delta-66" on track four. Arm the tracks for recording. Track three is now set up to record the guitar, and track four the microphone. Usually at this point you would want to return to the Delta Control Panel monitor mixer to set up levels. However, because

you will be recording the same instruments that you did on the first two tracks, you probably won't need to adjust input or monitoring levels.

20. Press record on your software's transport bar. Record a take of your new guitar and vocal tracks. Because you have set up the first two tracks to play back through the monitor mixer, you should hear those original tracks along with the ones that you are now recording.
21. When you are done playing, stop the recording software and rewind the take. Before playing back what you've recorded, you will need to assign the newly recorded tracks to output devices on the Delta 66. In your software, set the output ports of tracks three and four to "WavOut 3/4 Delta-66." Pan track three all of the way to the left (hard left), and pan track four all of the way to the right (hard right). Now track three (guitar) will be sent to the Delta software output 3, and track four (mic) to Delta software output 4.
22. Press play on your software's transport bar. Understand now that the four recorded tracks from the software are being sent to WavOut 1, WavOut 2, WavOut 3, and WavOut 4 simultaneously. Therefore they are all being input to the monitor mixer and their playback levels can be controlled at the corresponding channels of the monitor mixer. Open the Monitor Mixer page of the Delta Control Panel and adjust the levels of the four channels according to your taste. You may also experiment with the Mute and Solo controls while listening to the playback. Note also that the mixer continues to monitor the guitar and mic at analog inputs 1 & 2!

At this point, you should be able to see how this multi-tracking session is developing. As we add more tracks within our music software, we set them to the next pair of Delta software outputs, and bring up the faders of those software inputs in the monitor mixer. We continually monitor from the Delta hardware outs 1 & 2, via the 'Mon.Mixer' setting as the monitor 'source' in the Patchbay/Router page, and adjusting our mix of the software outputs (and the way we monitor our guitar and vocal at the inputs) via the Monitor Mixer settings.

Notice that if we continue to overdub past track 4, we run out of WavOut devices to assign to. In this case, you may want to do some of your level mixing within the software application if it supports it. Most applications will allow you to assign more than one track to an output device and then set the relative levels of the tracks within the software, letting the software do the mixing. In this example you could have assigned all of the playback tracks to "WavOut 1/2" and let the software handle the mix.

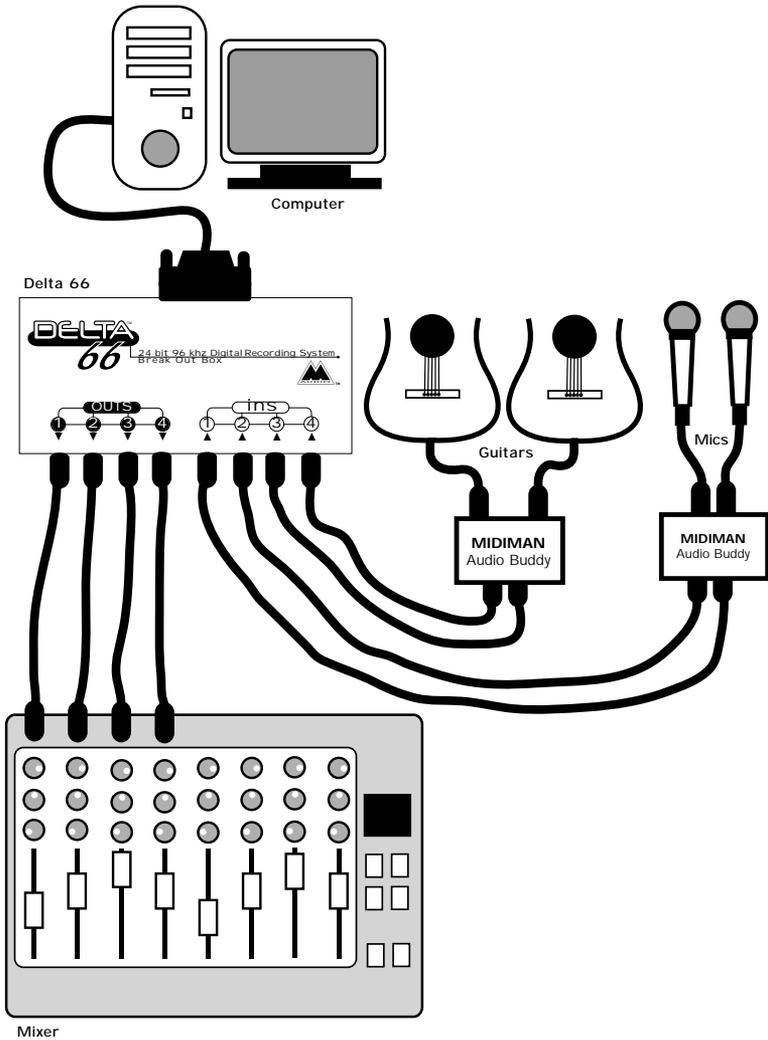
Typical Setup #2

This section contains a multi-tracking example illustrating another way to use the Delta 66 and its control panel software. We're going to use multiple inputs and multiple outputs, so a mixing console that will handle multiple inputs must be used on the output side of the Delta 66. A discussion of mixing consoles and their use will follow in Appendix B. For simplicity in this example we'll use pre-amps to get

the signal to the Delta 66, and a mixer connected to a sound system to handle the multiple outputs.

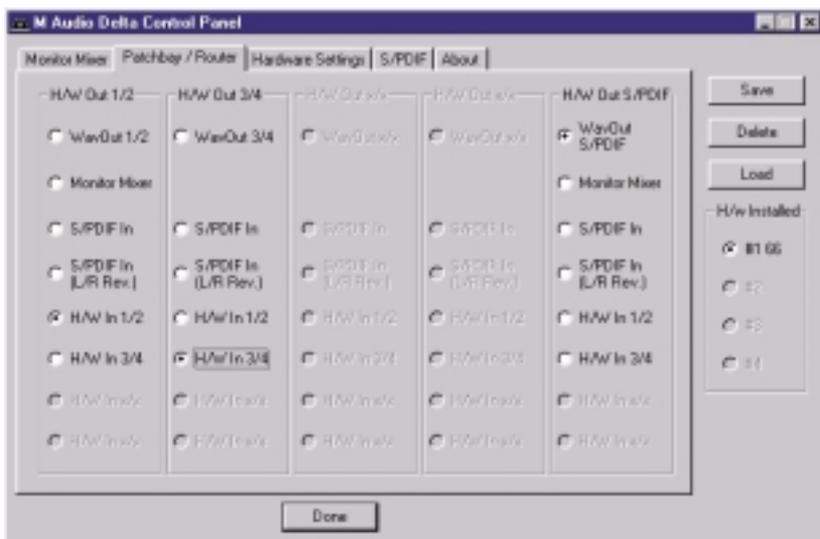
Let's say that we're recording a guitar/vocal duo. We've got a mic on each voice, with the guitars going 'direct' into the pre-amps.

NOTE: Because improper connections can potentially make very loud noises, it's a good idea to have monitor levels down while hooking up audio equipment — you may choose to turn your computer off before making the connections.



1. Plug the microphones into the mic inputs 1 & 2 of the pre-amps. Plug the guitars into the high impedance inputs 3 & 4 of the pre-amps.
2. Plug the outputs of the pre-amps 1-4 into the hardware inputs 1-4 of the Delta 66. Usually pre-amp outputs are balanced, so if they are, use TRS cables and set the Delta +4/Consumer/-10 input switches to the +4dB setting in the Hardware Settings page of the Delta Control Panel.
3. Plug the hardware outputs 1-4 of the Delta 66 into your mixer's inputs 1-4 (using 1-4 is recommended for convenience, but not necessary). Some mixers run at -10 line level, and some at +4. Many mixers may be set either way and actually have their own +4/-10 switch(es). Let's assume that our mixer runs at +4, so set the Delta +4/Consumer/-10 output switch to +4 in the control panel. At this point we'll assume that all mixer faders are down.

We're now physically set up to monitor, record, and playback audio with the Delta 66 and related components. The next steps involve the settings in the Delta Control Panel. We'll use the same settings as Typical Setup #1 for the Delta Control Panel's 'Hardware Settings' page, i.e. "Internal Xtal", "Reset Rate When Idle" and 48kHz idle sampling rate. The settings that we'll focus on will involve the 'Patchbay/Router' page. We won't be using the Delta 66's Monitor Mixer, so we'll ignore the 'Monitor Mixer' page.



4. Open the Delta Control Panel software and click on the Patchbay/Router tab.
5. For the first stereo pair, H/W Out 1/2, click the radio button in that column for "H/W In 1/2." For the second stereo pair, H/W Out 3/4, click the radio button in that column to "H/W In 3/4." Using these settings for the Patchbay/Router page connects each hardware input directly to a hardware output. These settings will allow us to monitor the inputs to the Delta 66 (vocals and guitar) while we are recording.
6. Minimize the Delta Control Panel to the Windows taskbar.

7. Open your music software program. Set up four tracks for recording:

- Track one — Left PCM In 1/2 Delta-66
- Track two — Right PCM In 1/2 Delta-66
- Track three — Left PCM In 3/4 Delta-66
- Track four — Right PCM In 3/4 Delta-66

8. Now we want to set up the output ports for the four tracks.

- Track one — WavOut 1/2 Delta-66, panned hard left.
- Track two — WavOut 1/2 Delta-66, panned hard right.
- Track three — WavOut 3/4 Delta-66, panned hard left.
- Track four — WavOut 3/4 Delta-66, panned hard right.

9. Bring up the meter view in your music software, and let's start to get some levels here. Let's say that your hardware input 1 is the lead vocal mic. Have the lead vocalist test the mic while raising the input gain on your pre-amp channel 1 until you see a level of -6dB or so. This is your recording level. At the same time you can begin to raise the faders on your mixer until you hear the voice at a comfortable volume. This is your monitor level. Do the same for the other vocal mic, and each guitar.

NOTE: You could view the record levels from the Monitor Mixer page also. The levels appearing in H/W In 1/2 and H/W In 3/4 will represent the signal appearing at the hardware inputs. We are not monitoring via the Monitor Mixer in this example, however, so no faders in this page are needed or apply.

Once this is done, we are set up and ready to record. Close or minimize your software's meter view at this point.

10. Arm tracks one through four for recording and press the record button on your music software's transport bar.
11. Once you have a take that you think is worth listening to, stop recording and rewind. Maximize the Delta Control Panel from your Windows taskbar.
12. Click the Patchbay/Router tab. In the first column, H/W Out 1/2, click the radio button "WavOut 1/2" so that our monitoring source is now the software outputs from the music program. Set the H/W Out 3/4 column to "WavOut 3/4." Now all of the software outputs of the music program are connected to the corresponding hardware outputs. Minimize the control panel.
13. Click play on the transport bar of your music software. If the take is satisfactory, disarm tracks one through four and revel in your success. If you wish to redo the tracks, "undo" the recording in your software, repeat steps 10 through 13 in this section.

Using the Delta 66 and the Delta Control Panel software in this manner may be your choice when using a mixing console to control the monitor and playback levels. If this were a real recording situation and you wished to add other instruments as overdubs, you might want to combine recorded tracks to one stereo pair of outputs (WavOut 1/2 Delta-66, for example). This would ‘free up’ several channels for monitoring the overdubs.

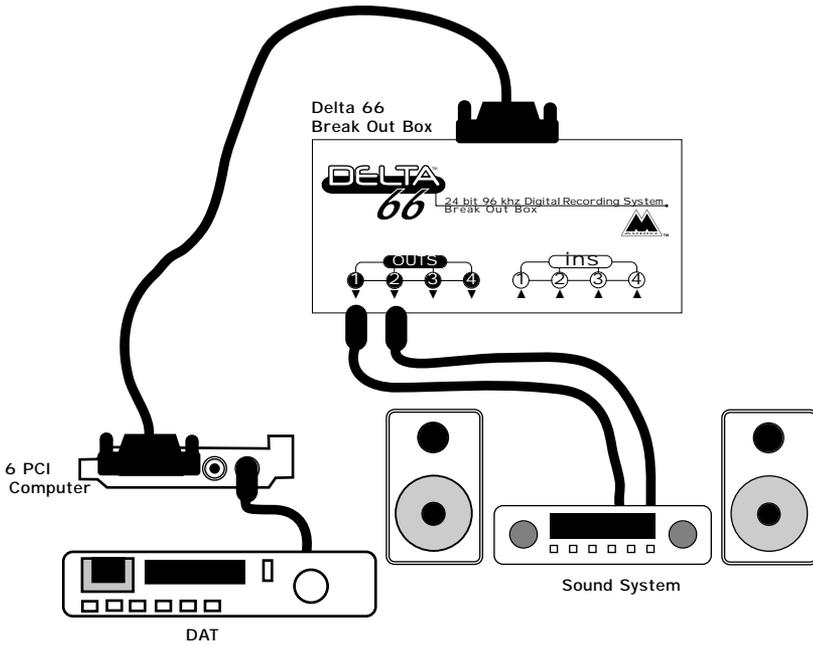
Typical Setup #3

Let’s look at a setup that involves a typical transfer of information from DAT to computer and back to DAT. Here, we’ll be using the Delta 66’s S/PDIF I/O plus one of the analog output stereo pairs.

NOTE: Because improper connections can potentially make very loud noises, it’s a good idea to have monitor levels down while hooking up audio equipment — you may even choose to turn your computer off before making the connections.

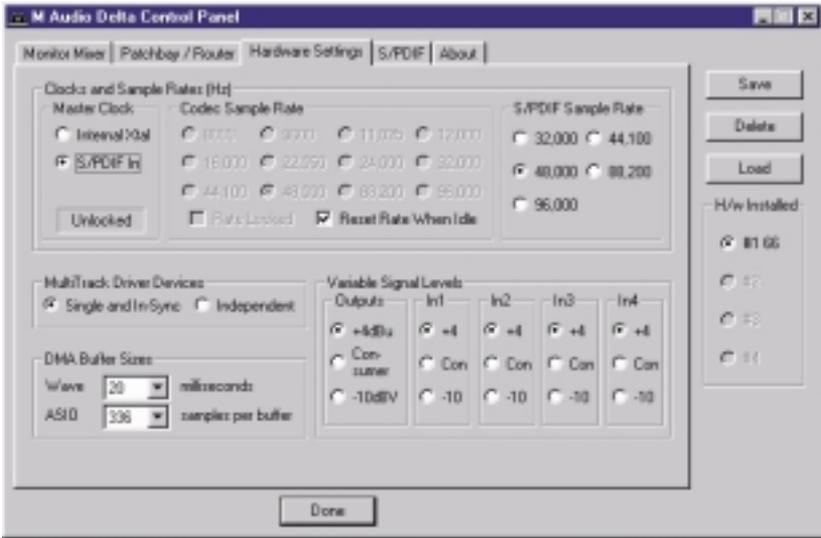
In this example, we will connect a DAT to the Delta 66 PCI host card using coaxial S/PDIF cables (75-ohm impedance RCA-to-RCA). We’ll also connect the Delta 66’s analog outputs to a sound system for monitoring purposes. A setup like this might be used to transfer a number of mixes from a DAT into an audio editing program, performing the appropriate edits, and then transferring the edited material back to DAT.

The example below may at first look long and laborious, but you will find that most of the settings are factory defaults and will rarely need to be modified.

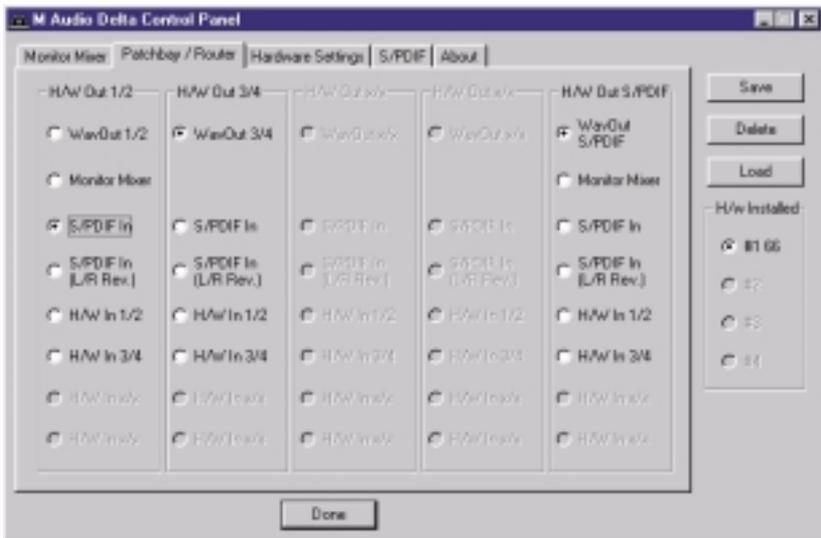


Transferring from DAT to Delta 66

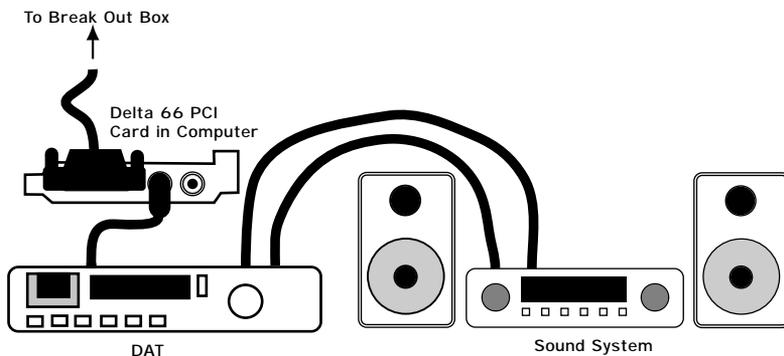
1. Connect the DAT's coaxial S/PDIF output to the S/PDIF In of the Delta 66 PCI host card, using a good quality cable.
2. Connect the Delta 66 outputs 1 & 2 to some type of amplified sound system. The sound system should be equipped with speakers or headphones. Set the software +4/Consumer/-10 switch on the Delta Outputs to be compatible with that sound system's inputs.
3. Because you will be recording from the S/PDIF input, you will need to set up the Delta 66 to synchronize its master clock with the S/PDIF input. To do this, open the Hardware Settings page of the control panel software. Under Master Clock, select "S/PDIF In."
4. Next, you will need to tell your application software the expected sample rate. We'll use 44.1 kHz in this example. Therefore, on the Hardware Settings page, set the "S/PDIF Sample Rate" to 44,100.



- In order to monitor the digital signal coming into the Delta 66, switch to the Patchbay/Router page of the control panel software. In the “H/W Out 1/2” column, select the radio button labeled “S/PDIF In.” This will copy all S/PDIF input audio directly over to the analog outputs. Therefore, in this example, the monitor mixer will be completely bypassed. Once this assignment is made, you may play the DAT material at any time and verify that it is making it into the Delta 66 successfully. This can be done regardless of whether or not your recording software is open.



6. Within your recording software, select “S/PDIF In Delta-66,” as the audio input device. The Delta input appears as a stereo pair.
7. Start your software recording and then start your DAT material playing. You should be able to hear the DAT material through your sound system.



Transferring from Delta 66 to DAT, monitoring with DAT

1. Connect the Delta 66’s S/PDIF Out to the DAT’s coaxial S/PDIF Input using a good quality cable.
2. Connect the DAT analog outputs to some type of amplified sound system. The sound system should be equipped with speakers or headphones.
3. Because you will be playing back at the recorded sample rate, you will want to set the Delta 66’s master clock to use the Delta 66’s internal crystal. Do this by opening the Hardware Settings page of the Delta Control Panel software and under Master Clock, selecting “Internal Xtal.” Also, under the Codec Sample Rate section you may uncheck “Rate Locked” if it is previously checked. This allows for more flexible sample rate playback.
4. In order to verify proper S/PDIF Output routing, open the Patchbay/Router page of the control panel software. In the “H/W Out S/PDIF” column, select the radio button named “WavOut S/PDIF.” Now everything that is sent by your software to the “WavOut S/PDIF” device will be routed to the hardware S/PDIF output, and consequently to the DAT.
5. Next let’s make sure the S/PDIF output format is correct. Open the S/PDIF page of the control panel software. Under Digital Output Format, choose “Consumer.” Uncheck “Advanced” if it is checked previously. Now click on the “Restore Defaults” button to set the default S/PDIF outgoing status bits. This will disable copy protection and also set the emphasis to “none,” allowing the DAT to accept and record the audio properly.
6. Within your recording software, select “WavOut S/PDIF Delta-66” as the audio output device.
7. Start your DAT recording and then start your software playing. You should be able to hear the DAT material through your sound system. This verifies that the digital audio is making it into the DAT correctly.

Troubleshooting

This section addresses potential problems that can occur in all operating system environments, with emphasis on hardware troubleshooting. Within the PC environment there are a limited number of hardware resources (I/O addresses, IRQs, and DMA channels) available for use. Since audio cards require many resources, most audio card installation problems arise from unavailable or improperly set resources. This is important enough to repeat:

IMPORTANT: Most sound card installation problems result from attempting to use system resources (IRQs, address locations) already in use by other hardware (or software acting as “virtual” hardware) in the system.

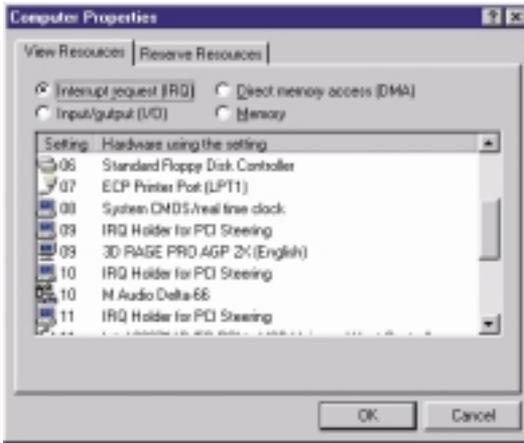
The Delta 66 has been carefully designed to minimize the number of resources consumed (it requires just one IRQ and does not require any DMA channel resources). It is also capable of sharing an IRQ in some cases. However, the possibility of resource conflicts still exists due to the nature of the Windows environment. Many resource conflicts are automatically recognized by Windows’ Plug-and-Play (PnP) system. When a resource conflict is detected, it is displayed in the Windows Device Manager. The Device Manager places a yellow exclamation point on top of the icon associated with the problem device. For an example of how the Device Manager should look when a Delta 66 is successfully installed, see the “Verifying Windows Driver Installation” section of this manual. If a yellow exclamation point does appear over your Delta 66 icon, you may have a resource conflict. There are several ways to approach this problem.

NOTE: When resolving conflicts between PnP and non-PnP devices, it is recommended to re-adjust the resource settings of the non-PnP device first. Typically, Windows is only aware of the resource settings of the installed PnP devices and has no information available to it for adjusting the PnP devices’ resources around those of the non-PnP devices. The exceptions to this are when: (1) a non-PnP device has a true Windows 95/98 driver written for it, (2) the BIOS setup allows reserving an IRQ for a legacy device as opposed to a PnP device, or (3) resource requirements for the non-PnP device have been manually entered into the Windows Device Manager. In these cases Windows is aware of the non-PnP device’s resource requirements.

One of the quickest ways to change the resources assigned to a PCI card like the Delta 66 is to merely relocate the card to another PCI slot. With the computer’s power off, remove the Delta 66 from its current PCI slot, move it to another available PCI slot, and turn your computer back on. More often than not, this will

change the IRQ assignment of the Delta 66 when you re-enter Windows. After returning to Windows, follow the steps outlined in the “Verifying Windows Driver Installation” section of this manual. It might take more than one PCI slot relocation to find an open IRQ.

If relocating your card to another PCI slot does not cure the Delta 66’s conflict(s), then you must do some further investigation to determine the exact nature of the conflict(s). Again, go to the Windows Device Manager, highlight the Delta 66 or other devices with conflicts and click the “Properties” button at the bottom of the Device Manager window. This will open the properties page for that device. Select the “Resources tab” in order to view the resource assignments, plus possible conflicts. You may learn more about a conflict by highlighting each item one-by-one (done by clicking on them, or scrolling through the list using your keyboard cursor keys) and examining the “Conflicting resource list:” at the bottom of the box.



Sometimes it is possible that a resource problem is not showing up in the conflicting resource list or as a yellow exclamation point in the Device Manager. If you have any doubt about the configuration of your device (or just want to double-check), you can view all of the devices and their assigned resources by highlighting “Computer” at the top of the Device Manager list and clicking the Properties button. This will allow you to view a list of assigned IRQ numbers on the left, and the associated devices on the right. If a number does not show up in this list, it means that it is available for use. Look also for IRQs that are shared by more than one device. While the Delta 66 may share an IRQ with some devices, not all devices are capable of sharing IRQs. An entry that reads “IRQ Holder for PCI Steering” along with an installed PCI device (such as the Delta 66) is normal. If you see another device showing up on the same IRQ as the Delta 66 (such as a video card, SCSI adapter, or USB Host Controller), then it is possible that this is the source of the conflict. Typically, if you move one of the conflicting cards to another PCI slot, an IRQ conflict will disappear.

Address conflicts are rare amongst PCI devices, but if there is no obvious IRQ conflict, why not check for I/O Address conflicts while in the Device Manager? You may view the list of assigned I/O addresses by selecting the “Input/output (I/O)” radio button below the “Interrupt Request (IRQ)” radio button at the top of the Device Manager page. I/O addresses are displayed as 16-bit hexadecimal numbers, therefore one might note that an address of 300h (the default address of the Winman 4X4/s, for instance), will read “0300” in this list.

If scanning all the resource lists in the Device Manager does not provide an answer or clue to the resource conflict, you might want to exit Windows and do a final inspection of your computer’s BIOS setup. Some newer BIOS’s (see your computer manual) allow the reservation of an IRQ for each PCI slot on the motherboard. This may be very handy in resolving IRQ assignments for PCI devices.

Also, sometimes a BIOS is configured to direct a particular IRQ to an ISA legacy device (non-PnP ISA card), and needs to be told to look for a PCI/ISA PnP device (some systems default to this, especially with IRQs 3 and 4). Consult your computer or motherboard manual for advice on how to do this.

Finally, with some systems you will reach the dead-end realization that you have no available IRQ’s — every one of them is assigned to some device in the system. This most typically occurs with pre-packaged computers made by the big-name O.E.M. computer companies. These computers have so many features packed into them that every IRQ is consumed. In this type of situation, some kind of reconfiguring or reprioritizing your system is in order. Optionally, Windows may allow you to create a second “hardware configuration” which disables some of the installed devices and makes their resources available for general use. See your Windows documentation for information on this subject.

Troubleshooting Tips for Frequently Asked Questions

Problem: No Sound.

Possible Cause 1: The Delta 66 hardware or software device drivers are not properly installed. See the installation sections of this manual for further information.

Possible Cause 2: There is a resource conflict between the Delta 66 and another device in your computer. Check the Delta 66 configuration (Address, IRQ) against those of the other installed devices. If necessary, change the settings for the one or more of the devices.

Possible Cause 3: Your application software has not been properly configured to use the Delta 66 as its audio output device.

Possible Cause 4: Misrouted outputs in the Delta Control Panel. Check the Delta Control Panel's Patchbay/Router page to verify output routing assignments. Also, make sure that if the output is routed from the digital mixer, that the mixer's faders, solo and mute controls are set up properly.

Possible Cause 5: Improper connections of the audio accessories. Verify that the Delta 66 analog audio outputs are properly connected to a digital mix deck or external mixer/amplifier, or the S/PDIF Out is connected to an external digital audio device capable of receiving S/PDIF.

Problem: No visual activity on Audio Input volume (VU) meters of user software.

Possible Cause 1: The Delta 66 input devices are not properly selected in the user's application software.

Possible Cause 2: If the software is recording from the Delta 66's monitor mixer device, be sure that the mixer's faders, solo and mute controls are set up properly.

Possible Cause 3: Improper connections to audio accessories.

Problem: Repetitious Sound.

Possible Cause: An IRQ resource conflict. Often this will result in a small segment of sound (0.5 to 1 second) repeating itself over and over, sometimes completely locking up the computer. See the general troubleshooting suggestions at the beginning of this section.

Problem: I'm getting some pops and clicks in my audio recording.

Possible Cause 1: Input levels are too "hot," causing clipping or input distortion. Make sure you have the proper signal levels set in the Delta Control Panel software. "+4" can handle much hotter signals than "Consumer" or "-10." If you find that you are still clipping at the +4 setting, you will need to turn down the audio at the source.

Possible Cause 2: If you are recording from the S/PDIF input, but you have the Delta 66's master clock set to something other than the S/PDIF input, you are recording an out-of-sync S/PDIF stream. This can result in lost or bogus samples being recorded.

Possible Cause 3: Your application software may not have the proper audio buffer sizes set. Each software application handles this differently, but typically there is somewhere in the software's setup to set the size of the playback and recording buffers used by the application. Some applications also require you to run a card calibration (sometimes called "profiling") the first time you use the software with a new audio card.

Possible Cause 4: Some accelerated graphics cards use excessive amounts of system bandwidth, preventing the recording buffer of an audio card from keeping up with demand. This can cause clicks in the recording. Reducing or turning off the graphics card's graphics acceleration feature often resolves this problem. In Windows, the level of graphics acceleration is accessed from Start | Settings | Control Panel | System | Performance | Graphics.

Problem: I'm getting some pops and clicks in my monitoring signal, even when my system is idle.

Possible Cause: If the S/PDIF input is not muted in the monitor mixer, and you have the Delta 66's master clock set to something other than the S/PDIF input, you are monitoring an out-of-sync S/PDIF stream. This can result in lost or bogus samples being monitored and recorded.

Problem: The sound from the monitor mixer is muffled. It sounds as if it were running through a mixer with the treble control turned all the way down!

Possible Cause: The current Delta 66 sample rate is too low. The monitor mixer is a digital device that runs at the current sample rate of the Delta 66 board. The frequency response of the mixer is roughly one-half of the sample rate. There is no way to prevent this lost frequency response while playing back or recording at a low sample rate. However, it may be prevented when the system is idle. See the "CODEC SAMPLE RATE" paragraph of the section 'Hardware Settings Page' for more information.

Appendix A - Technical Specs

Analog Audio

Peak Analog Input Signal:	+14dBu (+4dBu setting), +6dBV (Consumer setting), 0dBV (-10dBV setting).
Peak Analog Output Signal:	+14dBu (+4dBu setting), +6dBV (Consumer setting), 0dBV (-10dBV setting)
Dynamic Range:	
Outputs:	103dB (a-weighted),
Inputs:	99dB (a-weighted)
THD (at 0dBFS):	
Outputs:	less than 0.0015%,
Inputs:	less than 0.0024%
Frequency Response:	22Hz - 22kHz, -0.3,-0.2dB
Input Impedance:	10k ohms minimum
Input Connectors:	1/4" female TRS-type, balanced or unbalanced
Output Connectors:	1/4" female TRS-type, balanced or unbalanced

Digital Audio

Digital Input Format:	S/PDIF coaxial, 0.5V to 5V peak-to-peak.
Digital Input Sample Rate:	8kHz to 96kHz.
Digital Output Format:	S/PDIF coaxial, 0.5V peak-to-peak; AES/EBU data stream over S/PDIF coaxial.
Digital Output Sample Rate:	8kHz to 96kHz.

Adapter Resource Requirements

IRQ:	One required
I/O Addresses:	Four blocks: 32, 16, 16, and 64 bytes
DMA Channels:	None required

Appendix B -If You Use An External Mixer...

Our main objective is to get the signal we want to record to the Delta 66, and to monitor the outputs from the Delta 66. The Delta 66 has a mixer contained in its PCI chip that allows you to mix hardware inputs and software outputs and send it to an analog stereo output pair and/or the S/PDIF out. The Delta 66 also allows you to record that mix into your music software as a hardware input. Still, some of you may choose to use a mixing console to achieve your multi-tracking goals.

A mixing console (sometimes referred to as mixing ‘board’ or ‘desk’) that is designed for multi-track recording has the ability to fulfill these two basic functions — getting the signal to the recording device, and receiving the outputs of that recording device for mixing or monitoring. In this sense, a recording console is two mixers in one. A mixer designed for recording will also have the ability to send to one or more mixdown decks, to monitor these mixdown decks, to control separate control room and studio listening levels, as well as other recording-specific functions.

There are two basic layouts for the recording console, “split section” and “in-line.” The split section design is arranged with a recording or ‘channel’ section (to send the signal to the recording device) side-by-side with a monitoring section (to receive the outputs of the recording device). The in-line design has the recording and monitoring sections “in line” within each channel module, so that each channel has two line inputs.

The recording section is distinguished by its bussing system, which takes the recording channel signal through a summing matrix to multiple outputs- usually in multiples of eight. It could be said that an ‘8-buss system’ is designed for 8 track recording, and a 24-buss system for 24 track recording, etc., but this is not written in stone.

What we are describing here is the extreme- a professional, costly piece of gear that has been purchased for this one specialized purpose. There are features inherent in other types of consoles, however, that will allow us to perform these two separate functions of recording and monitoring. A sound reinforcement or a broadcast console, and in some cases a recording console, might offer a bussing system in the form of “sub-mix outs.” These are usually arranged in stereo pairs with a set of level control faders for each pair. This configuration can be effectively used for recording, as long as the record channels are taken out of the stereo buss. The difference here is that there is no real distinction between the recording and monitoring sections.

Some line mixers have a number of effect or auxiliary sends for each channel. These sends will have their own individual level control and will receive the signal either pre fader or post fader, i.e. either independent or dependent on that channel's fader level. It is possible to use these "aux sends" to send a signal to the recording device. A pre fader send is certainly preferable, since this will allow for a recording level that is separate from the monitoring level.

The bottom line here is that you can not use the 'main output' of your mixer to send a signal to the recording device, and then take the outputs of that recording device back into the mixer (whose signal also goes to the main out). This creates a feedback loop, bad for your eardrums and bad for your equipment.

One modern console design gets around that by offering an "alt out," which is an alternate stereo buss or output. When selecting 'alt out' on a channel, it mutes that channel to the stereo buss and redirects it to the alt out buss. This could be viewed as a 2-buss system, and can be used effectively for recording purposes.

In our Typical Setup 1 and 2 in the previous section, we used pre-amps to handle the recording. A line mixer that simply received the line outputs from the 66 and mixed them to stereo could handle the monitoring needs. Hopefully, the information here will give you some insight into how to use the gear that you own, or what to look for if you are seeking additional equipment to facilitate your hard disk recording.

Limited Lifetime Warranty

MIDIMAN warrants that this product is free of defects in materials and workmanship under normal use so long as the product is: owned by the original purchaser; the original purchaser has proof of purchase from an authorized MIDIMAN dealer; and the purchaser has registered his/her ownership of the product by sending in the completed warranty card.

This warranty explicitly excludes power supplies and included cables which may become defective as a result of normal wear and tear.

In the event that MIDIMAN receives written notice of defects in materials or workmanship from such an original purchaser, MIDIMAN will either replace the product, repair the product, or refund the purchase price at its option. In the event any repair is required, shipment to and from MIDIMAN and a nominal handling charge shall be born by the purchaser. In the event that repair is required, a Return Authorization number must be obtained from MIDIMAN. After this number is obtained, the unit should be shipped back to MIDIMAN in a protective package with a description of the problem and the Return Authorization clearly written on the package.

In the event that MIDIMAN determines that the product requires repair because of user misuse or regular wear, it will assess a fair repair or replacement fee. The customer will have the option to pay this fee and have the unit repaired and returned, or not pay this fee and have the unit returned unrepaired.

The remedy for breach of this limited warranty shall not include any other damages. MIDIMAN will not be liable for consequential, special, indirect, or similar damages or claims including loss of profit or any other commercial damage, even if its agents have been advised of the possibility of such damages, and in no event will MIDIMAN's liability for any damages to the purchaser or any other person exceed the price paid for the product, regardless of any form of the claim. MIDIMAN specifically disclaims all other warranties, expressed or implied. Specifically, MIDIMAN makes no warranty that the product is fit for any particular purpose.

This warranty shall be construed, interpreted, and governed by the laws of the state of California. If any provision of this warranty is found void, invalid or unenforceable, it will not affect the validity of the balance of the warranty, which shall remain valid and enforceable according to its terms. In the event any remedy hereunder is determined to have failed of its essential purpose, all limitations of liability and exclusion of damages set forth herein shall remain in full force and effect.