



C-Media Electronics Inc.

UDA Driver

Enhanced by Xear 3D™ Sound Technology

User Manual

**(Suitable for CMI9739/A, 9738/S AC'97 Audio Chips
and Rev.029 later driver)**

Revision: 1.1

Rev. Date: Feb. 25, 2003



Notice

The content furnished in this document is C-Media audio product knowledge for customers' reference. However, C-Media Inc. assumes no responsibility for the consequences of use of such information. The information included is subject to change without notice. This publication supersedes and replaces all information supplied previously. No part of this manual can be reproduced or transmitted in any form or by any means for any purpose without the permission of C-Media Electronics Inc.

Trademarks

C-Media, C-Media logo and Xear 3D are trademarks of C-Media Electronics Inc. EAX and A3D are trademarks of Creative Technology Ltd. Microsoft, DirectSound3D, Windows are trademarks of Microsoft Corporation. Other company and product names may be trademarks of the respective companies with which they are associated.

Copyright

Copyright © 2003-2004 C-MEDIA Electronics Inc.

C-MEDIA Electronics Inc.

6F, 100, Sec. 4, Civil Boulevard, Taipei, Taiwan 106 R.O.C.

URL: [HTTP://WWW.CMEDIA.COM.TW/](http://www.cmedia.com.tw/)



Revision History

Revision	Date	Applicable Driver Version	Description
1.0	11/15/02	UDA After V.025	Preliminary
1.1	02/25/03	UDA After V.029	1. Revision based on UDA V.029 driver 2. Describe output channel specification for analog input

Table of Contents

1. Introduction.....	P.5
✧ What is UDA Driver?.....	P.6
✧ What Chips are Applicable to Now?.....	P.6
2. Feature Overview.....	P.7
✧ What is Xear 3D?.....	P.7
✧ Driver Function Diagram.....	P.10
3. Audio H/W, S/W, and Speaker Setup.....	P.11
4. User Interface / Function Description.....	P.15
✧ 3D Audio Configuration.....	P.15
✧ Speaker Output.....	P.17
✧ S/PDIF.....	P.20
✧ Volume Tab.....	P.23
✧ Microsoft Volume Control.....	P.25
✧ Microsoft Recording Control.....	P.28
✧ Microphone.....	P.30
✧ Xear 3D- 5.1 Virtual SPEAKER SHIFTER.....	P.32
✧ Xear 3D- Sound Effect.....	P.38
✧ Xear 3D- Multi-channel Music Demo.....	P.40
✧ Xear 3D- Play3D Demo.....	P.42
✧ Information.....	P.44
5. Output Channel Specification.....	P.45

List of Figures

Figure 1: Xear 3D Sound Features for All Applications.....	P.5
Figure 2: UDA025 Xear 3D Driver Function Diagram.....	P.10

List of Tables

Table 1. Speaker Output- Function Description.....	P.18
Table 2. S/PDIF- Function Description.....	P.21
Table 3. Volume Control- Function Description.....	P.24
Table 4. Microsoft® Volume Control Function Description.....	P.26
Table 5. Microsoft® Recording Control Function Description.....	P.29
Table 6. Microphone- Function Description.....	P.31
Table 7. 5.1 Virtual SPEAKER SHIFTER- Function Description.....	P.34
Table 8. Sound Effect- Function Description.....	P.39
Table 9. Multi-channel Music Demo Program- Function Description.....	P.41
Table 10. Play3D Demo Program- Function Description.....	P.43
Table 11. Output Channel Specification.....	P.45

1. Introduction

Thanks for choosing C-Media audio solution! The user manual is a guide for users to understand how to use the new generation **UDA driver for all C-Media AC'97 audio chips** with exclusive **Xear 3D™ sound technology**. **C-Media provides a value-added PC audio total solution. All kinds of applications can get maximum support.** With this manual, users can quickly take advantage of these great features to enjoy amazing sound effects even better than consumer acoustics.

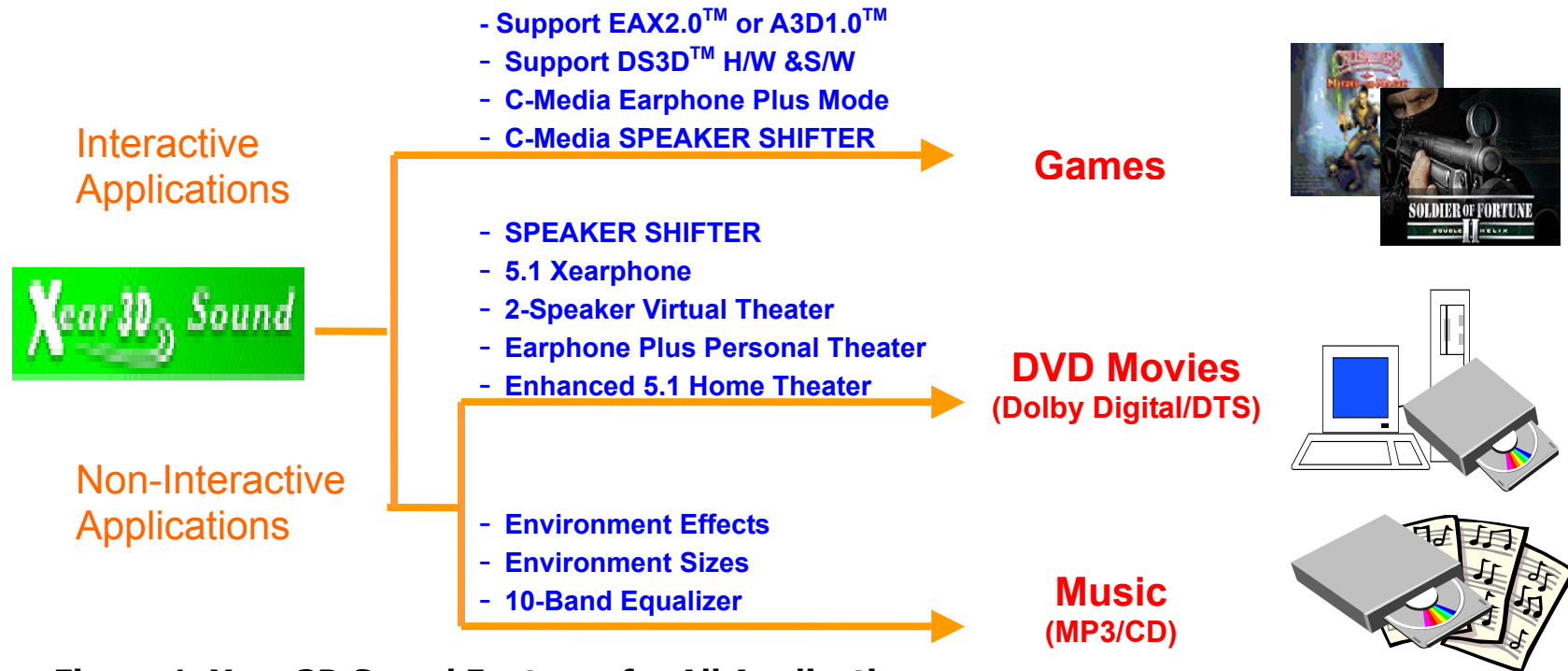


Figure 1. Xear 3D Sound Features for All Applications



What is UDA driver?

C-Media designs the driver of audio chips using **Universal Driver Architecture** that is so-called **UDA driver**. UDA driver has a flexible interface so that it can be applied to different platforms and all C-Media audio chips. The benefits for you are:

1. The same driver supports all Windows, C-Media AC'97 CODEC, and audio controllers (south bridges) on-board.
(You can download the free driver from <http://www.cmedia.com.tw/>)
2. No operation barrier when switching to other C-Media's products.

C-Media's UDA driver supports **Windows 98, 98/SE, ME, 2000, XP** (Microsoft® certificated) and all mainstream south bridges on your motherboards such as **Intel, SIS, VIA, NVIDIA, & Ali series**.

What Chips are Applicable to Now?

C-Media UDA driver is designed to support all C-Media audio chips including **CMI9739/A (6ch AC'97 CODEC), CMI9738/S (4ch AC'97 CODEC), and CMI8738 series products (PCI 6/4ch audio chips)**. At this stage, only CMI8738 series need more verification. UDA has been ready for AC'97 product series.

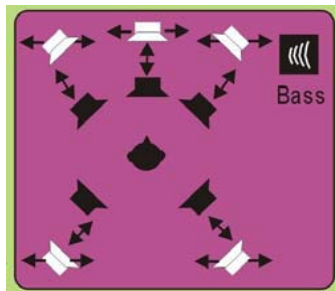
2. Feature Overview

C-Media driver has lots of advanced new features, especially the deployment of **Xear 3D™ sound technology**.

What is Xear 3D?

Advanced, Considerate, and Enjoyable Audio Killer Solution

With Virtual SPEAKER SHIFTER, you don't have to worry about the speaker types and their placement any more!

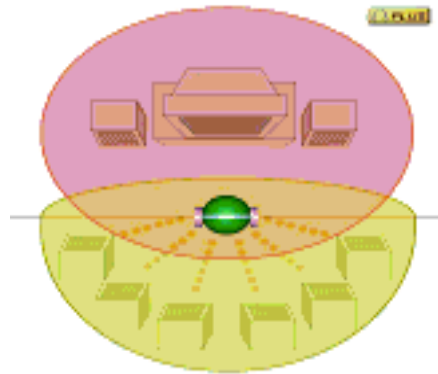


Xear 3D™ Sound Technology is a code word of C-Media killer solution for 2-channel virtual surround, adjustable multi-channel sound field, innovative listening mode, amazing sound effects and 3D positional audio that is now delivered by the new UDA driver. Xear 3D is a not only advanced but also considerate and enjoyable audio package to users. It currently includes the following exclusive core-features but not confined to these in the future:

1. 5.1 Virtual SPEAKER SHIFTER:

- ✧ Users can enjoy multi-channel surround sound using any kind of appliances including earphone (we call it **5.1 Xearphone** feature), 2, 2.1 to 5.1 speakers.
- ✧ Provides a user-friendly interface for shifting virtual speakers just like moving the physical speakers literally to break through any spatial placement limitation.

You don't need rear speakers to enjoy multi-channel or realistic 3D sound. Just use a general open-aired earphone as rear speakers!



open-aired earphones as follows that will not stuff into your ears and prevent you from hearing front-speakers sound.



- ✧ **Users can adjust the best sound field dynamically** adapted to different applications and sound sources.
- ✧ **Provides a new multi-channel listening mode: Earphone Plus.** You can use open-aired earphones in place of rear speakers to save the cost and setup trouble of rear speakers.

2. HRTF 3D Positional Audio:

Xear 3D integrated world-standard **Sensaura's CRL3D™ engine** for providing the best **HRTF (Head-Related Transfer Function) 3D positional audio** and related features as follows which are necessary for gaming and interactive applications:

- ✧ **EAX™ 1.0 & 2.0** (Creative Environment Audio eXtension has been a world-wide standard for high-quality games.)
- ✧ **A3D™ 1.0**
- ✧ **Compatible with Microsoft DirectSound 3D™ H/W & S/W**

3. Sound Effects:

- ✧ **27 Environment Effects** (with sound reflection and reverberation characteristics)
- ✧ **3 Environment Size** scenarios for each environment
- ✧ **10-band Equalizer** function with 12 preset modes



All these sound effects make your audio more customized, special and amazing.

Demo Program:

Multi-channel Music

Multi-channel Music Demo Program has three 5.1-channel melodies for playing. You can also click on the speakers respectively for testing each channel and adjust virtual speakers before playing multi-channel audio applications like DVD.

Play3D Demo

Play3D Demo provides 5 sound sources and moving paths for 3D audio playing. You can feel 3D positional sound. You can also use this program to adjust your virtual speakers before playing 3D audio applications like gaming.

Driver Function Diagram

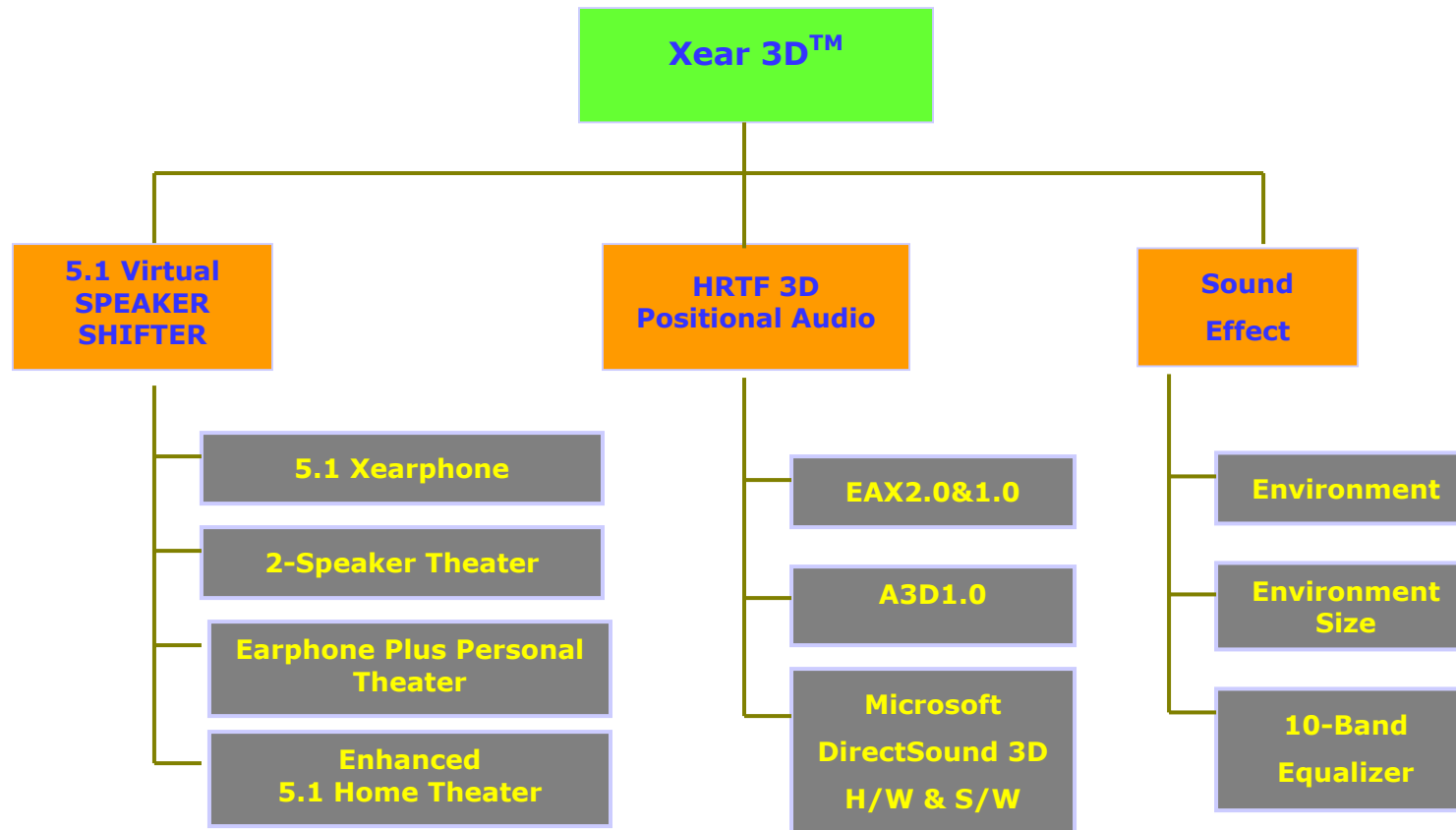


Figure 2. UDA Xear 3D Driver Function Diagram



3. Audio H/W, S/W, and Speaker Setup

Audio Hardware

C-Media UDA driver is designed to support all C-Media audio chips:

1. CMI9739/A (6ch AC'97 CODEC)
2. CMI9738/S (4ch AC'97 CODEC)
3. CMI8738 series products (PCI 6/4ch audio chips).

If you bought the motherboard or the system with a C-Media audio chip on board, you don't have to do any audio hardware setup. **If you bought a sound card using C-Media audio chip, you should install your sound card to PCI slot on your motherboard first.** After that, you can continue to install the audio driver/software.

Audio Software

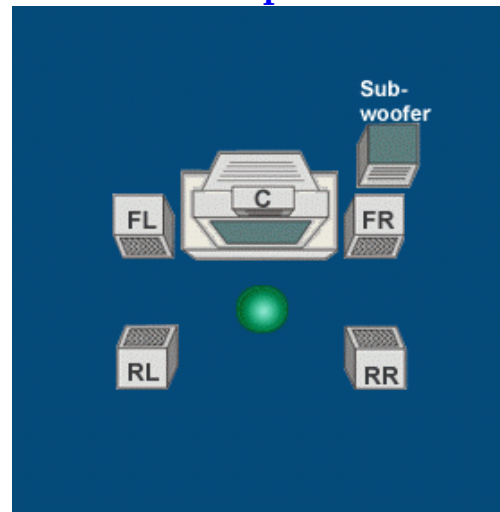
Just put the support/driver CD into your CD-ROM/DVD-ROM to install the C-Media audio driver/software. (Please also refer to the Guide from your system vendor.)

Speaker Setup

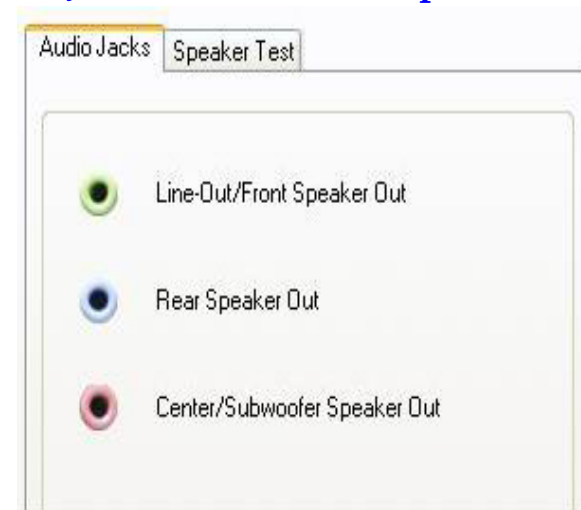
1. 6CH Audio Chips (CMI9739/A, CMI8738-6ch, CMI8738-MX, CMI8738-LX, etc.)

If the audio chip on your system supports 6 channels output, it means you can set up a 5.1 speaker system to enjoy real 5.1 surround sound when playing DVD movie titles like the figure below. The subwoofer only has low-frequency effect (LFE) instead of broadband audio frequency and hence it's often called the “.1” speaker. Please connect the speakers to the correct jacks referring to the jack function description in the audio configuration panel.

5.1 Speakers



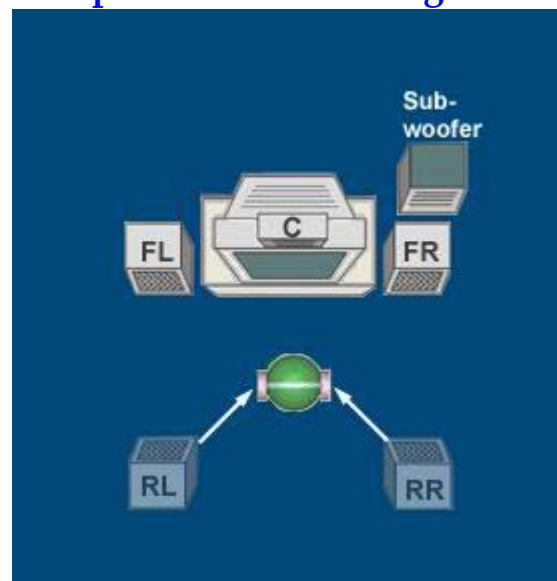
Jack Function Description



However, if you only have usual 2 or 2.1 speakers or it's not convenient to set up the rear speakers in your room, how do you enjoy multi-channel

surround sound? **We strongly recommend you to use C-Media exclusive Xear 3D- Earphone Plus listening mode that allows you to use common open-aired earphones in place of rear speakers for rear surround sounds. Just turn on Virtual SPEAKER SHIFTER and then Xear 3D engine will produce rear sound field for you through the earphones.** Therefore, you can easily own a personal theater environment at home, Internet café, or in the office. Earphone Plus helps you to save much money for rear speaker and to avoid space limitation and much setup troubles.

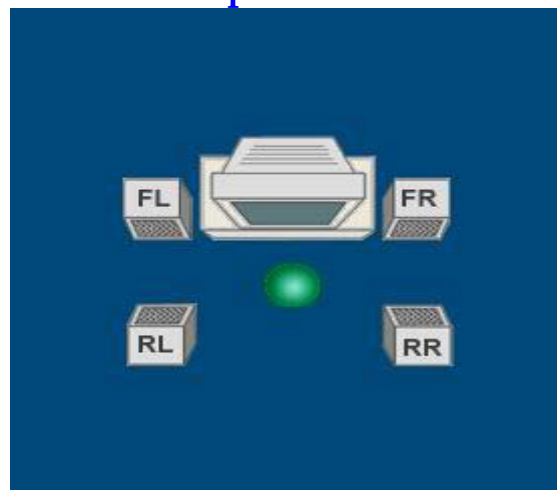
Earphone Plus listening mode



2. 4CH Audio Chips (CMI9738/S, CMI8738, CMI8738-SX)

If the audio chip on your system supports 4 channels output, it means your system can deliver 4ch surround sound (Front-Left, Front-Right, Rear-Left, Rear-Right) like the figure below. When playing DVD that has 5.1ch audio, the center channel can be delivered by synthesis of Front-Left and Front-Right channels.

4 Speakers



4. User Interface / Function Description

C-Media designs a very user-friendly user interface to set up the audio functionality. The following is the guideline of how to use the audio features.

3D Audio Configuration

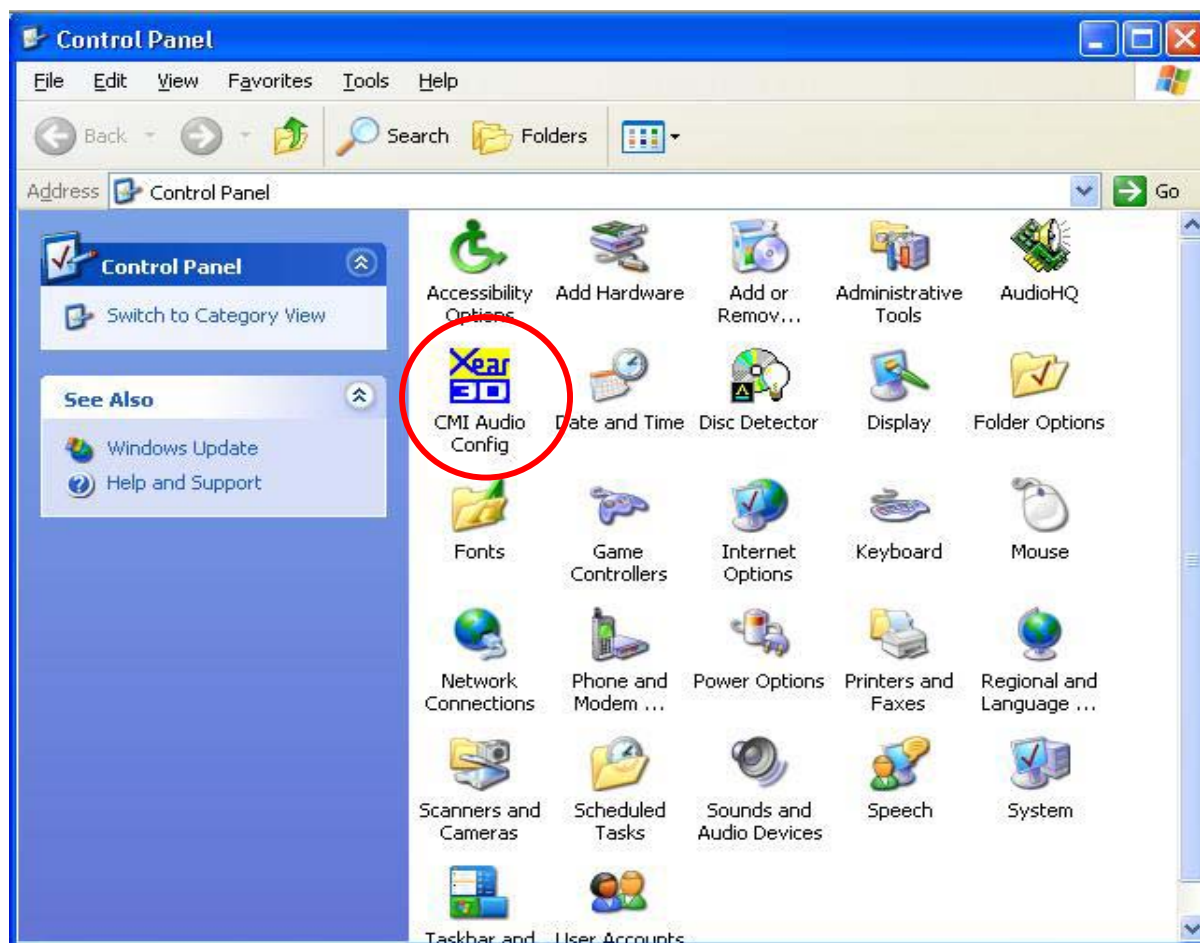
“3D Audio Configuration” is C-Media’s 3D audio setting panel with that you can control basic audio configuration. After finishing the installation of the driver and rebooting the system, you can find the panel from two places:

1. The system tray in the right-bottom of your screen. You can click right button of the mouse on it to get an audio-related pop-up menu as follows.



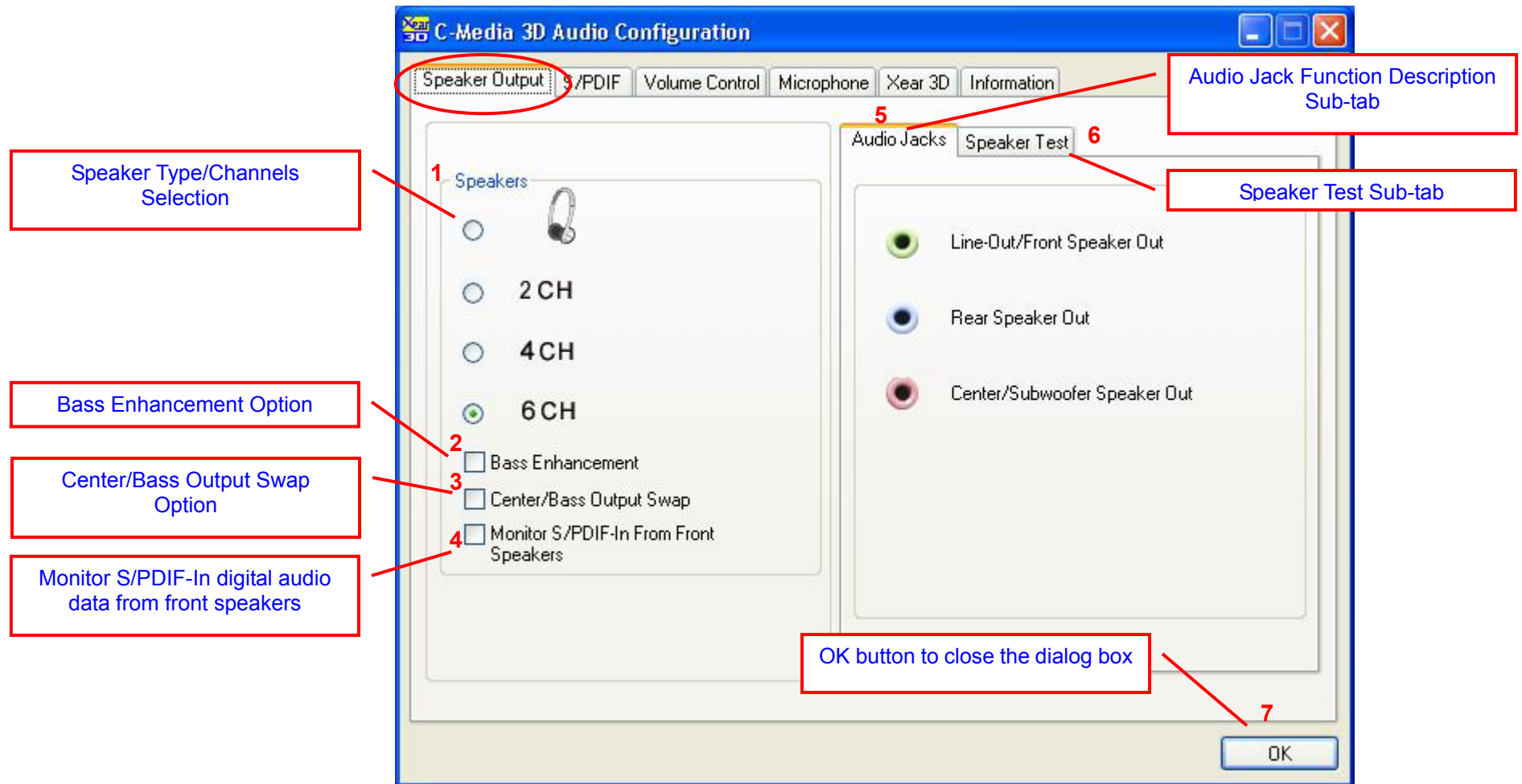
3D Audio Configuration

2. In the “Control Panel” (Start=>Setting=>Control Panel), double-click “CMI Audio Config” to open it.



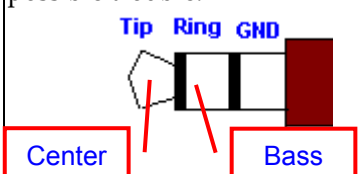
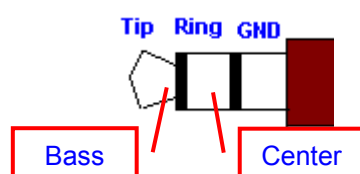
Speaker Output

When you open the “3D Audio Configuration”, you will see the default Output tab as the figure below. “Speaker Output” tab collects main setting/options for analog output to speakers.



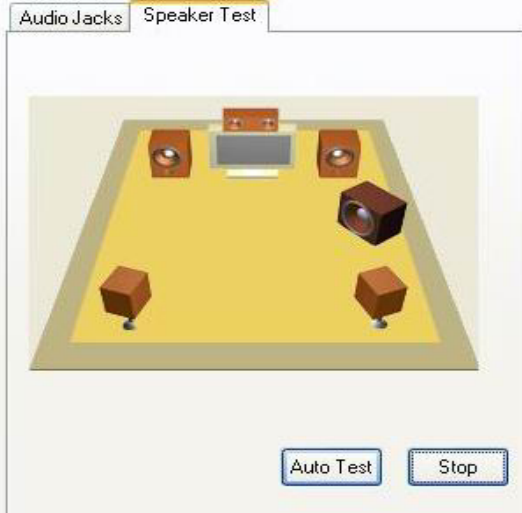
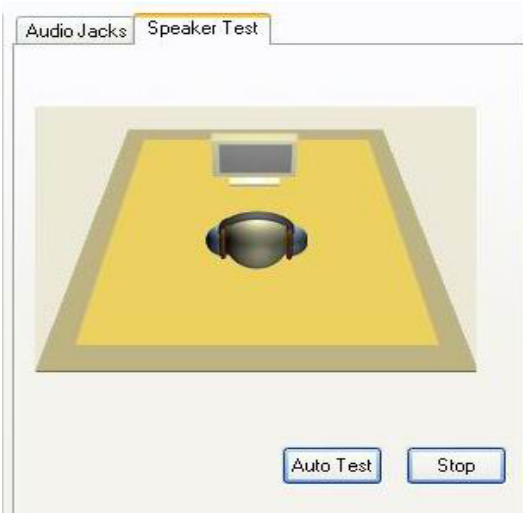
Speaker Output

Table 1. Speaker Output- Function Description

#	Function	Function Description
1	Speaker Type/Channels Selection	When you use different listening equipments, you should choose corresponding speaker type like Earphone, 2CH (for 2 or 2.1 speakers), 4CH (for 4 Speakers or Front 2 speakers plus rear earphone), & 6CH (for 5.1 speakers or 3.1 speakers plus rear earphone) . However, the actual output also depends on your sound source format and application program. (Please refer to “Output Channel Specification” in this document.) Default setting is 2CH.
2	Bass Enhancement Option	<p>Bass Enhancement is to enhance Bass signal effect especially for Earphone Plus Mode. It's available in 4 & 6CH setting. Most subwoofers of contemporary active PC 5.1 speakers would acquire bass signal from both Front and Rear-channel sounds automatically in addition to the independent Bass channel. What driver will do is to extract bass signal from some channels and to add it into others as descriptions below:</p> <p>In 4CH setting: Rear channel => Front Channel In 6CH setting: Front and Rear channel => Independent Bass/Subwoofer Channel</p> <p>When the rear channels are output to earphone instead of rear speakers in Earphone Plus Mode, you may not be aware of the bass component within the rear channel from the subwoofer. Moreover, a few subwoofers may not extract bass from other channels automatically. In these situations, you may need this option especially. Default setting is enabled in Xear 3D Mode and disabled in Common Mode.</p>
3	Center/Bass Output Swap Option	<p>Enable this option will exchange the center/bass output channel. PC speaker manufacturers define typically that the center signal is delivered by tip of the stereo plug and the bass signal is by ring of it like the figure below. However, some speakers have contrast definition. That's why we offer the option to avoid possible trouble.</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Tip Ring GND</p> <p>Center Bass</p> </div> <div style="text-align: center;">  <p>Tip Ring GND</p> <p>Bass Center</p> </div> </div>

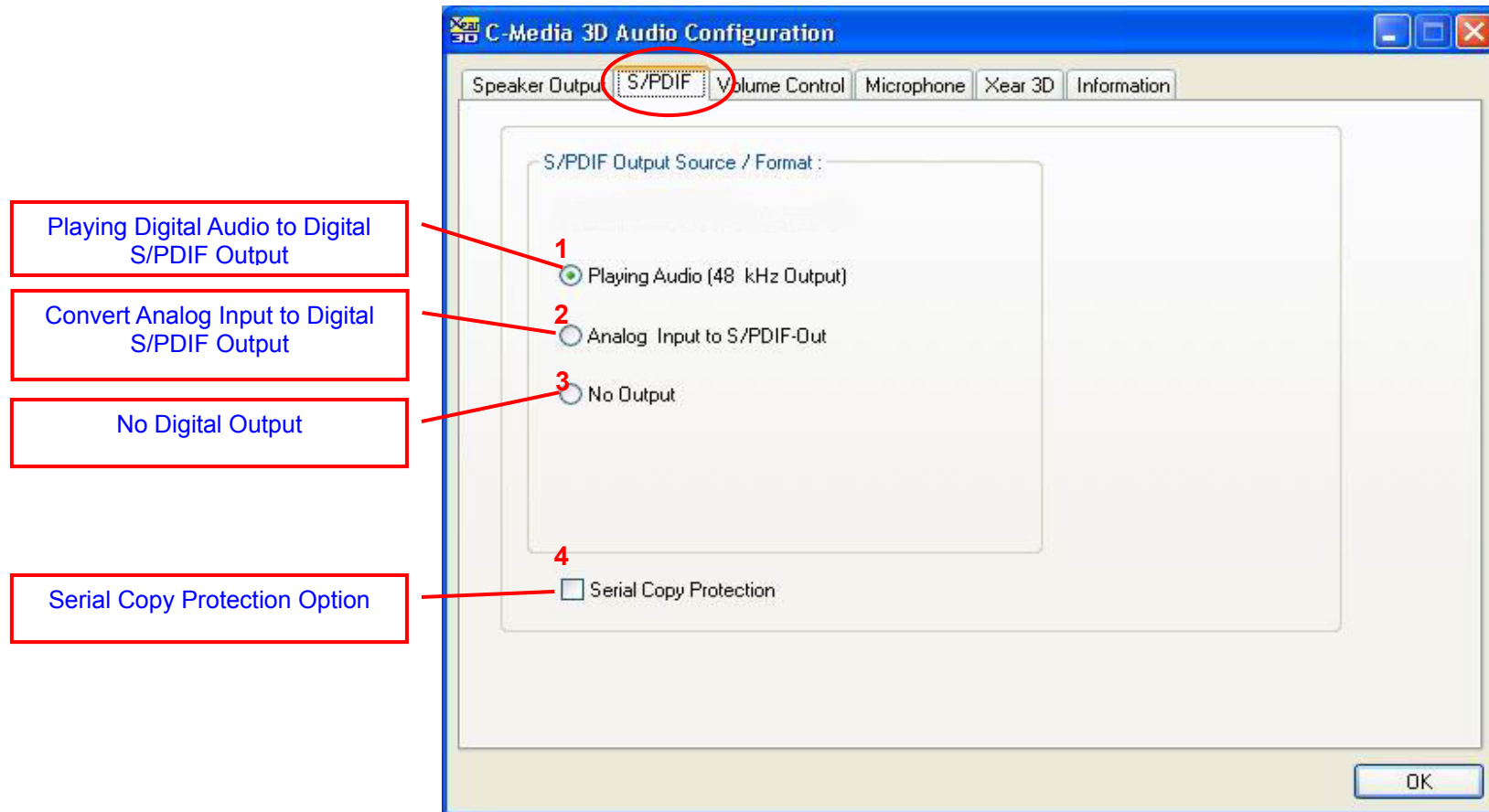
Speaker Output

Table 1. Speaker Output- Function Description (Continued)

#	Function	Function Description
4	Monitor S/PDIF-In from Front Speakers	To listen to the digital S/PDIF input audio data from front speakers in real time, you should select the “monitor” function. The data should be PCM format instead of compressed ones like AC-3 or DTS. When you enable it, the digital audio playback through front speakers will be replaced by S/PDIF-In data. So you will not hear the playback audio from front speakers. Some systems do not have S/PDIF input, and therefore you won’t see this item.
5	Audio Jack Function Description Tab	This tab will indicate a jack function map (by color and text description) corresponding with your current output setting. Please confirm you have connected your hardware to correct jacks before using.
6	Speakers Test Sub-tab	<p>This tab shows the speaker figure and test environment complying with your speaker type setting as follows. You can click “Auto Test” button or just click each speaker for testing your audio connection. The sound will repeat unless you click “Stop”</p> <p style="text-align: center;">6CH (5.1) Speakers Mode</p>  <p style="text-align: center;">Earphone Mode</p> 
7	OK button	All setting change will be activated once you click it. To click “OK” button will save your settings and close the 3D Audio Configuration program.

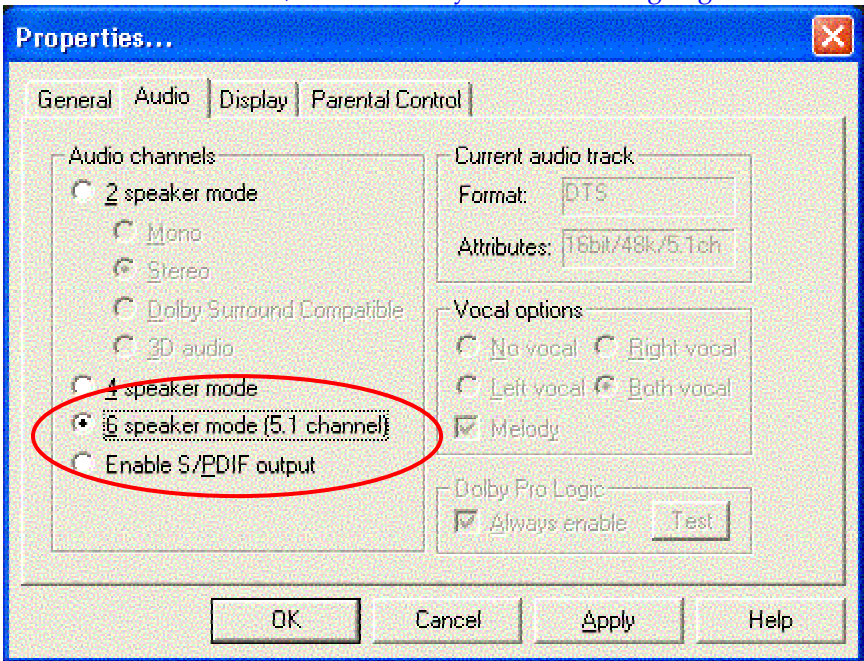
S/PDIF

C-Media driver supports digital S/PDIF output (Sony/Philips Digital InterFace, developed by SONY/PHILIPS to provide a low-distortion digital data transfer between audio devices) but some of our chip (CMI9738) don't support it and hence you will not see the relevant items. There may be an optical or coaxial connector for S/PDIF on your system. When you select S/PDIF tab, you will see the setting page as the figure below.



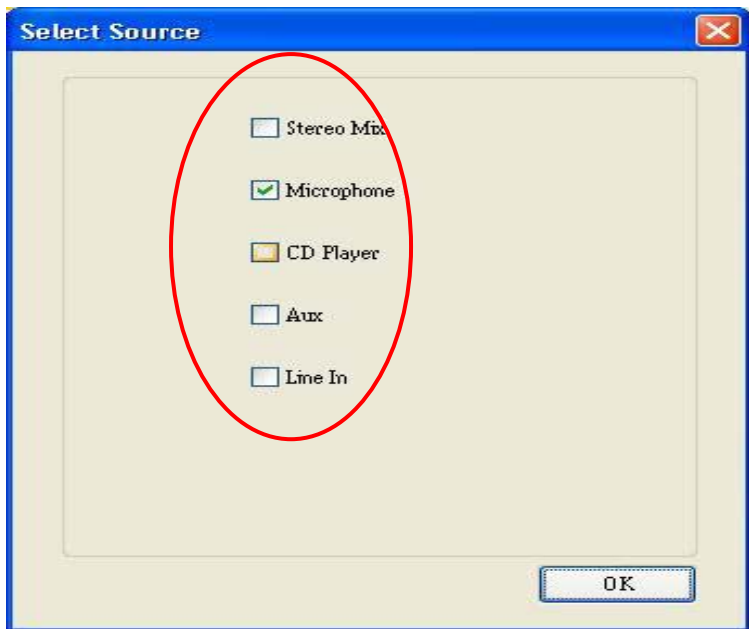
S/PDIF

Table 2. S/PDIF- Function Description

#	Function	Function Description
1	Playing Digital Audio to Digital S/PDIF Output	<p>Output digital playing audio from your computer like DVD, VCD, digital CD, MP3, Wave, etc. through S/PDIF in 48KHz sample rate. (44.1K source will be up-sampled to 48K) When playing a DVD title (AC-3 or DTS audio) with a software DVD player, if you have an external AC-3/DTS decoder, you can choose this item and also "S/PDIF output" in the player's audio setting to deliver out AC-3 or DTS data. Otherwise, you should connect analog speakers and select 5.1 speakers mode in that player, and the software will automatically decode AC-3/DTS to 5.1-channel PCM format before output to your speakers.</p> <p>For Instance, WinDVD Player Audio Setting Page</p>  <p>Since Xear 3D Virtual Speakers can always perform 6CH audio, we don't recommend you to select 2 or 4 speaker mode in the software player.</p>

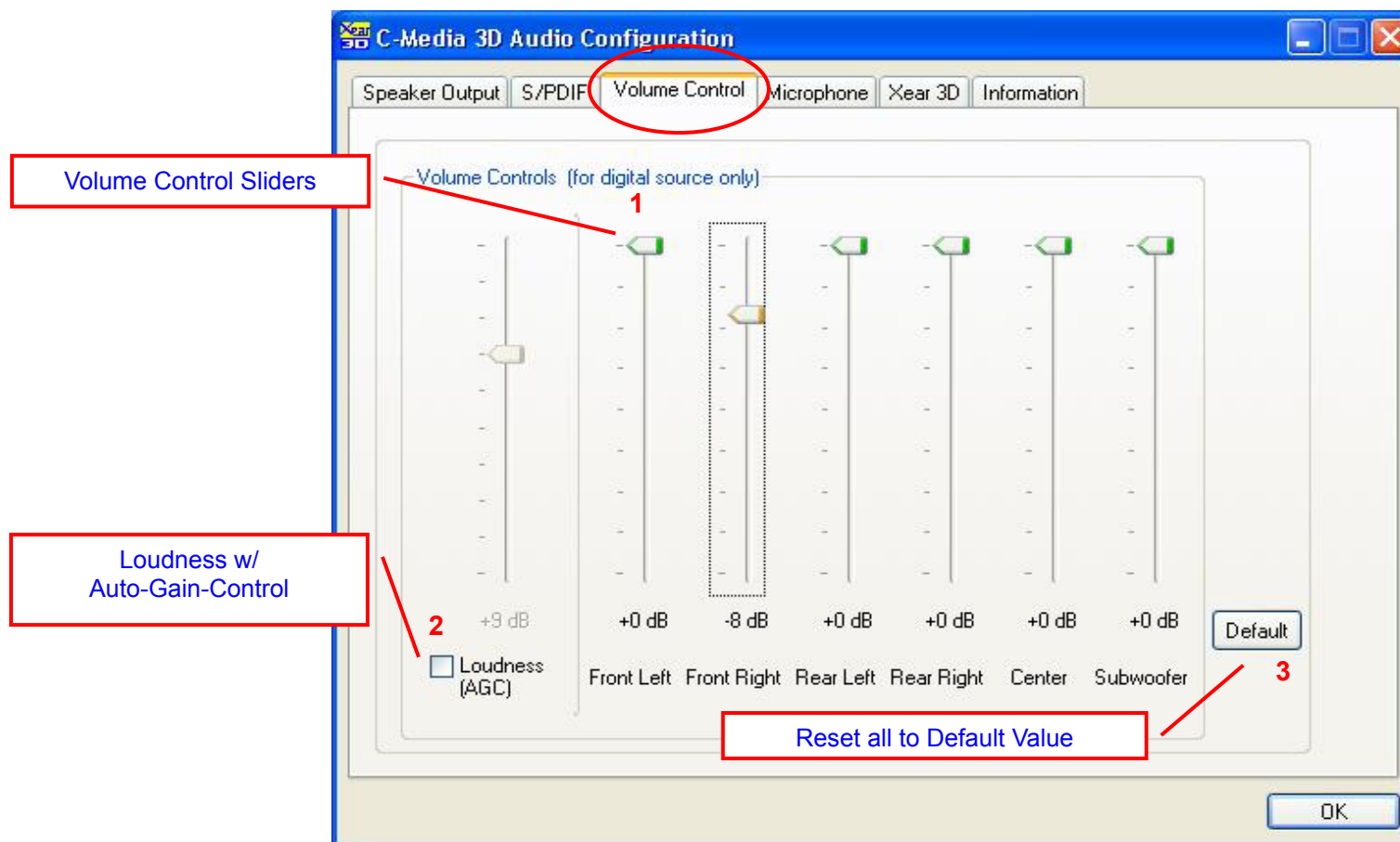
S/PDIF

Table 2. S/PDIF- Function Description (Continued)

#	Function	Function Description
2	Convert Analog Input to Digital Output	<p>This function is to convert analog input audio like Line-In, CD-In, Microphone-In signal to S/PDIF digital output in real time. This is useful to transfer the analog audio from one device to the S/PDIF interface of another such as the external decoder or the amplifier of Home Theater. The analog input signal needs to be recorded and converted to digital format. Therefore, you have to click "Select Source" button and select "one analog source" in the following panel. Actually the selected item synchronizes with the recording panel of Microsoft.</p> 
3	No Output	C-Media AC'97 CODECs support S/PDIF output with analog output at the same time. When choosing "No Output", S/PDIF output signal will be terminated. Otherwise, it would be transmitted all the time.
6	Serial Copy Protection Option	When this option is enabled, the copyright of S/PDIF output audio data will be asserted. Then it can be only recorded once but cannot be copied again according to SCMS (Serial Copy Management System) mandated by Audio Home Recording Act of U.S. in 1992.

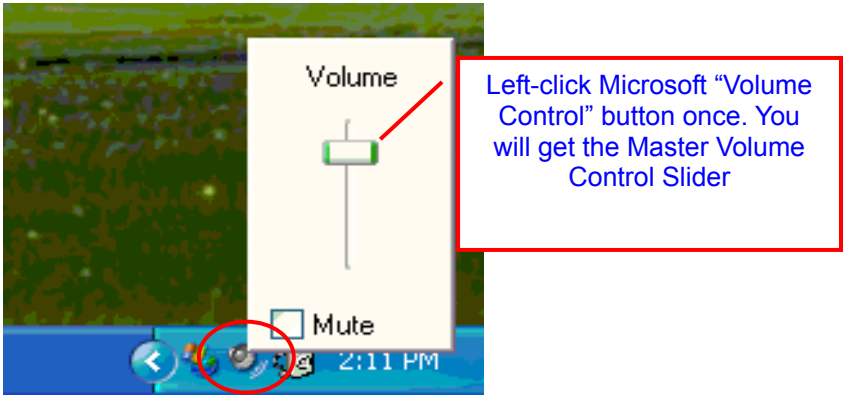
Volume Control

C-Media driver provides the digital volume control for all 6 channels in 3D Audio Configuration. You can regulate each volume to the speaker for current playing digital sound sources. It's not effective for analog input sources.



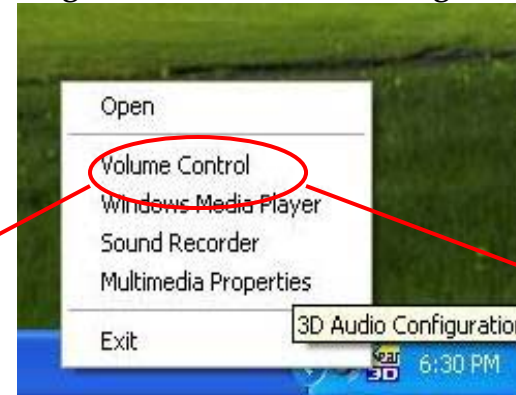
Volume Control

Table 3. Volume Control- Function Description

#	Function	Function Description
1	Volume Control Sliders	You can adjust each channel volume via drag and move the Volume Control Sliders. Default settings are all 0 dB (at the top) that means no extra gain or decay. When move it to the bottom of the slider, it will mute the digital sound for the channel. The dB number below each slider will show the responding volume level.
2	Loudness w/ Auto-Gain-Control	<p>When you want a higher volume level of digital audio, you can enable “Loudness”. It provides extra +3dB to +12dB gain to all channels. The driver also has been designed with a sophisticated auto gain control for minimizing the signal clipping distortion. However, it is still not recommended to enhance the volume too much here if you want a best sound quality. The better way is to increase the volume of external speakers or just to increase the Master Volume in Microsoft Volume Control (explained in the following).</p> 
3	Reset all to Default Value	Click the button to reset the volume of all 6 channels to 0 dB and Loudness to +9dB.

Microsoft Volume Control

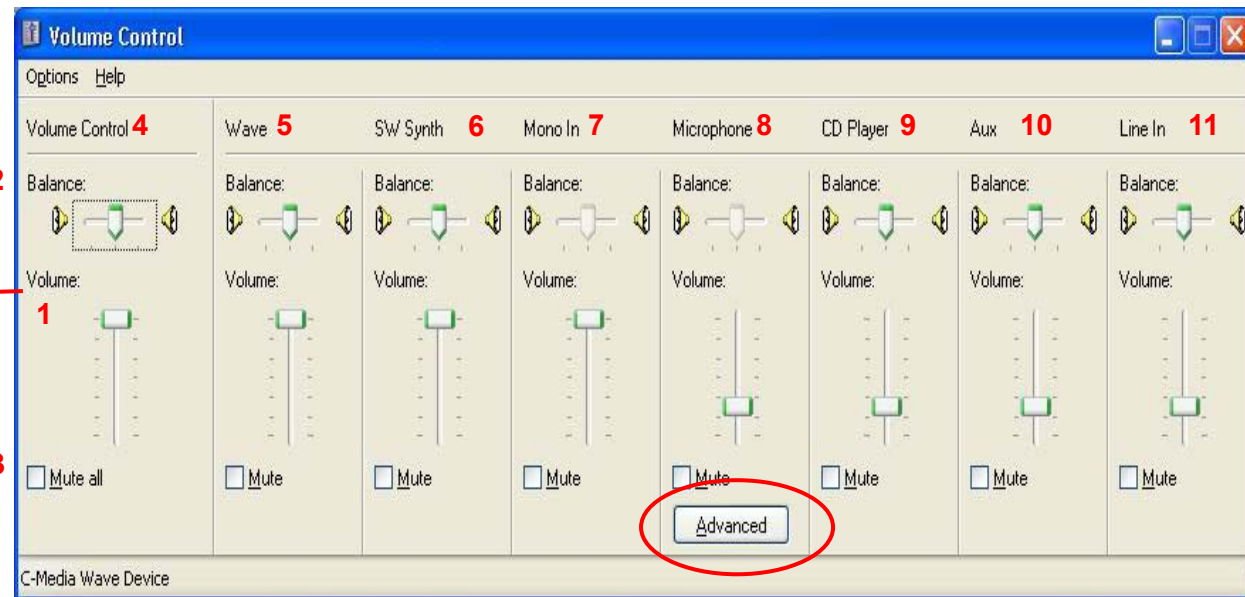
To change the volume of different audio paths, you should use “Microsoft Volume Control” as follows. Please right-click 3D Audio Configuration to find it out.



Left/Right Balance Slider

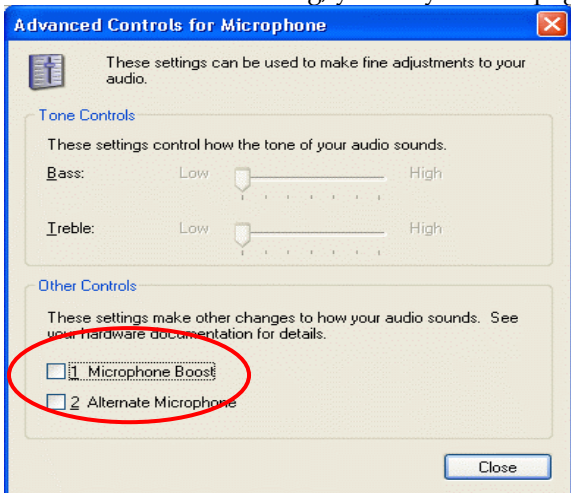
Volume Slider

Mute



Microsoft Volume Control

Table 4. Microsoft Volume Control- Function Description

#	Function	Function Description
1	Volume Slider	You can move it up and down to change the volume for each audio path.
2	Left/Right Balance Slider	Move it to Left, the right channel sound volume will decrease. Pan it to Right, the left channel sound volume will decrease.
3	Mute	To click "Mute" will mute the channel audio. For Master Volume, it will mute All.
4	Volume Control	This is the Master Volume Control and it influences all channels' audio volume.
5	Wave	Wave controls the front 2 channels digital playing audio sources (PCM format) based on Microsoft's definition.
6	SW Synth	This one is to control the volume of Microsoft Software Synthesizer (MIDI wavetable).
7	Mono-In	Mono-In is the analog mono input. For examples: PC-Beeper, speakerphone input. It depends on your H/W system design.
8	Microphone	<p>This is Microphone input path. In its "Advanced" setting, you may see the page as follows:</p>  <p>"Microphone Boost" is to boost the Microphone volume by +20dB. "Alternate Microphone" is the same as "Front-Panel Microphone". Both of these setting are also displayed in the "Microphone" tab of C-Media 3D Audio Configuration.</p>

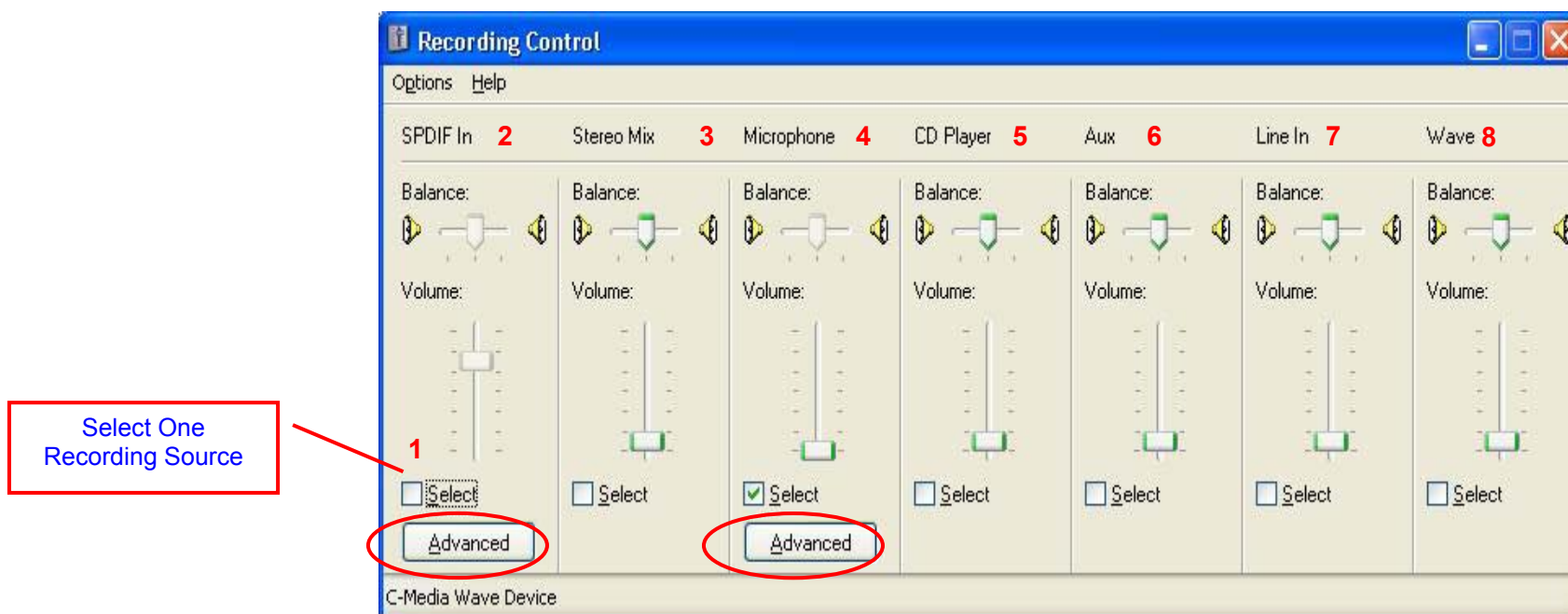
Microsoft Volume Control

Table 4. Microsoft Volume Control- Function Description (Continued)

#	Function	Function Description
9	CD Player	CD Player means the analog audio CD-ROM input. Windows XP default setting is Digital CD playing. If you want to use analog CD audio, you have to connect the analog audio output of CD-ROM to CD-In connector on M/B and switch the both settings of CD-ROM/DVD-ROM in device manager and the application program like Media Player to "Analog" CD.
10	Aux	If you see this item, it may imply your H/W has an Auxiliary input as a secondary stereo input like CD-In. It's a backup for your secondary CD-ROM/DVD-ROM or other use.
11	Line-In	Line-In is a common stereo input and the connector is usually one of the audio jacks in the back-panel. You can refer to the Jack Function Description tab in 3D Audio Configuration. It's usually used for the line input from consumer acoustics devices.


Microsoft® Recording Control

If you want to record audio in your computer, you need to set the Microsoft Recording Control correctly. You can find it from the path: Volume Control => Options => Properties => Recording. The volume/balance is similar to Playback Volume Control.



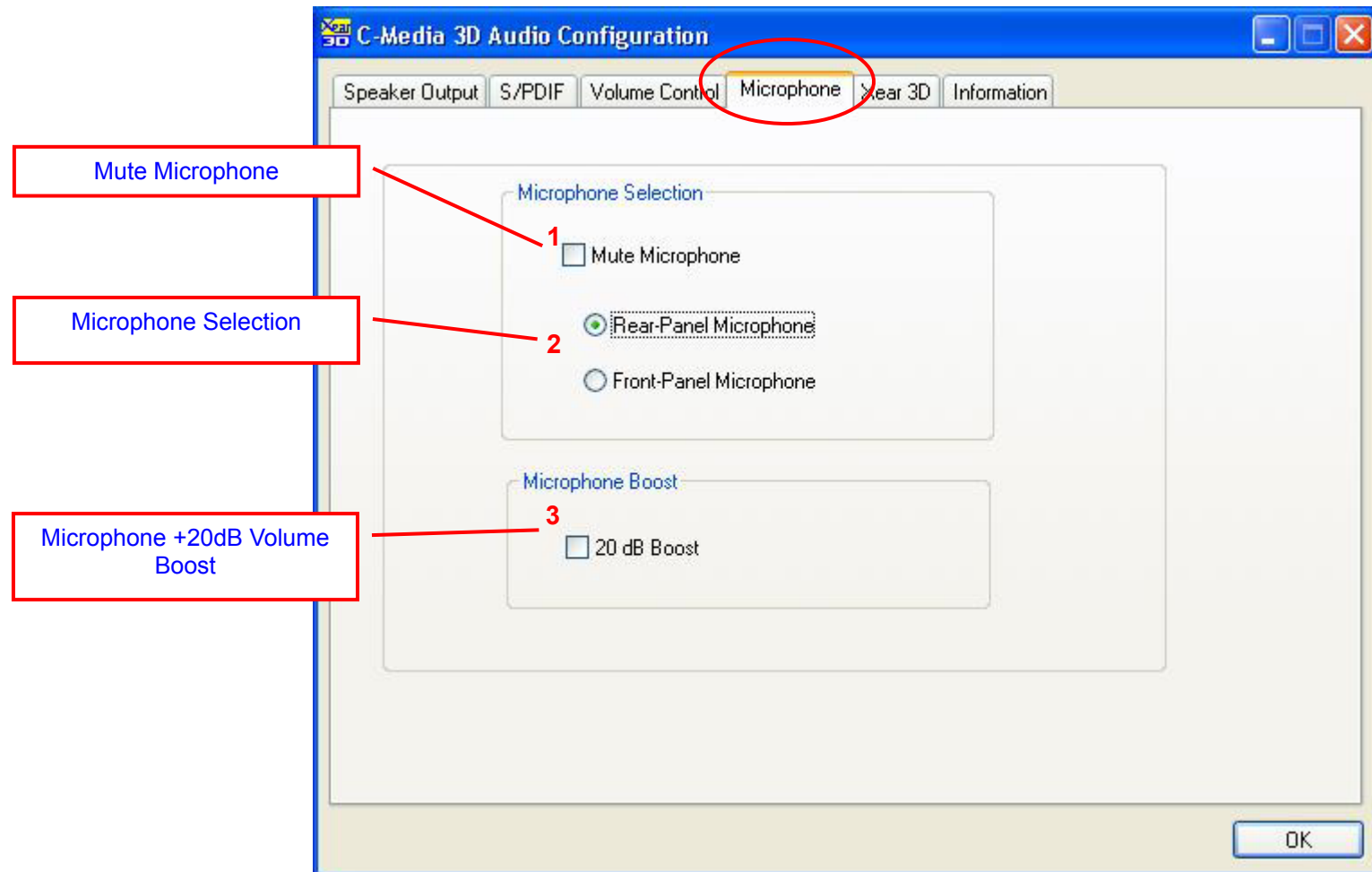
Microsoft® Recording Control

Table 5. Microsoft Recording Control- Function Description

#	Function	Function Description
1	Select One Recording Source	Select one audio path you want to record from. Only one item can be selected for recording.
2	S/PDIF-IN	<p>It means to record the digital PCM audio data from S/PDIF input. Click the “Advanced”, you can see the extra setting item:</p>  <p>“Validity Check” is enabled to check if the S/PDIF input audio is valid PCM audio data or not to get rid of recording noise from AC-3, DTS or invalid audio.</p>
3	Stereo Mix	Stereo Mix is to record all mix of audio sources except S/PDIF-In.
4	Microphone	Select to record Microphone input audio. The “Advanced” setting is the same as playback.
5	CD Player	Select to record analog audio CD Input. Please take the explanation of CD Player in Volume Control section above as reference.
6	Aux	Select to record Auxiliary stereo input. Please take the explanation of Aux in Volume Control section above as reference.
7	Line-In	Select to record line stereo input. Please take the explanation of Line-In in Volume Control section above as reference.
8	Wave	To record the digital playing audio only. If you want to record the playing MP3, digital CD, VCD, DVD, etc., please select to record “wave”.


Microphone

C-Media driver provides microphone setting in 3D Audio Configuration directly for more convenience. You can control microphone options in the tab though you can also reach them in Microsoft volume control.



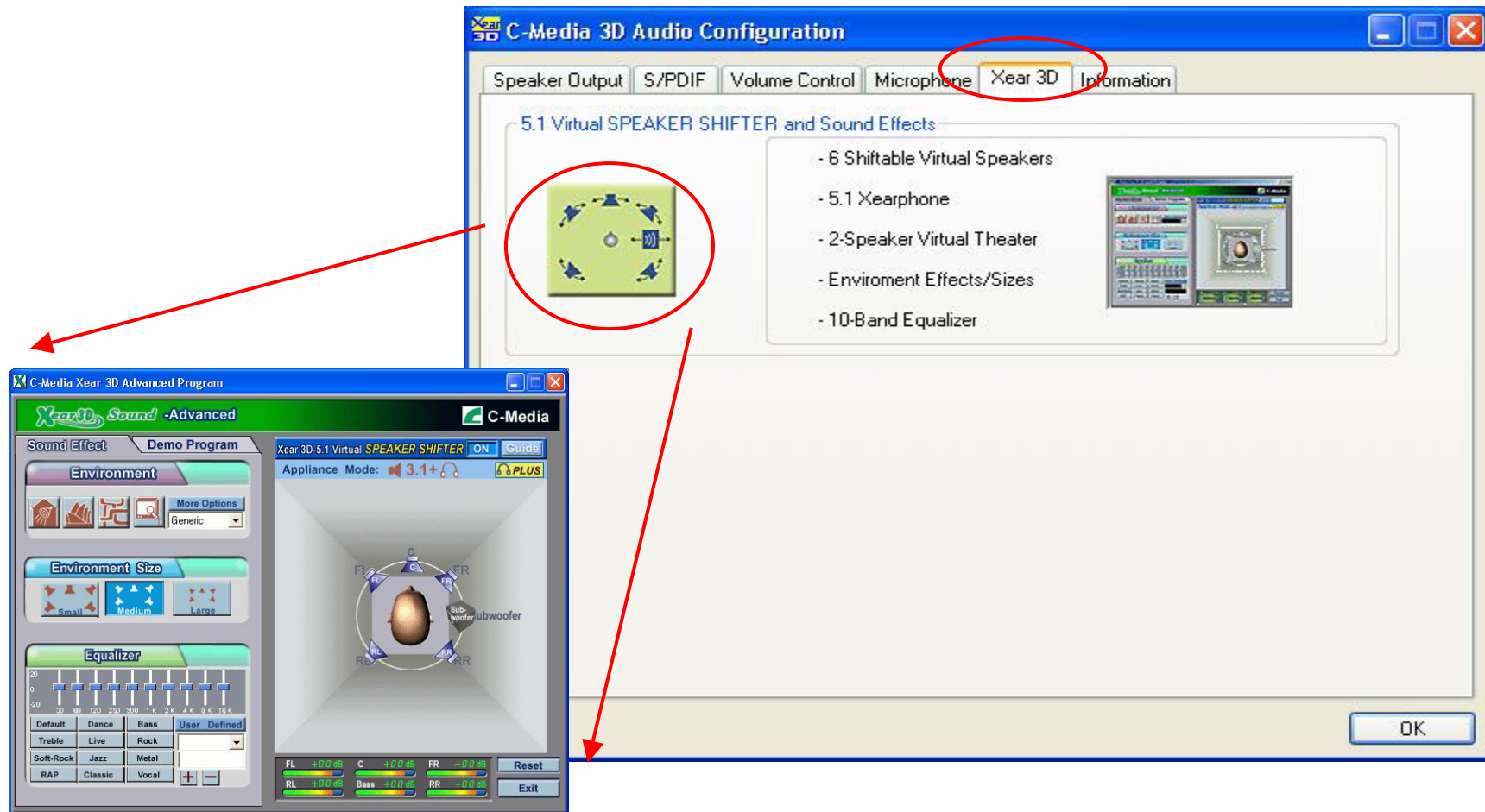
Microphone

Table 6. Microphone- Function Description

#	Function	Function Description
1	Mute Microphone	To click this item will disable microphone inputs.
2	Microphone Selection	<p>To select the microphone input that you are going to use. Some systems do not support 2 microphone inputs and so you won't see two items. The rear-panel microphone jack is sometimes shared by center/subwoofer output and will be grayed like the picture below: when you set 6CH speaker output. At this moment, you can still use front-panel microphone.</p> 
3	Microphone +20dB Volume Boost	Click the item will enhance microphone volume by +20 dB.

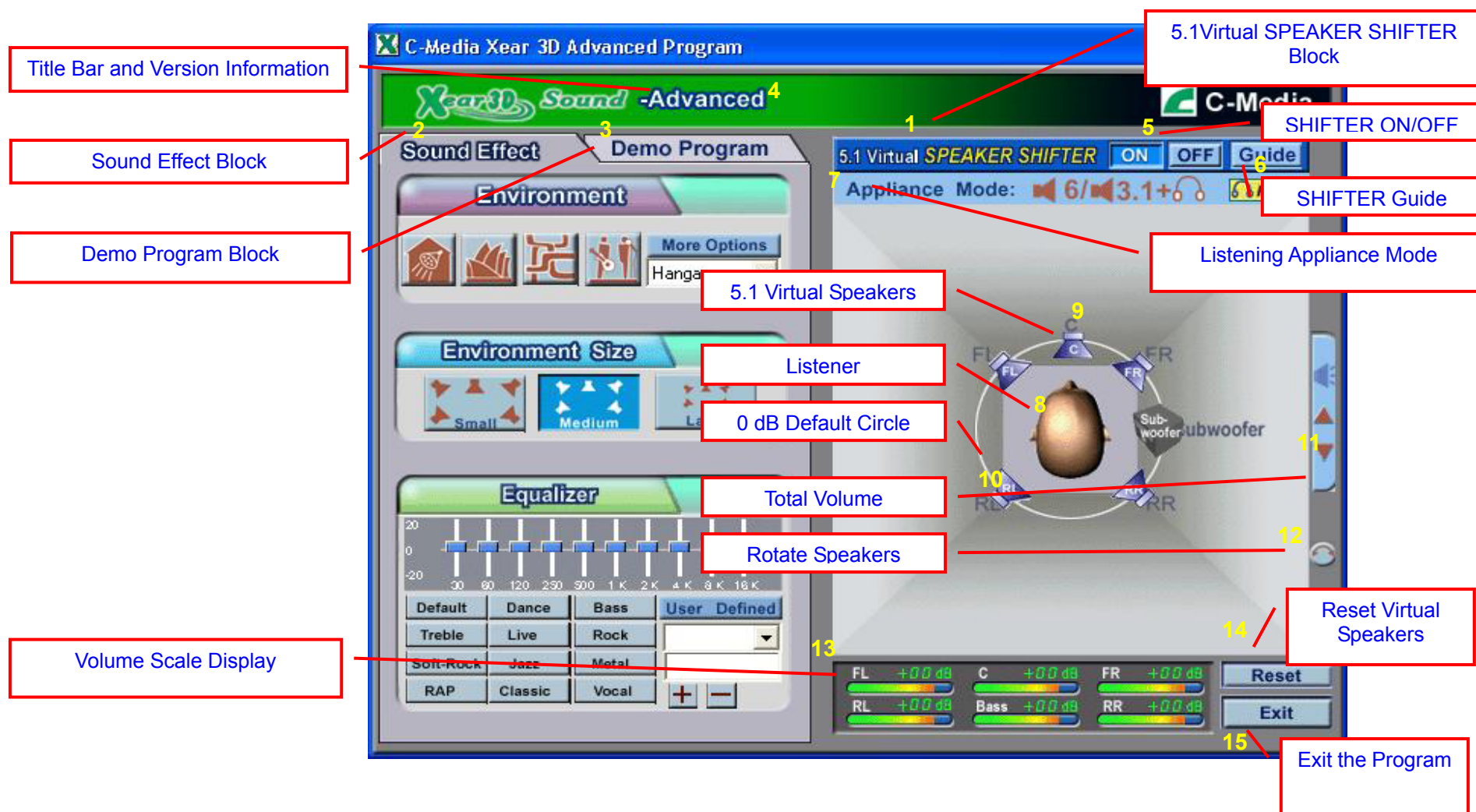
Xear 3D

C-Media UDA driver now supports Xear 3D- 5.1 Virtual SPEAKER SHIFTER and sound effects (Please refer to P.3 introduction). Just click the left button in Xear 3D tab and then the new friendly/fancy graphic user interface will pop up.




Xear 3D– 5.1 Virtual SPEAKER SHIFTER

Xear 3D Advanced Program has three functional blocks: SPEAKER SHIFTER, Sound Effect, and Demo Program. We will introduce SPEAKER SHIFTER first.



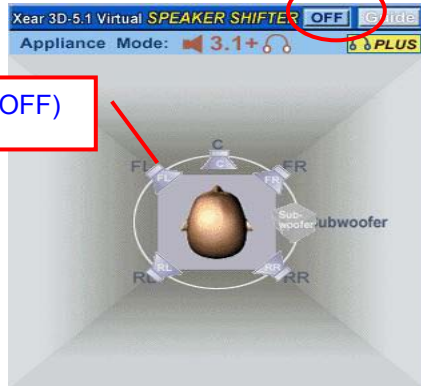
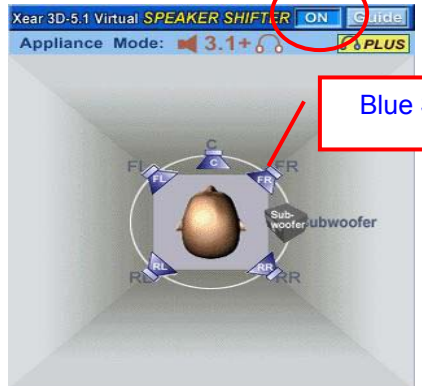
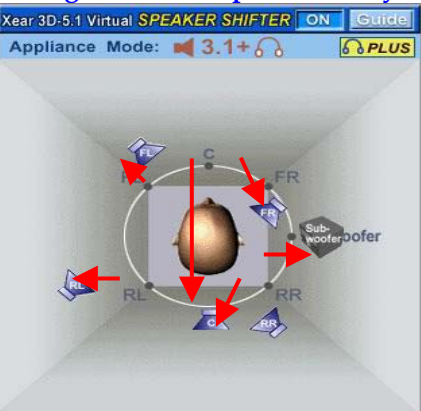
5.1 Virtual SPEAKER SHIFTER

Table 7. 5.1 Virtual SPEAKER SHIFTER- Function Description

#	Function	Function Description
1	5.1 Virtual SPEAKER SHIFTER Block	The SPEAKER SHIFTER block provides an advanced, amazing and considerate feature- dynamically adjustable multi-channel sound system no matter what listening appliance you use and what application you are running. You do NOT have to endure unbalanced speaker placement due to spatial limitation. You can enjoy multi-channel surround sound with even an earphone or usual 2 speakers. Besides, this block will show a reference figure for Environment Size settings that will be described in the following text.
2	Sound Effect Block	This block provides 27 Environment Effects, 3 Environment Sizes and 10-band pre-set Equalizer.
3	Demo Program Block	This block contains multi-channel music (including speakers testing) demo program.
4	Title Bar and Version Information	It's the program title bar and will show version information if you put your cursor on the bar for a while..
5	SHIFTER ON/OFF	Virtual SPEAKER SHIFTER ON/OFF switch. Just click ON/OFF button to turn it on or off.
6	SHIFTER Guide	A live guide for introduction and fine-tune of Virtual SPEAKER SHIFTER. Please listen to the explanation and then try to drag the virtual speakers to anywhere you want for the most balanced and comfortable sound field. Enjoy the interesting Guide. This is just available while SPEAKER SHIFTER is turned ON.
7	Listening Appliance Mode	It depends on and synchronizes with the speaker type you selected. Under 4CH or 6CH, the logo  PLUS will show up and means that the rear speakers can be replaced with open-aired earphones (Earphone Plus listening mode) as long as you turn on SHIFTER. When you select to use earphone only, you can still hear 5.1-channel sound that is so-called 5.1 Xearphone. It's even more flexible than Dolby Headphone [®] since you can shift the multi-channel signals to the best sound field.
8	Listener	This is a top view. Listener's head is a relative position reference for virtual speakers.
9	5.1 Virtual Speakers	There're 6 Virtual Speakers here and they show a typical 5.1 surround sound environment. Every Virtual Speaker represents the positioning of a channel sound signal to the physical speaker. It allows you to shift the signals instead of the speakers whenever you want to adjust the sound field. In addition to the angle change, the sound will decay with the distance between the listener and the speaker. You can see the correspondent volume value in decibels (dB) in the "Volume Scale Display" at the bottom. Please note that if you choose different Environment Sizes, the speakers will enlarge (in Small size) or narrow (in Large size) to express the relative space change.

5.1 Virtual SPEAKER SHIFTER

Table 7. 5.1 Virtual SPEAKER SHIFTER Function Description (Continued)

#	Function	Function Description
9	5.1 Virtual Speakers	<p>When SHIFTER is turned OFF, the Virtual Speakers will be in gray status. When SHIFTER is turned ON, the Virtual Speakers will be turned into blue. The following are the steps to use the Virtual SPEAKER SHIFTER:</p> <p>Step 1: Run any audio applications (DVD, VCD, Games, MP3, CD....)</p> <p>Step 2: Turn On SHIFTER</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Gray Status (OFF)</p> </div> <div style="text-align: center;">  <p>Blue Status (ON)</p> </div> </div> <p>Step 3: Click and drag the virtual speaker to anywhere you want for most comfortable sound field</p> <div style="display: flex; justify-content: space-between; align-items: center;">  <div style="border: 1px solid black; padding: 5px; width: 30%;"> <p>Note: Front-Left, Front-Right, Rear-Left, Rear-Right and Center virtual speakers can be moved to anywhere. Center is usually for voice in DVD and can be adjusted from now on. Subwoofer signal is usually directionless low-frequency sound to human ears. Therefore, just keep it move in horizontal to express strength or weakness.</p> </div> </div>


5.1 Virtual SPEAKER SHIFTER

Table 7. 5.1 Virtual SPEAKER SHIFTER Function Description (Continued)

#	Function	Function Description																																		
9	5.1 Virtual Speakers	When SHIFTER is turned ON, though the Virtual Speakers will all be turned into blue, it doesn't imply all virtual speaker will take effect anytime. It depends on the sound source format and the application program. The virtual speaker won't take effect if that channel has no digital audio. Please refer to the table indicating effective virtual speakers below:																																		
		<table><tr><th rowspan="2">Sound Source</th><th rowspan="2">AP</th><th colspan="4">Speaker Type</th></tr><tr><th>Earphone</th><th>2CH</th><th>4CH</th><th>6CH</th></tr><tr><td>5.1-channel 2D Sound (DVD)</td><td>WinDVD / PowerDVD (Select 5.1 speakers)</td><td>All Effective</td><td>All Effective</td><td>All Effective</td><td>All Effective</td></tr><tr><td>2-channel Stereo 2D Sound (MP3, CD)</td><td>DirectSound Interface (like Media Player, C-Media Media Rack)</td><td>FL, FR</td><td>FL, FR</td><td>FL, FR, RL, RR</td><td>FL, FR, RL, RR, Center, Subwoofer (if "Bass Enhancement" is enabled.)¹</td></tr><tr><td>2-channel Stereo 2D Sound (MP3, CD)</td><td>MCI Interface (Winamp old versions before 3.0)</td><td>FL, FR</td><td>FL, FR</td><td>FL, FR</td><td>FL, FR, Subwoofer (if "Bass Enhancement" is enabled.)²</td></tr><tr><td>3D Sound</td><td>Games</td><td>FL, FR</td><td>FL, FR</td><td>FL, FR, RL, RR</td><td>FL, FR, RL, RR, Center³</td></tr></table>	Sound Source	AP	Speaker Type				Earphone	2CH	4CH	6CH	5.1-channel 2D Sound (DVD)	WinDVD / PowerDVD (Select 5.1 speakers)	All Effective	All Effective	All Effective	All Effective	2-channel Stereo 2D Sound (MP3, CD)	DirectSound Interface (like Media Player, C-Media Media Rack)	FL, FR	FL, FR	FL, FR, RL, RR	FL, FR, RL, RR, Center, Subwoofer (if "Bass Enhancement" is enabled.) ¹	2-channel Stereo 2D Sound (MP3, CD)	MCI Interface (Winamp old versions before 3.0)	FL, FR	FL, FR	FL, FR	FL, FR, Subwoofer (if "Bass Enhancement" is enabled.) ²	3D Sound	Games	FL, FR	FL, FR	FL, FR, RL, RR	FL, FR, RL, RR, Center ³
		Sound Source			AP	Speaker Type																														
			Earphone	2CH		4CH	6CH																													
		5.1-channel 2D Sound (DVD)	WinDVD / PowerDVD (Select 5.1 speakers)	All Effective	All Effective	All Effective	All Effective																													
		2-channel Stereo 2D Sound (MP3, CD)	DirectSound Interface (like Media Player, C-Media Media Rack)	FL, FR	FL, FR	FL, FR, RL, RR	FL, FR, RL, RR, Center, Subwoofer (if "Bass Enhancement" is enabled.) ¹																													
		2-channel Stereo 2D Sound (MP3, CD)	MCI Interface (Winamp old versions before 3.0)	FL, FR	FL, FR	FL, FR	FL, FR, Subwoofer (if "Bass Enhancement" is enabled.) ²																													
3D Sound	Games	FL, FR	FL, FR	FL, FR, RL, RR	FL, FR, RL, RR, Center ³																															
Note: 1. Center speaker is usually for voice in the movies. When playing stereo music, we do not mix stereo music into center channel currently in fear of damage to the stereo directionality.																																				
2. For MCI application program like Winamp, it just can deliver 2-channel stereo sound even you set 6CH. It's only proper for the driver to enhance Bass sound which is directionless.																																				
3. 3D Sound is currently positioned by HRTF 3D Engine at maximum 5 speakers.																																				

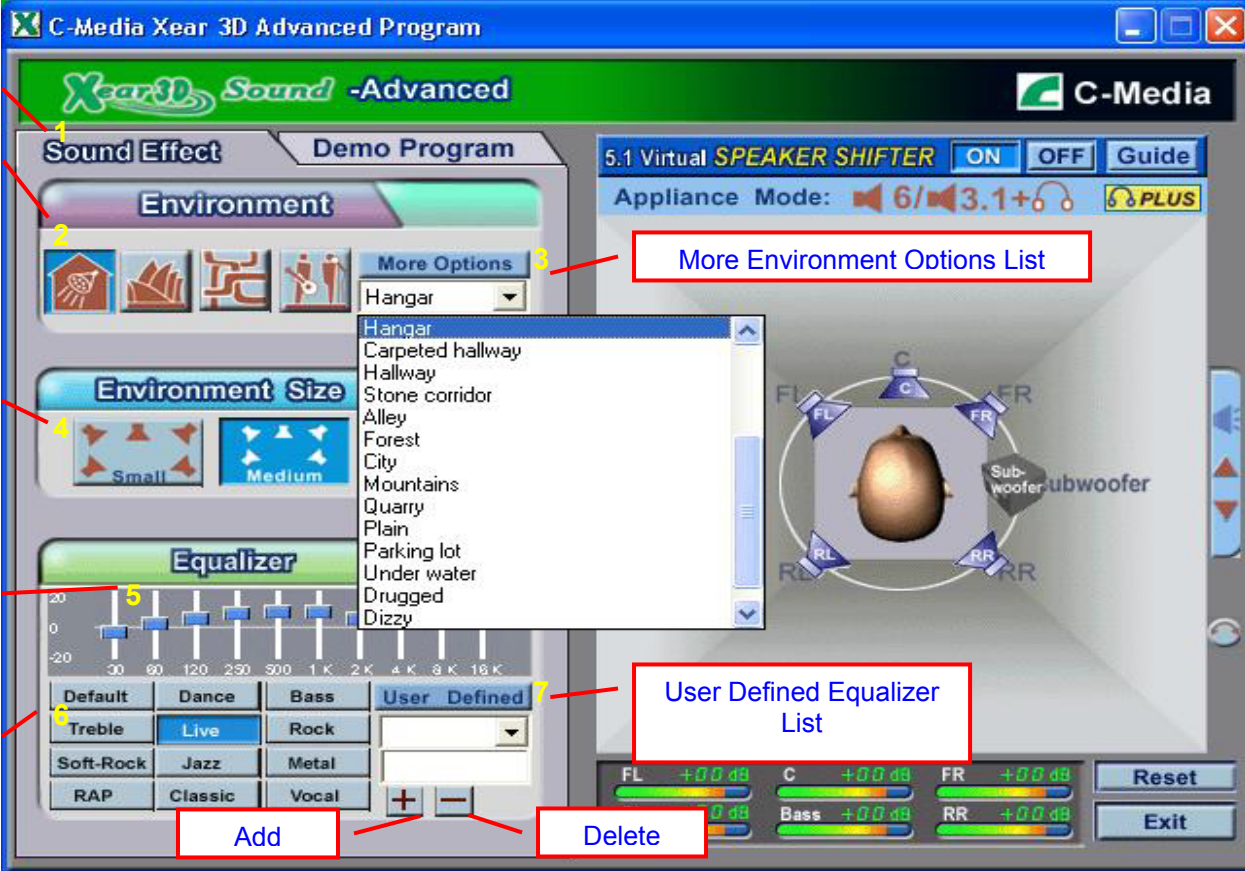
5.1 Virtual SPEAKER SHIFTER

Table 7. 5.1 Virtual SPEAKER SHIFTER Function Description (Continued)

#	Function	Function Description
10	0 dB Default Circle	This circle has 6 default positions for each virtual speaker. On this circle, virtual speakers are on 0 dB reference distance (no extra gain or decline of volume). The volume of each channel will decay when the virtual speaker is far from the circle. On the contrast, it will increase when the virtual speaker is approaching the central listener inside the circle. Please see the “Volume Scale Display” below. Please note that if you choose different Environment Sizes, the circle will enlarge (in Small size) or narrow (in Large size) to express the relative space change and hence the volume will be influenced if SHIFTER is “ON”.
11	Total Volume	Total volume is to move all virtual speakers close to or far from the listener and then change the volume. Up-arrow is to increase volume and down-arrow is to decrease. One step is 1dB.
12	Rotate Speakers	Clicking the button will make all virtual speakers grouped and then you can drag and rotate all speakers simultaneously with the listener as a center. It's useful when you just change your direction of face.
13	Volume Scale Display	Volume Scale Display will show you volume status in dB for each channel depending on each speaker's position. You can take it as a volume balance reference when adjusting the virtual speakers.  <p>Of course, if your actual speakers are not placed in the correct points. You should use virtual speakers to compensate it.</p>
14	Reset Virtual Speakers	Click this “Reset” button to set the virtual speakers back to default positions on the 0 dB circle.
15	Exit the Program	Click “Exit” to close Xear 3D Advanced Program but all sound effect and settings are valid if still in Xear 3D Mode. Once you switch to Common Mode, the program will be automatically closed and all effects are disabled, too.

Xear 3D– Sound Effect

Xear 3D Advanced Program provides another functional block- Sound Effect. You can create a different feeling for your music including 27 Environment Effects, Environment Size & 10-Band Equalizer with 12 pre-set models.








The screenshot shows the 'C-Media Xear 3D Advanced Program' window. It features a 'Sound Effect' tab with 'Environment' and 'Environment Size' sections. A 'More Options' list is open, showing various environments like Hangar, Carpeted hallway, and Under water. Below this is a '10-Band Equalizer' section with sliders and a 'User Defined' list. The interface also includes a '5.1 Virtual SPEAKER SHIFTER' and a 'Demo Program' section.

Callouts and their corresponding interface elements:

- 1**: Sound Effect Block
- 2**: Listening Environment Options: Bathroom, Concert Hall, Sewer Pipe, Music Pub
- 3**: More Environment Options List
- 4**: Listening Environment Size: Small, Medium, Large
- 5**: 10-Band Equalizer
- 6**: 12 Pre-set Equalizer Models
- 7**: User Defined Equalizer List
- Add**: Button to add a new user-defined equalizer model.
- Delete**: Button to delete a user-defined equalizer model.

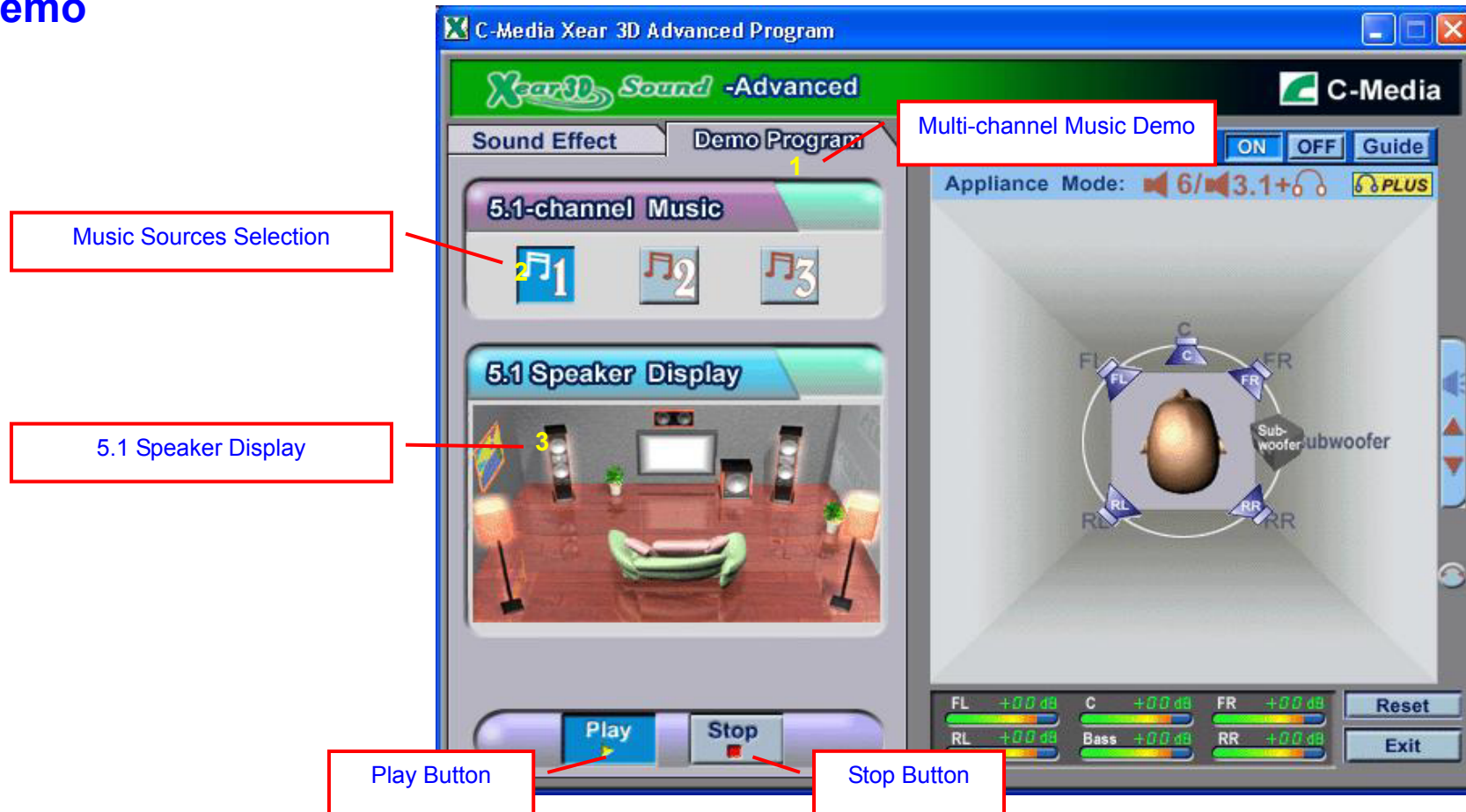
Sound Effect

Table 8. Sound Effect- Function Description

#	Function	Function Description
1	Sound Effect Block	This block provides 27 Environment Effects, 3 Environment Sizes and 10-band Equalizer with 12 pre-set Models.
2	Listening Environment Options: Bathroom, Concert Hall, Sewer Pipe, Music Pub	Environment Effects control the production of sound reflection and reverberation characteristics to simulate the real listening environments. Just click the four environment buttons:  : Bathroom  : Concert Hall  : Sewer Pipe  : Music Pub (Recommended for pops) There are more options in the More Options List. Click the button again will turn it OFF.
3	More Environment Options List	There are still other 23 Environment options in the list. Just choose one and click "More Options" button.
4	Listening Environment Size: Small, Medium, Large	There are 3 Size options for each environment. Different Sizes imply different reverberation parameters to let you feel the space difference. Default setting is "Medium".
5	10-Band Equalizer	We provide 10-Band Equalizer (30~16K Hz) for you to compensate the frequency response of your speakers or to create different frequency response curves. You can move the slider of each band to fine-tune.
6	12 Pre-set Equalizer Models	We also pre-set 12 models of Equalizer for your utilization conveniently. For Example, if you want more live show feeling, just click "Live" button. The same, to click it again can turn it OFF. Default setting is flat (no effect).
7	User Defined Equalizer List	When you have fine-tune a personal model for Equalizer, you can give it a name in the blank and click "+" button. Then it will be save into the User Defined list. Just select it in the list next time you want to use.  Step1: Adjust the 10-band sliders Step2: Key in a new name Step3: Click "+" to Add If you want to delete any item in the list, just select it and then click "-" button.


Xear 3D– Multi-channel Music Demo

Xear 3D Advanced Program also provides plentiful multi-channel music demo program including each speaker testing. Another Play3D demo program will be described later.



Multi-channel Music Demo

Table 9. Multi-channel Music Demo Program Function Description

#	Function	Function Description
1	Multi-channel Music Demo	This demo program provides each speaker testing and three 5.1-channel music. You can get feeling about 5.1-channel surround music and use it to test SPEAKER SHIFTER, too. All demo music/sound here will repeat playing if you don't press "Stop" button.
2	Music Sources Selection	There are three pieces of 5.1-channel music for your selection. Please choose one and click the button.
3	5.1 Speaker Display	<p>This is a 5.1-channel speaker environment. When the speaker has sound, it will be lighted up. You can also click each speaker for testing your connection/configuration. More important, it can assist you in adjusting your virtual speakers for multi-channel audio applications like DVD.</p>  <p>The screenshot shows the 'C-Media Xear 3D Advanced Program' window. It features a 'Sound Effect' tab and a 'Demo Program' tab. Under 'Demo Program', there's a '5.1 Virtual SPEAKER SHIFTER' section with 'ON' and 'OFF' buttons and a 'Guide' button. Below this is the 'Appliance Mode' set to '6'. The main area is titled '5.1 Speaker Display' and shows a 3D virtual room with a green sofa and a TV. Surrounding the room are six speakers labeled FL, C, FR, RL, RR, and Sub-woofer. Red callout boxes provide instructions: 'Step 1: Click each speaker and get one channel sound' points to the FL speaker; 'Step 2: Adjust the corresponding virtual speaker' points to the C speaker; 'Step 3: Repeat for each channel to get the best sound field for you' points to the Sub-woofer. At the bottom, there are volume sliders for FL, C, FR, RL, RR, and Bass, each set to +0.0 dB, along with 'Reset' and 'Exit' buttons.</p>






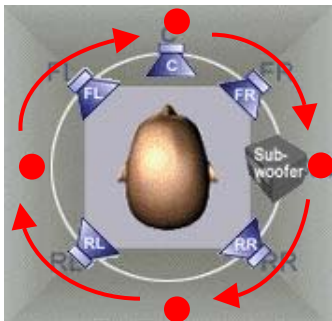
Xear 3D– Play3D Demo

Xear 3D Advanced Program also provides interesting Play3D demo programs as below. After installing the program with setup program, you will find the program from the path: "Start->Programs->C-Media 3D Audio->Play3D Demo".



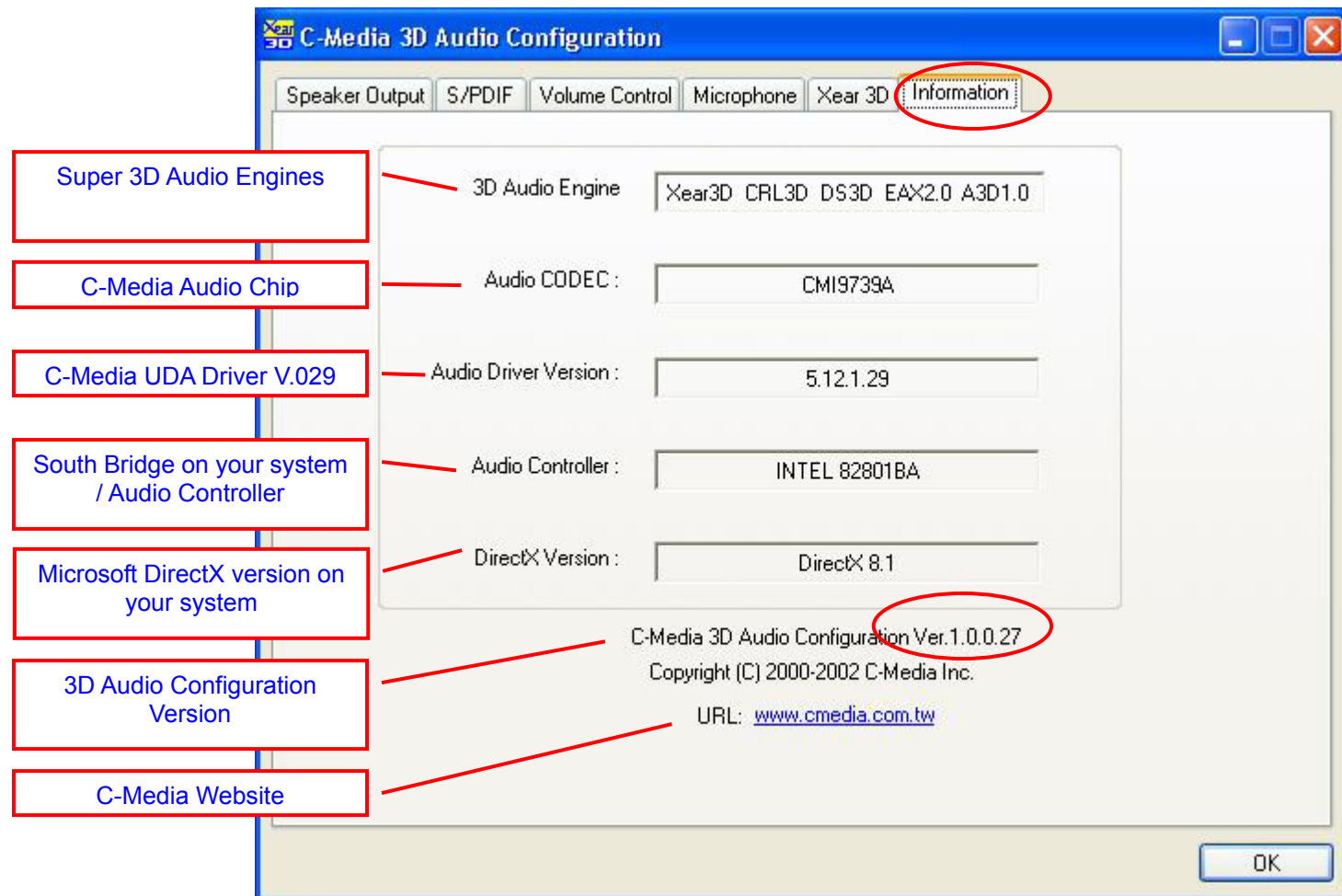
Play3D Demo

Table 10. 3D Sound Demo Program Function Description

#	Function	Function Description
1	Sound Source Selection	There are five 3D sound sources built-in. Just choose one and click the button.
2	User Defined Sound Source	You can also select your own wave file as the sound source (limited to mono or 2ch stereo wave files). Please click the "+" button to select a wave file and the filename will be listed in the User Defined menu. When you want to delete any file, just click "-" button.
3	3D Sound Source Position	The red ball means the 3D sound source. It indicates the relative position to the listener.
4	Moving Path Selection	<p>There are five moving path for your trying:</p> <p>  : Drag Path  : Horizontal Circle  : Vertical Circle  : Z Path  : Random Curve </p> <p>You can also use this program to adjust your virtual speakers before playing 3D audio applications like gaming. We would suggest using the drag path because it's most flexible. Just place the ball in four right-angle directions and see if the sound is from the correct direction. If not, adjust your virtual speakers till the direction sounds right.</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px; border: 1px solid black; padding: 5px;"> <p>Note: It will be better for 3D sound positioning if you use Earphone Plus mode (2 Front Speakers + Rear Earphone) or at least 4 speakers.</p> </div> </div>
5	Environment Setting	You have 6 local Environment Effects on the same page for convenience. It's similar to EAX effect in the 3D gaming.

Information

There is a C-Media audio-related Information tab in 3D Audio Configuration. You can get a whole picture about the audio chip, driver version, 3D Audio Engine, Microsoft DirectX Version, and Configuration Version itself.



5. Output Channel Specification

This chapter will summarize the specification about the actual output channel (the speakers that will have sounds) for different audio applications/sources.

Table 11. Output Channel Specification

Sound Source	AP	Digital S/PDIF-Out	Analog Speaker Type			
			Earphone	2CH	4CH	6CH
5.1-channel PCM Audio (DVD)	WinDVD / PowerDVD (Select 5.1 speakers in the AP audio setting)	Down-mix 6ch to 2ch	Down-mix 6ch to 2ch (Xear 3D Virtual 5.1ch with SHIFTER Xearphone ON)	Down-mix 6ch to 2ch (Xear 3D Virtual 5.1ch with SHIFTER ON)	Down-mix 6ch to 4ch (Xear 3D Virtual 5.1ch with SHIFTER ON)	5.1 ch (FL, FR, RL, RR, Center, Subwoofer)
	WinDVD / PowerDVD (Select S/PDIF-Out in the AP audio setting)	AC-3/DTS Format Data	N.A.	N.A.	N.A.	N.A.
2-channel Stereo PCM Wave Audio (MP3, CD, VCD, ...)	MS Media Player / C-Media Media Rack (Use DirectSound Interface)	2ch	FL, FR	FL, FR	FL, FR, RL, RR	FL, FR, RL, RR, Center, Subwoofer (if "Bass Enhancement" is enabled.)
	Winamp old version (Use MCI Interface by default before V.3.0)	2ch	FL, FR	FL, FR	FL, FR	FL, FR, Subwoofer (if "Bass Enhancement" is enabled.) ¹
2-channel MIDI	All Players	2ch	FL, FR	FL, FR	FL, FR	FL, FR, Subwoofer (if "Bass Enhancement" is enabled.) ¹
3D Sound	Games	2ch	FL, FR	FL, FR	FL, FR, RL, RR	FL, FR, RL, RR, Center ²
Analog Input	May not need players	2ch	FL, FR	FL, FR	FL, FR, RL, RR	FL, FR, RL, RR, Center, Subwoofer ³



- Note: 1. **For MCI application program like Winamp old version, it just can deliver 2-channel stereo sound when playing general stereo music even you set 6CH.** It's only proper for the driver to enhance Bass sound which is directionless. MIDI is in the similar situation. Therefore, you will only get 2-speaker or 2.1-speaker sound (if you enable "Bass Enhancement" option).
2. **3D Sound can be currently positioned by HRTF 3D Engine at maximum 5 speakers (FL, FR, RL, RR, Center).**
3. **In 4CH or 6CH mode, the analog input audio (microphone or stereo input) will be duplicated to rear channels (and center/subwoofer only for CMI9739A new revision) by the hardware copy mechanism.**