

PCI 368DSP SOUND CARD

User's Manual

Version 1.0

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Contents



Chapter 1	Introduction	5
Chapter 2	Before You Begin	6
	2.1 Minimum System Requirements	6
	2.2 Safety Precaution	7
	2.3 Installation Notes	7
Chapter 3	Setting Up Your Sound Card	8
	3.1 Installing Your Sound Card	8
	3.2 Connecting Your Sound Card	11
Chapter 4	Installing the Sound Card Drivers & Software Utilities	12
	4.1 Installing the Sound Card Drivers	12
	4.1.1 For Windows® 95	12
	4.1.2 For Windows® 98	16
	4.1.3 For Windows NT® 4.0	19
	4.2 Installing Clef Studio 3.0	19
	4.3 Installing Voyetra MIDI Orchestrator Plus (applicable for Germany only)	20
	4.4 Installing DOS Drivers/Utilities for DOS Games	21

Chapter 5	Running the Software Utilities	22
	5.1 Running ThunderBird 128™ Control Panel	22
	5.2 Running Clef Studio 3.0	25
	5.3 Running Voyetra MIDI Orchestrator Plus (applicable for Germany only)	25
Appendix A	Frequently Asked Questions	26
Appendix B	Technical Specifications	31
Appendix C	Sound Card Layout	34
Appendix D	QEM™	35
	Glossary	40

Introduction

Congratulations on your purchase of PCI 368DSP Sound Card!

*PCI 368DSP gives you a real-time 3D audio effects which creates a far more realistic and immersive audio environment than mere stereo reproduction could ever provide. It supports up to 4 speakers, 2 in front of your computer and 2 at the rear. With these 2 additional speakers supported, you will definitely enjoy a more '**alive**' and '**powerful**' home-theatre like environment with your computer!*

For more experienced sound card users, we are proud to reveal that PCI 368DSP supports Microsoft DirectSound™ acceleration of up to 128 channels, 320-voice wavetable synthesis and high quality sampling rate providing supreme PC audio performance.

*The control panel applet - **ThunderBird 128™** will give you access to the sound and speakers configurations. The **Clef Studio** software package enables you to play your favourite audio CDs, create, record or edit sound files and add sound to almost every computing task.*

The following sections will show you exactly how to install and configure your sound card. In no time, you can sit back and let the PCI 368DSP sound card storm your sensations !

Chapter 2



Before You Begin

This chapter contains information that you need to know before installing your sound card. They are the basic system requirements needed for your sound card to run, the safety rules to follow, as well as the installation guidelines.

2.1 Minimum System Requirements

- PC-based computer with Pentium® 166MHz MMX processor
(Pentium® 233MHz MMX-based processor or better is highly recommended)
- PCI Bus slot
- 16MB RAM (32MB RAM and above for computers with Windows NT®)
- minimum 15MB hard disk space (system files and audio drivers only)
- CD-ROM drive
- Active (amplified) speakers
- Windows® 95/98/NT® 4.0



2.2 Safety Precaution

- Do not remove your card from its protective bag until you are ready to install it.
- Always try to hold your card by its edges. Avoid touching any electronic components on your card.
- Static electricity can cause permanent damage to your card. To prevent such a damage, you must ground yourself during the installation:
 - » Use a grounding strap - a coiled wire with a clip at one end and an elastic strap at the other. Wear the strap around your wrist and attach the clip to any non-painted metal surface of your computer chassis.

OR

- » If you do not have a grounding strap, touch any non-painted surface of your computer chassis before you begin installation, and again every minute or so until the installation is completed.

2.3 Installation Notes

- Computers come in different shapes and sizes. The installation procedures in this manual apply generally and you should compare the illustrations here with your computer.
- A Philips screwdriver is required.
- The documentation for your computer should come in handy during the installation. Have it ready by your side.
- If you have an existing *non* Plug-n-Play sound card installed in your computer, you must first de-install its audio drivers before you remove the card. Refer to the documentation of your existing sound card for more details.

If your existing sound card is Plug-n-Play, you may proceed to install your new sound card.

Chapter 3



Setting Up Your Sound Card

This chapter contains information on how to install the sound card to your computer and to other audio equipment.

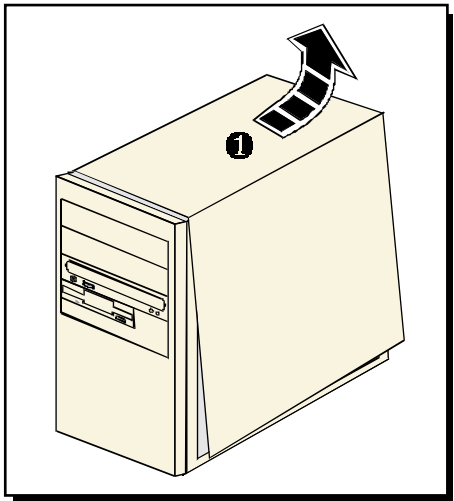
Power off your computer and any connected devices before installing your sound card !

3.1 Installing Your Sound Card

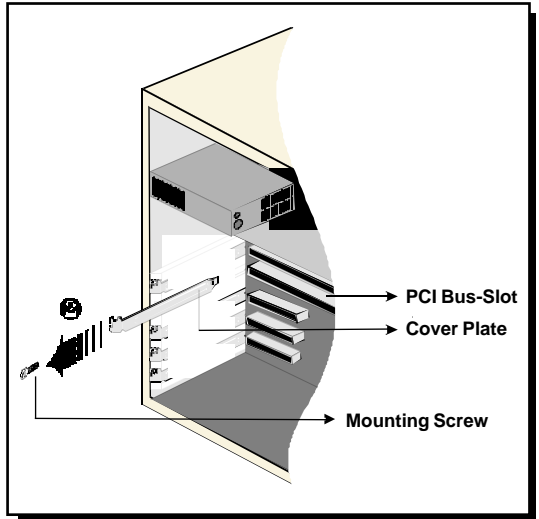


You need to remove any existing sound card installed in your computer. If the sound card is non Plug-and-Play, de-install its audio drivers before you remove it from your computer. Check the documentation on your existing sound card for details.

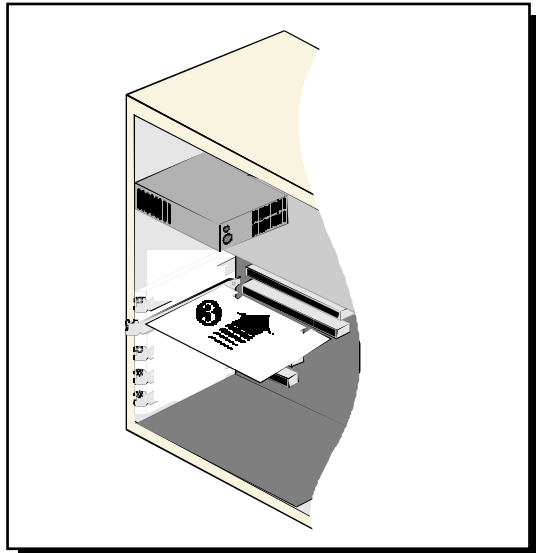
1. Remove the cover of your computer.

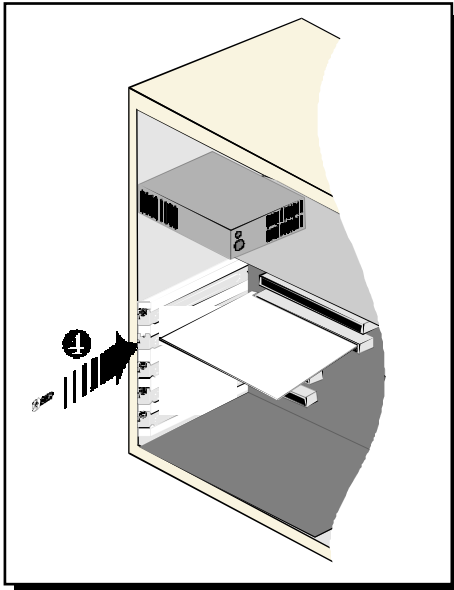


2. Select an available **PCI Bus-Slot** and remove its cover plate. Keep the mounting screw to secure your sound card later.



3. Align your sound card with the selected PCI Bus-Slot and firmly push it into the slot. If the sound card does not slide in, do not force it. Make sure the card is aligned properly and try again.



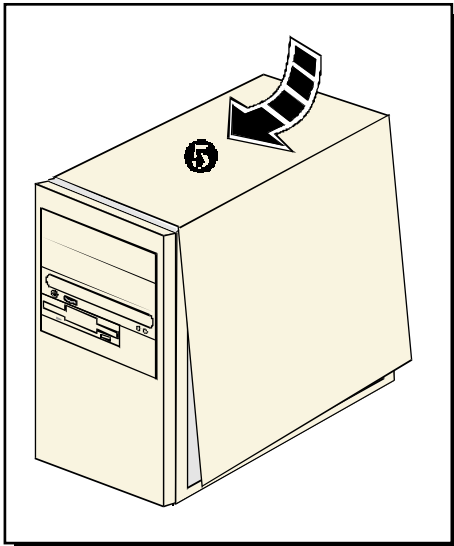


4. Secure your sound card to the chassis of your computer with the mounting screw.



*You may wish to connect your CD-ROM audio cable to the sound card for CD-ROM audio output. See **Appendix C - Sound Card Layout** for the location of the CD Audio connector on the sound card.*

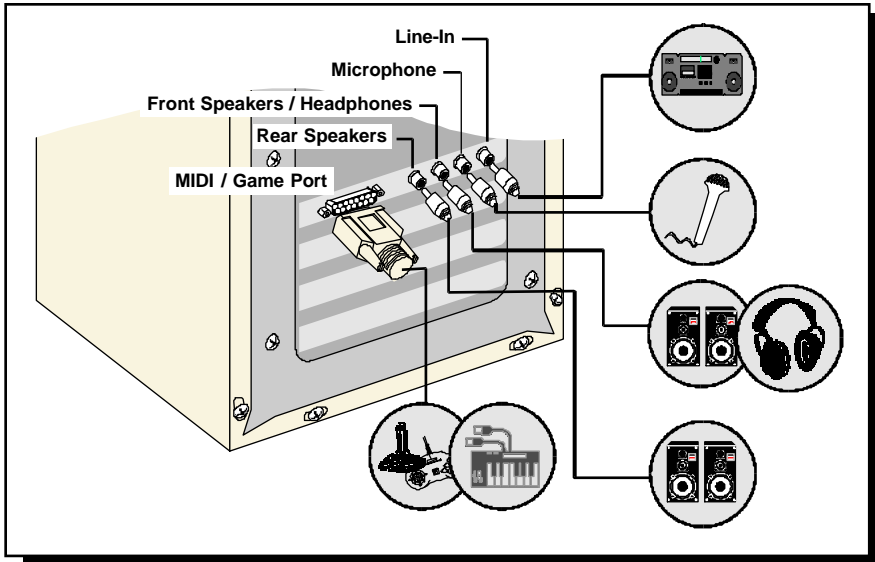
(The audio cable should be supplied with the CD-ROM drive. However, as CD-ROM audio cables are not standardized, you need to make sure that your CD-ROM audio cable is suited for use with this sound card)



5. Replace the cover of your computer.

3.2 Connecting Your Sound Card

You may connect a variety of audio equipment to your sound card as shown in the illustration below:



Line-In: Connect from any external sound sources, example, from the Line/ Audio Out of your external Audio CD-ROM or mini-hifi. *(Sound will be produced from the attached speakers)*



Microphone:

Connect to a microphone. Example, you may want to sing Karaoke through the microphone. *(Sound will be produced from the attached speakers)*

F **Front Speakers / Headphones:**

Connect a pair of active speakers to the front of your computer. You may also connect to your headphones for private listening.

R **Rear Speakers:**

Connect a pair of active (amplified) speakers to the back of your computer.

MIDI / Game Port:

Connect to either a joystick, game pad or to your MIDI keyboard.

Chapter 4

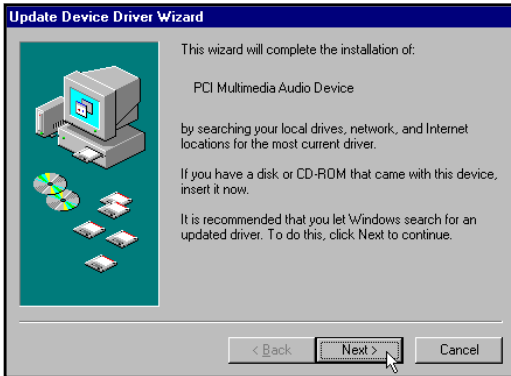
Installing the Sound Card Drivers & Software Utilities

This chapter contains information on how to install the sound card drivers and software utilities found in the PCI Audio Multimedia Studio CD.

4.1 Installing the Sound Card Drivers

4.1.1 For Windows® 95

1. Power on your computer. Windows® 95 will detect your newly-installed sound card and the following **Update Device Driver Wizard** will appear.



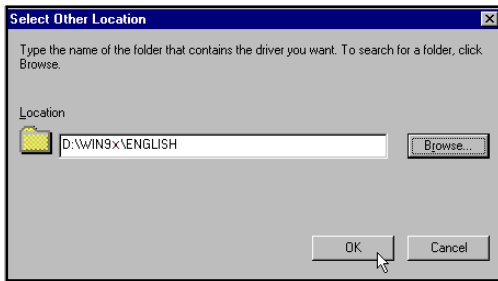
Place your **PCI Audio Multimedia Studio CD** in the CD-ROM drive.
Click **Next**.

2.



Click **Other Locations...** to locate the drivers from your **PCI Audio Multimedia Studio CD**.

3.



Click **OK**.

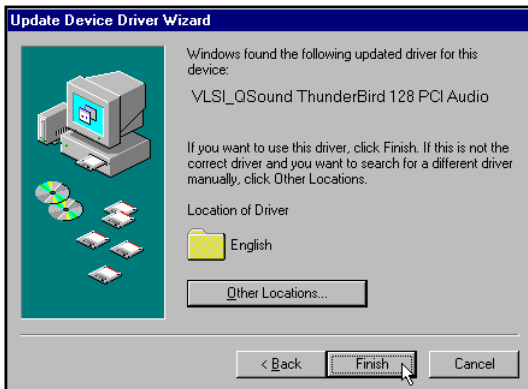
Type **'D:\WIN9x* *<Language>'** in the text box.

(Assuming your CD-ROM drive is D. If not, substitute the drive letter accordingly)

***<Language>: You may choose either English, German, French, Italian, Spanish or Dutch language.*

x denotes Windows 95/98

4.

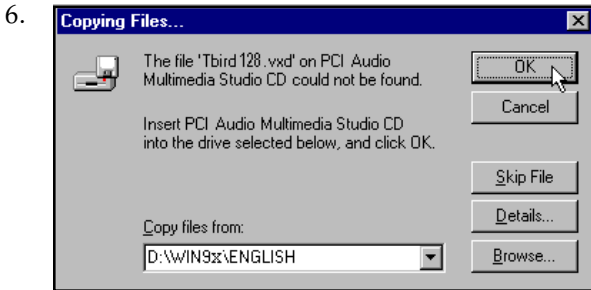


Windows will prompt that it has located your drivers.

Click **Finish** to start the installation.



Click **OK** to proceed.



Type '**D:\WIN9x**<Language>**' in the text box.

****<Language>**: *You may choose either English, German, French, Italian, Spanish or Dutch language.*

x denotes Windows 95/98

Click **OK**.

7. Windows® 95 may now prompt you for your Windows 95 CD.



This usually happens if you did not install any Windows® 95 multimedia applications previously. Carry out the following:

- (i) Place your **Windows 95 CD** in the CD-ROM drive and click **OK**.
- (ii) Specify where the required files can be found on the Windows 95 CD and click **OK**.

The selected multimedia applications will be installed.

8. Place the **PCI Audio Multimedia Studio CD** in the CD-ROM drive when prompted and click **OK**.
9. The system proceeds with the **Software Synthesizer** setup (for enhanced sound quality). Follow the on-line instructions to complete the installation.

If the Software Synthesizer installation is not activated, you may manually run it from your PCI Audio Multimedia Studio CD.

(i) From the Windows taskbar, click **Start > Run**.



(ii) In the **Run** text box, type

"D:\SoftSynt<Language>\Disk1\setup.exe"**

****<Language>**: You may choose either English, German, French, Italian, Spanish or Dutch language.

(iii) Click **OK**.

10. Upon completion, you will be prompted to restart your system. Select the option '**Yes, I want to restart my computer now**' and click **Finish**.
11. Upon system start-up, you will be prompted a **DirectX(R) setup**. Click **ReInstall DirectX** and restart your system again.
12. A **ThunderBird 128 Control Panel** applet will be created.

To run the application, see section 5.1 - Running ThunderBird 128™ Control Panel. Else, you may proceed to section 4.4 - Installing Clef Studio 3.0.

4.1.2 For Windows® 98

1. Power on your computer. Windows® 98 will run and detect your newly installed sound card. Click **Next**.



2. Click the option **Search for the best driver for your device (Recommended)**. Click **Next**.



- Place the PCI Audio Multimedia Studio CD in the CD-ROM drive.



Select the option **Specify a location**. In the text box, type:

"D:\Win9x<Language>"**

(Assuming your CD-ROM drive is D. If not, substitute the drive letter accordingly)

***<Language>: You may choose either English, German, French, Italian, Spanish or Dutch language.*

x denotes Windows 95/98

Click **Next**.



Windows will prompt that it has located your drivers.

Click **Next** to start the installation.

5.



Click **Finish** to complete the installation.

6. The system proceeds with the **Software Synthesizer** setup (for enhanced sound quality). Follow the on-line instructions to complete installation.



If the Software Synthesizer installation is not activated, you may manually run it from your PCI Audio Multimedia Studio CD.

(i) From the Windows taskbar, click **Start > Run**.

(ii) In the **Run** text box, type

"D:\SoftSynt<Language>\Disk1\setup.exe"**

****<Language>:** You may choose either *English, German, French, Italian, Spanish or Dutch language.*

(iii) Click **OK**.

7. Upon completion, you will be prompted to restart your system. Select the option '**Yes, I want to restart my computer now**' and click **OK**.

8. Upon system start-up, you will be prompted a **DirectX(R) setup**. Click **ReInstall DirectX** and restart your system again.

9. A **ThunderBird 128 Control Panel** applet will be created.

To run the application, see section **5.1 - Running ThunderBird™ Control Panel**. Else, you may proceed to section **4.4 - Installing Clef Studio 3.0**.

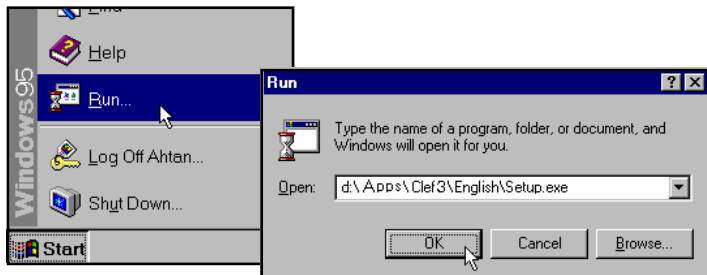
4.1.3 For Windows NT® 4.0

1. Power on your computer to start Windows NT®.
2. Place your **PCI Audio Multimedia Studio CD** in the CD-ROM drive.
3. From Windows NT® taskbar, click **Start > Run**.
4. In the **Run** text box, type "**D:\NT40**<Language>\setup.exe**".
(Assuming your CD-ROM drive is D. If not, substitute the drive letter accordingly)
***<Language>: You may choose either English, German, French, Italian, Spanish or Dutch language.*
 Click **OK**.
5. Follow the on-line instructions to complete the installation. A **ThunderBird 128 Control Panel** applet will be created.

To run the application, see section 5.1 - Running ThunderBird™ Control Panel. Else, you may proceed to section 4.4 - Installing Clef Studio 3.0.

4.2 Installing Clef Studio 3.0

1. Start Windows® 95/98 or Windows NT® 4.0.
2. Place the **PCI Audio Multimedia Studio CD** in the CD-ROM drive.
3. From the Windows taskbar, click **Start > Run**.
 Type '**D:\Apps\Clef3**<Language>\setup.exe**' in the text box.
(Assuming your CD-ROM drive is D. If not, substitute the drive letter accordingly)
***<Language>: You may choose either English, German, French, Italian, Spanish or Dutch language.*



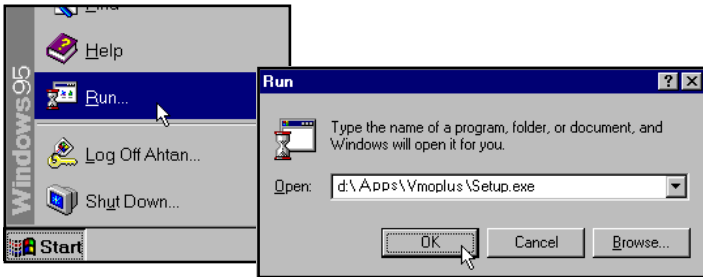
Click **OK** .

4. Upon completion, a **Clef Studio 3.0** program group containing the multimedia applications will be created. To run the application, see section 5.2 - **Running Clef Studio 3.0**.

4.3 Installing Voyetra MIDI Orchestrator Plus (applicable for Germany only)

1. Start Windows® 95/98 or Windows NT® 4.0.
2. Place the **PCI Audio Multimedia Studio CD** in the CD-ROM drive.
3. From the Windows taskbar, click **Start > Run**.
Type **'D:\Apps\Vmoplus\setup.exe'** in the text box.
(Assuming your CD-ROM drive is D. If not, substitute the drive letter accordingly)

Click **OK** .



4. System will run the Voyetra setup. Follow the on-line instructions to complete the installation.

Upon completion, a **Voyetra** program group containing the *MIDI Orchestrator Plus* will be created. To run the application, see section 5.3 - **Running Voyetra MIDI Orchestrator Plus**.

4.4 Installing DOS Drivers/Utilities for DOS Games

(This section is only applicable to Windows® 95 and Windows®98 users)

If you are playing DOS games, you will need to install the DOS drivers that comes with the PCI Audio Multimedia Studio CD.

1. From Windows® 95/98 taskbar, click **Start > Run**.
2. In the **Run** text box, type "**D:\Inst_dos.bat**" and click **OK**.

(Assuming your CD is still in your CD-ROM drive is D)

Follow the on-line instructions to complete the installation. Upon completion, restart your system (**Start > Shut Down... > Restart**).



For playing of DOS games, you have to be in real-mode DOS. Restart your system. Immediately after Windows restarting... message, press <F8>. Select the Command prompt only option. You may execute your DOS games in this environment.

For volume and configuration settings, type tbirdctl.exe in C prompt (C:\) and hit <Enter>. Follow the on screen instructions to change the settings.

Chapter 5


Running the Software Utilities

This chapter will give a brief guideline on running the

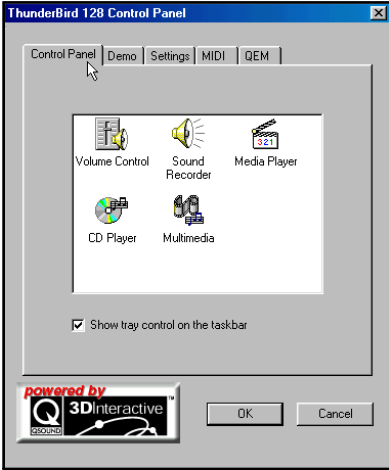
- *ThunderBird 128™ Control Panel Applet (for sound configurations)*
- *Clef Studio 3.0 (for creating and editing of sound files)*
- *MIDI Orchestrator Plus (for creating and playing of MIDI files)*

5.1 Running ThunderBird 128™ Control Panel

ThunderBird 128™ Control Panel gives you access to the speaker settings, volume control, sound recorder, CD Player and so on.

1. From the Windows taskbar, click **Start** > **Settings** > **Control Panel**.
2. Double-click the **Thunder Bird 128** icon.
(Alternatively, you may double-click the  icon at the corner of the taskbar.)
3. The **ThunderBird 128 Control Panel** will be displayed. The following sections will describe the settings and options available under this applet.

5.1.1 Control Panel




Volume Control

for adjusting volume


Sound Recorder

for recording of sound outputs and playback of wave files


Media Player

for playing of video and sound files

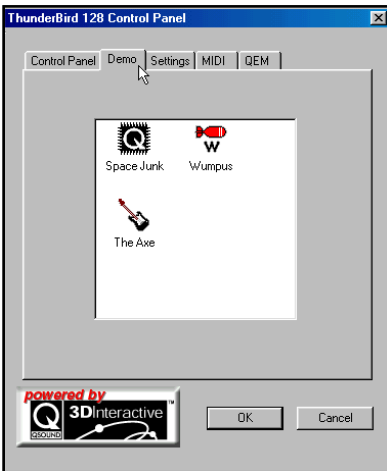

CD Player

for playing of audio CDs


Multimedia

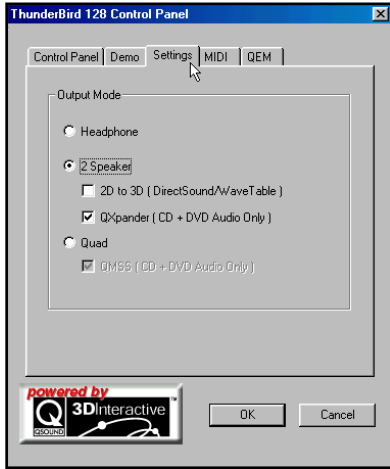
for configuring your sound card and video settings

5.1.2 Demo



These programs allows you to perform the 3-dimensional sound demonstrations on your 2/Quad speakers. You should be able to determine the source of the sound from the demo programs.

5.1.3 Settings



Headphone : select this when you are using your headphones

2 Speakers : select this when you are using only the front 2 speakers

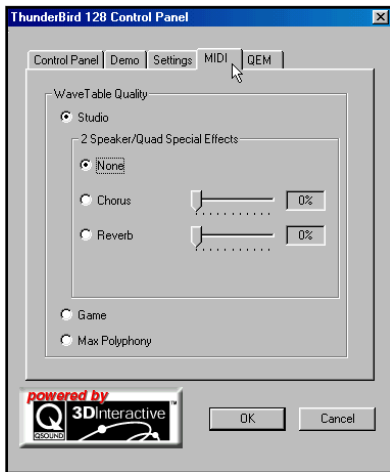
- **2D to 3D**
expands normal stereo panning to 3D when using a 2D DirectSound program

- **QXpander**
expands sound field to 3D for stereo audio from Audio CD/DVD

Quad : select this when you are using all 4 speakers

- **QMSS**
redistributes image across all 4 speakers when playing Audio CD/DVD
(for waves and MIDI files, QMSS is enabled by default)

5.1.4 MIDI



Studio

None : select this if you do not want to have any special sound effects

Chorus : to adjust the chorus effect level of the sound output

Reverb : to adjust the reverb effect level of the sound output

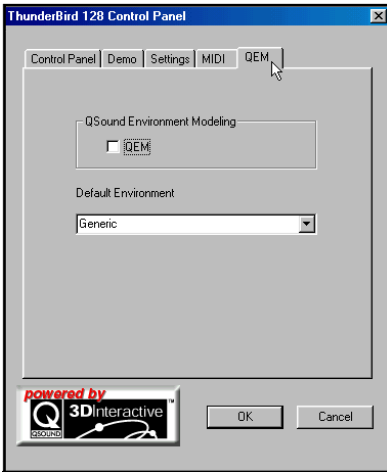
Game

offers moderate wavetable quality for games

Max Polyphony

offers the **highest** wavetable quality (*more memory required*)

5.1.5 QEM



QSound Environment Modeling

QEM : QEM™ is an environmental audio rendering engine providing reverberation and other special audio effects. It is compatible with the EAX™ API (Application Programming Interface) provided to software developers by Creative Labs, Inc. (see *Appendix D - QEM™ for details*)

Default Environment

Select from the drop-down list your preferred default environment.

(This option will only affect Non-EAX™ games. EAX™ games will use the environmental effects pre-programmed with the game)

5.2 Running Clef Studio 3.0

Clef Studio 3.0 is a comprehensive audio application that comes with PCI 368DSP. Besides playing your favourite Audio CD, you are also able to create, record and edit sound files using this utility.

1. From the Windows taskbar, click **Start > Programs > Clef Studio 3.0**.
2. Double-click **Clef Studio 3.0**.
3. A virtual “mini-hifi” will be displayed. It has similar functions to a mini-hifi system found in most houses. The on-line help (**Help > Contents**) will give a detailed descriptions on running the player.

5.3 Running Voyetra MIDI Orchestrator Plus

(applicable for Germany only)

1. From the Windows taskbar, click **Start > Programs > Voyetra**.
2. Double-click **MIDI Orchestrator Plus**.
3. The on-line help (**Help > Contents**) will give a detailed descriptions on running the MIDI Orchestrator Plus.

Frequently Asked Questions

This chapter highlights some of the more commonly asked questions and their possible solutions. Reviewing this chapter can help you solve many problems and often eliminate the need for telephone assistance.



Will PCI 368DSP work on all motherboards ?



*Yes, it will if the motherboard has at least one free PCI slot and meets the minimum system requirements (see **section 2.1 - Minimum System Requirements**).*



Is PCI 368DSP full-duplex capable ?



Full duplex is the ability for a sound card to record and playback audio at the same time. PCI 368DSP is able to do this while maintaining full 16-bit 48KHz quality.



Why is it that some of my games do not seem to work with the Q3D™ Positional Sound feature?



Not all games, especially older ones, support the Q3D™ Positional Sound feature. However, Q3D™ Positional Sound is becoming a popular standard among game developers and Q3D™ will also work with any game written to support the Microsoft® DirectSound3D™ standard.



What wave file types is PCI 368DSP compatible with (ie. what wave types can it playback) ?



Almost all wave files types. Most of the supported sample rates of audio applications such as Soundforge or Wavetable are supported, although one or two non-standard ones may not work.



What games does PCI 368DSP support ?



It can support almost all PC titles.



Can PCI 368DSP work with A3D™ or EAX™ ?



Yes. It supports both A3D™1.0 and EAX™1.0.



What version of DirectX™ should be installed ?



For most applications and particularly for games, it is recommended that you install DirectX™5.0 or higher.

*(You can install DirectX™6.0 from your PCI Audio Multimedia Studio CD. Place the CD into your CD-ROM drive. From your windows taskbar, click **Start** > **Run**. In the text box, type '**D:\DirectX\Directx\Dxsetup.exe**', assuming your CD-ROM drive is D. If not, substitute the drive letter accordingly. Click **OK**. DirectX™6.0 will be installed in your system)*



Do I need to connect all 4 speakers at the same time ?



*You do not need to connect all 4 speakers to enable your sound output. You can have only the front 2 speakers connected. To enable the 3D sound effect on 2 speakers, go to **ThunderBird 128 Control Panel**, select **Settings** tab, click **2 Speaker** option and select **2D to 3D** (or **QXpander** option if you are listening from Audio CD/DVD).*



What does 2D to 3D remapping do ?



*For 2D sound games, **2D to 3D** option (found in ThunderBird 128™ Control Panel) is able to convert the 2D sound to 3D sound. For games that play 3D sound, Q3D™ will work with 2 speakers on all DirectSound3D™ games and A3D™1.0 games.*



What does QXpander™ do?



QXpander™ expands sound field to 3D for stereo audio from Audio CD/DVD.



Why isn't there any sound from the speakers ?



Go through the following steps:

1. Make sure that the connections from your speakers to your computer are as described in **section 3.2 - Connecting Your Sound Card**.
2. Your speakers are **active (amplified)** speakers (with built in power supply and amplifier). Passive speakers (without built in power supply and amplifier) can only be used if connected to an external amplifier.
3. Power from the Mains to your speakers are properly connected and powered ON.
4. You are running Windows® 95/98/NT®4.0. If you are running Windows® 95, you need to install DirectX™ that comes with your CD. (See the FAQ - What version of DirectX™ should be installed ?)
5. The Output Mode (**ThunderBird 128 Control Panel** > **Settings** tab) must be set to **Speaker** if you are using only the 2 front speakers and to **Quad**, if you are using 4 speakers.



There is a yellow exclamation mark (error) for the “VLSI_QSound ThunderBird 128 PCI Legacy Audio” device.



Certain motherboards with USB capability may encounter this problem. The USB port(s), when enabled, may contend with the PCI 368 Sound Blaster Emulation device for the same IRQ resource resulting in a conflict.

The PCI 368 Sound Blaster Emulation device typically uses IRQ 5 and IRQ 10.

Depending on the type of motherboard you have, there may be 2 possible ways to solve this problem:

1. Reserve IRQ 5 for ISA slots (configurable in the BIOS).
2. Disable COM Port 2 (configurable in the BIOS).



How do I de-install the audio drivers ?



Windows 95/98

1. From the Windows taskbar, click **Start** > **Settings** > **Control Panel**.
2. Double-click **Add/Remove Programs** icon.
3. Select “**ThunderBird PCI Audio Support Files**” from the window prompted and click **Add/Remove...**.
4. The audio drivers for the ThunderBird™ will be removed.

Windows NT

1. From the Windows taskbar, click **Start** > **Settings** > **Control Panel**.
2. Double-click on the **Add/Remove Programs** icon.
3. Select your product devices and click **Add/Remove**.
4. The system will start removing your sound card drivers. Upon completion, click **Finish** and restart your system.



How do I see the resources listings ?



Windows 95/98

1. From the Windows taskbar, click **Start** > **Settings** > **Control Panel**.
2. Double-click the **System** icon.
3. Select **Device Manager** and double-click **Sound, video and game controllers**. Select your device and click **Properties**. Click **Resources**.

The IRQ and memory range used by the card will be listed.

Windows NT

Run the **Windows NT Diagnostics** as follows:

1. From the Windows taskbar, click **Start** > **Programs** > **Administrative Tools (Common)**.
2. Click **Windows NT Diagnostics**. From the Diagnostics Window, click the **Resources** tab > **Devices** tab.
3. Double-click **WinAcPci**.

The IRQ and memory range used by the card will be listed.



My system does not detect the sound card when I boot up for the first time. What's wrong?



Windows 95/98

Make sure your sound card is fully inserted into the PCI Bus slot. However, if the sound card has been properly installed, do the following:

1. From the Windows taskbar, click **Start** > **Settings** > **Control Panel**.
2. Double-click **System** icon.
3. Click the **Device Manager** tab.
4. Check whether there is a yellow exclamation mark (error) on any of the 'VLSI_QSound ThunderBird PCI' devices. If there is, remove all devices (by selecting each device one at a time and click **Remove**) and re-install the sound card drivers. See **section 4.1 - Installing the Sound Card Drivers**.

Windows NT

Not applicable.

Appendix

B

Technical Specifications

This chapter contains the technical specifications of your card. The information may be more useful for technically inclined users.

B.1 Sound Standards Compatibility

EAX™ using Q3D™ 2.0, A3D™ using Q3D™
DLS 1.0
DirectSound™, DirectSound3D™ and DirectInput™, Sound Blaster®, Sound Blaster® Pro
General MIDI 1.0, MPU401 UART, Audio Codec'97 rev 1.03

B.2 Sound Card Features

Support Microsoft DirectSound™ Acceleration up to 128 channels, 64 in hardware and 64 in MMX host
Hardware 64-channel QSound® Q3D™ Positional Sound
Hardware 64 voices Wavetable, Software 256 voices Wavetable
QSurround® 2 or 4 speaker virtualization of DVD multi-channel audio
QMSS™ (QSound Multi-Speaker System) for expansion of normal stereo to 4 speakers
Stereo to 3D enhancement
High-quality Sample Rate Converter and Digital Mixer
WDM Streaming and USB Ready
Supports simultaneous full-duplex record/playback at independent sampling rate
High quality codec (>90dB SBR)
Supports OPL3 FM Emulation
PCI Bus Specifications Revision 2.1
ACPI and OnNow Power Management
Supports Legacy Address MPU401 MIDI and joystick

B.3 System Audio Hardware

System Audio Sources
Mono Mic-In
Stereo Line-In
Stereo CD-In
Stereo AUX-In
TAD Connector
Stereo (PCM) Digital Audio

System Audio Output
Front Channel Buffered Line-Out / Headphone Out
Rear Channel Buffered Line-Out

B.4 Interfaces

MIDI Interface
MPU401 UART Mode Interface
Full duplex interface for connectors of MIDI instruments (need optional MIDI kit)
MIDI I/O goes through the joystick port connector

GAME Port
MIDI port doubles as game port providing support to 2 standard PC joysticks

B.5 Connectors On Board

Audio Internal
4-pin MPC (70553 - Black) connector for CD-In
4-pin PH04 (white) connector for CD-In
4-pin PH04 (blue) connector for AUX-In
4-pin PH04 (red) connector for TAD

Audio External
3.5mm jack (red) for mono microphone input
3.5mm jack (blue) for stereo Line-In
3.5mm jack (green) for stereo Front Channel buffered Line-Out / Headphone Out
3.5mm jack (white) for stereo Rear Channel buffered Line-Out / Headphone Out

Wavetable Upgrade

26-pins gold flash connector for Wavetable synthesizer daughter board

Game Port

D-SUB 15 connector for joystick and MIDI interface
--

B.6 System Audio Software OS Support

Window® 95

Window® 98

Windows NT®4.0

Windows NT®5.0 (WDW)

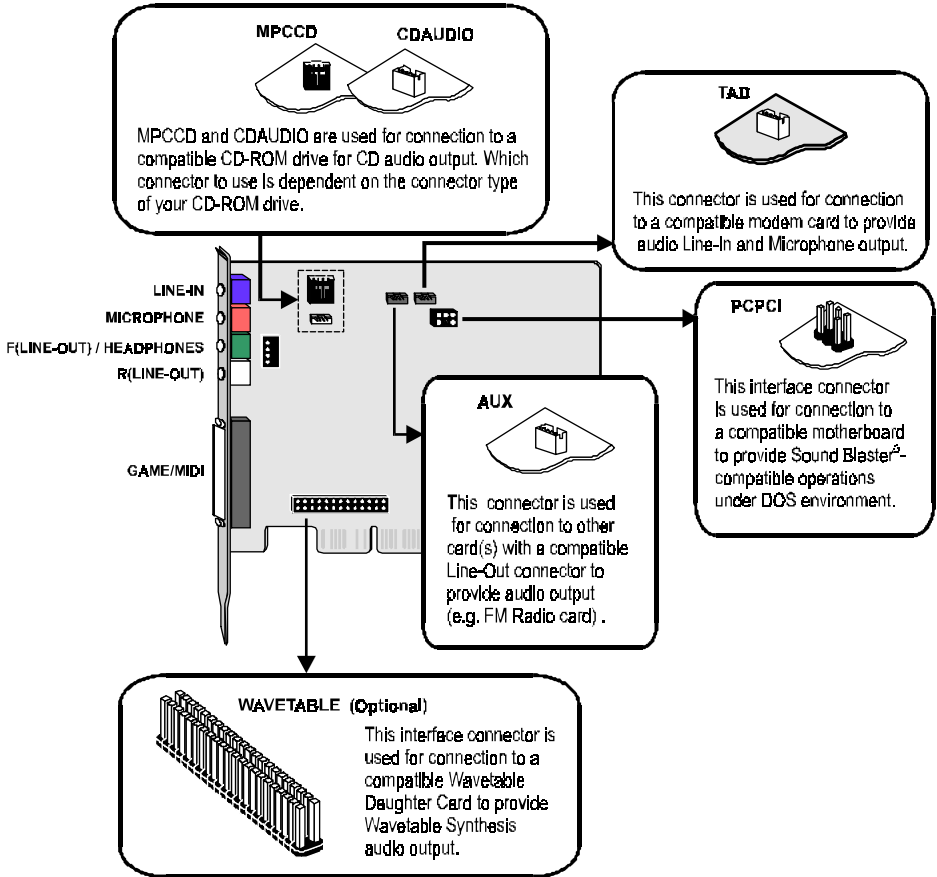
Real-Mode DOS



The product specifications herein are subject to change without prior notifications.

Appendix C

Sound Card Layout



Appendix D

QEM™ (QSound Labs, Inc.)

D.1 What is QEM™?

QEM™ stands for QSound® Environmental Modeling™, a sound rendering technology that produces reverberation and other special audio effects. QEM™ is compatible with the EAX™1.0 API (application programming interface) from Creative Labs which means that any game written to take advantage of EAX™ will also work with your sound card.

D.2 What does QEM™ do?

In real life, every room, or “environment” you enter has some sort of *reverberant quality*, depending on different factors like its *size*, and the *material* the surrounding objects (e.g. walls, mountains, etc.) are made of.

QEM™ attempts to model this in a game world, by applying environment effects to DirectSound™ audio streams, by way of presets that can be either set manually, or called automatically from within an “EAX™-enabled” program. (See Figure 1)

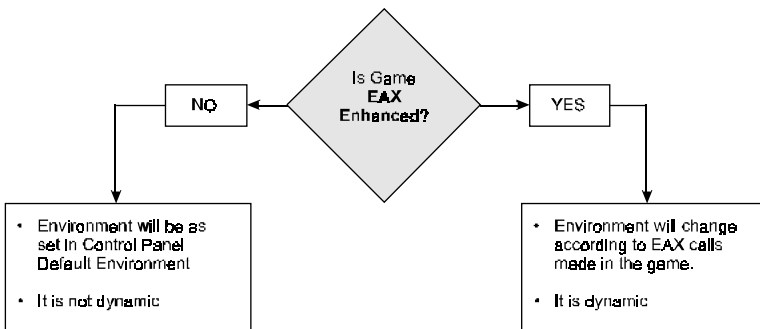


Figure 1. How QEM™ Works

From a player's perspective, this means that they can get ambient environment effects on all the Direct Sound™ games they play. Using **ThunderBird 128™ Control Panel**, there are **2 ways** they can achieve this:

D.2a Getting QEM™ To Work On A Non-EAX™ DirectSound™ Game

If the game you want to play has not been programmed to take advantage of QEM™ (i.e. non EAX™-Enabled DirectSound™ games), all you need to do is select a suitable environment from the **Default Environment** list in the ThunderBird 128™ Control Panel, and run the game. The effect you have selected will be present throughout the game. You can select any standard environment from the list.

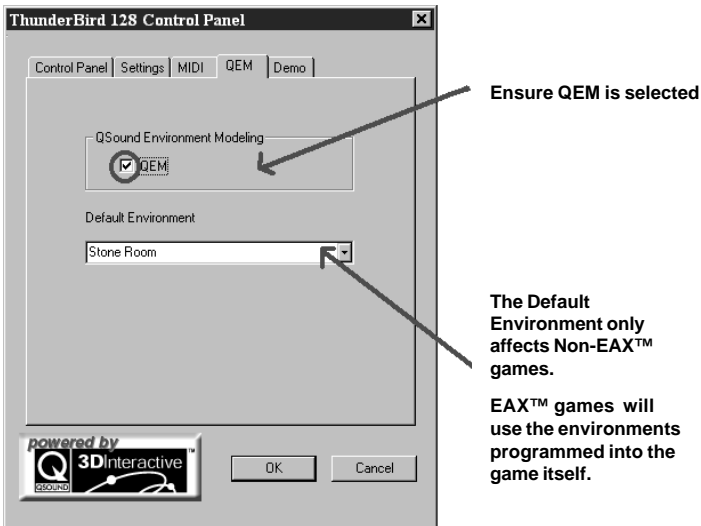


Figure 2. Control Panel – QEM Tab

D.2b Getting QEM™ to work on an “EAX™-ENABLED” DirectSound™ Game (See Figure 2)

“EAX™-enabled” is a term used for games/applications that have been programmed to take specific advantage of EAX™ technology. These games use the EAX™ API to make calls regularly throughout the program to change the current environmental effect, as is appropriate to the current in-game scenario.

Here’s a typical example of what an EAX™-enabled game would do: If the current scenario in the game is a *cave-like* setting, the game will automatically select the “cave” environment preset from the **Default Environment** list (*this all happens internally, so you won’t see anything change in the control panel*). If the player’s character then moves into a *larger room*, the game might then call for an “Auditorium” environment preset, giving the overall impression that the player has indeed, entered a large room.

In other words, an EAX™-enabled game will automatically select the appropriate environment from the list (*excluding the special “game-specific” presets for non-EAX™ games*), and will keep doing this throughout the game.

(If you manually selected a preset from the list, any EAX™-enabled game you play subsequently will make its own calls that will over-ride the setting you have selected.)

Some examples of EAX™-enabled titles on the market are, *Unreal* (updated with the most recent patch), *Half-life*, and *Jurassic Park: Trespasser*.

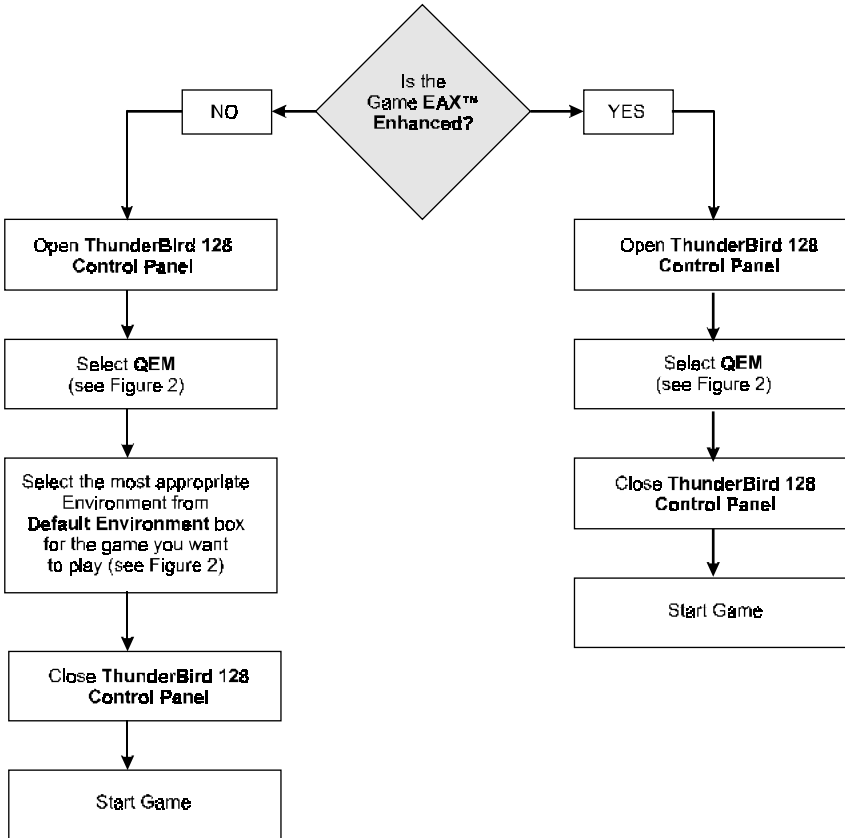


Figure 3. How to use QEM™
(Remember QEM™ only works with DirectX™ Games)

Glossary

3D Positional Sound

3-Dimensional Positional sound allows you to hear sound from every direction in 3D space.

A3D™

Positional audio standard produced by Aureal.

Active (amplified) Speakers

Speakers having a built-in amplifier and therefore requiring an external power supply such as an AC adapter.

API

Application Programming Interface. An interface that defines the functions/operations a programmer uses, to write software routines, sometimes specific to a type of hardware.

DirectX™ drivers

Microsoft's set of standardized APIs (application programming interfaces) for games and multimedia applications. With these standards, programmers are able to write programs that access the hardware features of the computer without knowing exactly what hardware will be installed on the machine where the program eventually runs.

DLS

Downloadable Sounds. It provides a means for game developers and composers to add their own custom sounds to the GM sound set stored in a sound card's ROM. DLS-compatible devices will automatically download these custom sounds from the card, disk or CD-ROM into system RAM, allowing MIDI music to be freely augmented with new instrument sounds, dialog or special effects, providing an unlimited palette of sounds.

EAX™

Environmental Audio Extensions™ (EAX™) by Creative Labs.

Line-In Jack

Audio-in connector on the sound card that allows you to connect to your mini-hifi / radio / CD-ROM Player. Amplified/active speakers connected to Line-out will output the music.

Line-Out Jack

Audio-out connector on the sound card that allows you to connect to your amplified/active speakers . Any input to your sound card (from Line-In) will be heard from the speakers.

Microphone Jack

Microphone connector on the sound card that allows you to connect your microphone such that you can do voice recording or playback.

MIDI

Musical Instrument Digital Interface. It is a musical communication standard that lets you (with the help of a MIDI keyboard / guitar) instruct a sound to play from your synthesizer.

MIDI Port

A physical interface enabling the interconnection of multimedia computers and electronic musical instruments to record, store and play back music performance data in the form of MIDI commands.

PCI-Bus

Peripheral Component Interconnect expansion bus connector. The PCI bus sends/receives data 32-bits at a time, superceding the slower 16-bit ISA (Industry Standard Architecture) expansion bus. By making use of PCI bus, PCI 368DSP allows higher data throughput and indirectly gives rise to faster game play.

Plug-n-Play

Also known as PnP, it is an Intel Standard for the design of PC expansion boards. It eliminates the need to configure the IRQ (Interrupt Request Channel) and DMA (Direct Memory Access) settings as well as I/O and memory addresses when adding new peripherals. Windows will automatically configure your new device to work properly on your system.

QEM™

QSound® Environmental Modeling™ by QSound Labs, Inc. (See *Appendix D - QEM™*)

QMSS™

QSound® Multi-Speaker System™. QMSS™ redistributes image across all 4 speakers when playing stereo Audio CD/DVD. This feature can be found in ThunderBird 128™ Control Panel under the **Quad** speakers option.

QXpander™

By QSound Labs, Inc. This feature can be found in ThunderBird 128™ Control Panel under **2 speakers** option. It expands sound field to 3D for stereo audio from Audio CD/DVD.

Q3D™

Patented positional 3D audio technology developed by QSound Labs, Inc.

Wavetable

A table of stored sound waves that are digitized samples of actual recorded sound.