HANDBOOK

Leema Acoustics Elements Precision DAC

LEEMA ELEMENTS PRECISION DAC

INPUT   USB 24/192
VOLUME   85

VOL

STANDBY   IR

PHONES   INPUT

INPUT

MENU   MUTE

LEEMA ACOUSTICS

Index

EC Declaration of Conformity
In accordance with EN ISO 17070-1:2004

We   **Leema Electro Acoustics Limited**

of   **Llanfair Caereinion**
Welshpool
Powys
UK

in accordance with the following Directive(s): **2006/95/EC The Low Voltage Directive**   **2004/108/EC The Electromagnetic Compatibility Directive**

hereby declare that: Equipment Hi-Fi digital to analogue converter Model Name **ELEMENTS PRECISION DAC**

is in conformity with the applicable requirements of the following standards

Standard. No.	Name	International Equivalents
BS EN60065; 2002	Electrical Safety Requirements	EN60065; 2002 / IEC60065; 2001
BS EN 55020; 2002	EMC Immunity	EN55020; 2002 / CISPR 20; 2002
BS EN 55013; 2001	EMC Emissions	EN55013; 2001 / CISPR 12; 2001
BS EN 61000-3-2; 2001	EMC Limits for Harmonic Emissions	EN61000-3-2; 2000 / IEC61000-3-2; 2000
BS EN 61000-3-3; 1995	EMC Limits for Voltage Fluctuations	EN61000-3-3; 1995 / IEC61000-3-3; 1994

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all applicable Essential Requirements of the Directives and Standards.

Signed by: ....

Name: Mallory Nicholls
Position: Technical Director
Done at: Leema Electro Acoustics Ltd.
On: 08/08/2011

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Introduction

Congratulations on your purchase of a Leema Elements Precision DAC.

The Leema range of products has been painstakingly engineered in the United Kingdom to offer genuine state-of-the-art performance.

Partnered with suitable equipment, Leema products will provide audio performance far beyond that of competitors and will equal or better the performance of products costing many times their purchase price.

Purchasers should read and follow this instruction manual, paying particular attention to the user installation and safety advice section.

This manual has been written to enable you to achieve the very best performance and maximum listening pleasure from your investment.

We wish you many years of pleasurable listening... Move Your World!

With best regards

The Leema Team.

VERY IMPORTANT

Before connecting your new Leema Precision DAC to the rest of your system, please ensure all required input and output cables are connected BEFORE inserting the mains power lead and powering for the first time.

User installation and safety advice

Please ensure that the mains voltage of your new Elements Precision DAC is correct for your region. The setting is displayed on a label above the mains power inlet. The mains voltage setting is not user adjustable, therefore the DAC must be returned to the manufacturer if any changes are required.

Ensure the mains supply is switched off at the wall socket, or unplugged before installing or moving the DAC.

Do not use near water, for example do not place a potted plant on top of the unit or allow drinks to be placed near the unit. If liquid is spilt in to the cabinet, remove the mains lead from the wall immediately. The DAC should then be returned to your dealer for safety testing before re-use. Failure to do so may result in electric shock or even fire! Do not use the DAC in damp conditions, e.g. outside of the house.

Keep away from direct sunlight and other heat sources and ensure adequate ventilation around the DAC to maintain proper cooling. Units **MUST NOT** be stacked directly on top of each other.

Never attempt to open the cabinet. There are no user adjustable parts inside and doing so will invalidate the product warranty.

In the event of an electrical storm, remove the mains power lead from the wall outlet.

Elements Precision DAC overview

The Leema Elements Precision DAC is a microprocessor controlled, high-performance DAC. It is capable of class-leading performance at the heart of an audiophile stereo system, but thanks to the LIPS (Leema Intelligent Protocol system) interface, it can also form part of a sophisticated audio and home cinema system. Each component in the system dynamically configures in real time depending on the requirements of each input source. The microprocessor gives an unprecedented degree of sophistication, making Leema products easy to use for all the family.

Environmental Issues

Leema operates a 100% recycling program. All waste materials generated as part of the manufacturing process are recycled via a licensed specialist company. The power drain from all Leema electronics, in standby or power off modes, has been optimised to a negligible level. All Leema products have been designed to attain full operational specifications and sound quality within a few minutes of switch-on.

Made in the UK

Leema electronics are designed and manufactured in the UK.

Contact Us

Leema may be contacted via our website: www.leema-acoustics.com or by telephone: +44 (0)1938-811900

Rear Panel

Balanced Outputs

Balanced connection is possible with a suitably equipped amplifier, such as an Elements Integrated.

'LIPS' connectors

The LIPS system allows communication between separate Leema units.

Digital Connectivity

Three 24bit 96kHz optical inputs to the 24 bit 192kHz DACs are provided, along with Three coaxial inputs and a USB connector for use with a computer. These inputs are 24bit 192kHz capable.

DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE
DO NOT USE IN DAMP CONDITIONS
NO USER SERVICEABLE PARTS INSIDE
REFER TO QUALIFIED SERVICE PERSONNEL

THIS UNIT MUST BE EARTHED

| CAUTION | VORSICHT |
REMOVE POWER BEFORE OPENING | VOR DEM ÖFFNEN NETZSTECKER ZIEHEN

CE

SERIAL NUMBER ON UNDERSIDE

USB

OPT 1   OPT 2   OPT 3

MAINS INPUT

LIPS

L   L

R   R

COAX 1   COAX 2   COAX 3

LEFT BAL   OUTPUTS   RIGHT BAL   INPUT   DIGITAL INPUTS

FUSES: 2AT-230v 4AT-115v

230 VAC ∿ 50/60Hz 60W MAX

RCA/Cinch Output

Standard unbalanced output via RCA/Cinch connectors to a pre-amplifier or integrated amplifier such as a Leema Elements Integrated

Analogue input

This input can be used by a stereo analogue source such as a TV, a radio or a CD player

Power Inlet

Ensure that the specification indicated below the connector is correct for your area. Voltage rating is not user adjustable.

Connections

Analogue Input connections

RCA/Cinch> A pair of RCA connectors for analogue connection are provided on the rear panel. The rear RCA/Cinch and the Jack input on the front panel operate in parallel and share a single analogue input to the DAC.

Jack> The Elements Precision DAC's **Jack** input, on the front panel, can be connected directly to any line level analogue stereo source. Some devices such as MP3 or hard disk based portable players have a comparatively low output which will require the Elements Precision DAC's volume control (if enabled) to be set at a higher position than would normally be required.

Digital connections.

OPT 1/OPT 2/OPT 3> These inputs may be connected to digital optical outputs carrying a SPDIF (PCM) **stereo** data stream, such as satellite TV boxes, Freeview TV boxes, games machines etc. Ensure that the data stream is not multi-channel, such as AC3. The DAC can decode all data rates up to and including 24bit/96kHz.

COAX 1/COAX 2/COAX 3 > These inputs may be connected to digital coaxial outputs carrying a SPDIF (PCM) **stereo** data stream, such as satellite TV boxes etc. Ensure that the data stream is not multi-channel, such as AC3. The coaxial inputs support data rates up to and including 24bit/192kHz

USB > A computer may be connected here for playback. The USB decoder supports formats up to 24 bit/192kHz.
It may be used for streaming playback. Please refer to page 21 for more details.

Output connections

LINE OUTPUTS > Line outputs to the pre-amplifier or power amplifier are available in both balanced mode, via two XLR sockets, one for left and one for right, or unbalanced (single ended) mode via a pair of RCA/Cinch sockets.

HEADPHONE OUT> A headphone output is available on the front panel. The output uses a 3.5mm mini-jack as found on personal stereo headphones. Headphones should have a minimum impedance of 32 Ohms. When this output is in use, the loudspeakers are muted. It is advisable to unplug headphones before powering down the DAC.

LIPS connection

LIPS cables are directional and have one black end and one red. If the Elements Precision DAC is controlling other units, the black connector should be plugged in to either LIPS socket on the Elements Precision DAC and the red connector plugged in to the next component. If the Elements Precision DAC is to be controlled, the black connector is connected to the master device and the red connector is plugged in to either LIPS socket on the rear of the Elements Precision DAC.

Cables

Never underestimate the importance of good quality interconnecting cables. The higher the system resolution, the more easily the differences between cables can be discerned. Leema recommend Leema Linx cables for optimum system synergy.

Front panel controls

Power

The Power button toggles the Elements Precision DAC between Power On and Off. If a LIPS connection is used, the power status of any other Leema components connected via LIPS will also be controlled.

Volume Control

The Elements Precision DAC can be used simply as a DAC with selectable inputs but no volume control, or as a combined DAC and pre amplifier with volume control. The output mode is configured in the setup menu. Please see page 16.

Source selection with Volume Control

The input source is selected with the rotary Volume/Input control. The default setting for this control is "Volume" (**if selected in the setup menu**) and the display highlights the current selected volume level with a chevron >. However, simply pressing the knob once, switches the control over to Input selection, again highlighted with a chevron >. The input options are shown sequentially on the display when the volume/input knob is rotated. To switch back to volume, simply leave the control alone and after a few seconds the volume function will be enabled. If you wish to action the selection sooner, press the knob to return to volume mode.

The Volume control adjusts the volume via an Analogue Devices precision attenuator under microprocessor control. This method of volume control permanently ensures the highest fidelity without the gradual degeneration of conventional motorised volume controls. The volume control also regulates the pre-out volume.

Note: Small clicks in the audio during volume changes are normal.

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Source selection without Volume Control

The input source is selected with the rotary Volume/Input control. The input options are shown sequentially on the display when the volume/input knob is rotated. To select an input simply turn the Volume/Input knob until the desired input is displayed. The system will switch to the displayed input after a second or two.

Mute

Pressing the Mute button while the system is playing will rapidly fade the volume to zero. Simply re-press to restore the volume.

Menu

Pressing the Menu button will enter the setup menu. The button will illuminate while in the menu pages. Press again to leave the setup menu and save your selections.

Elements Remote Control Precision DAC commands

Power
There are two power buttons. The red button (ALL) turns all the units in a Leema Elements system on or off simultaneously. The blue power button (IND) allows units within an Elements system to be turned on or off independently by first selecting the required device button (CD, AMP or DAC) then pressing the blue power button. When powered on, the unit initialises then, if applicable, the previous input selection will be restored and the volume set to a low level.

Mute
Pressing the mute button once while the system is playing will cause the volume to rapidly fade to zero; --- is then displayed. A second push of the button will restore the volume level.

Input
The input - and + buttons cycle through the available input sources, one-button push at a time. The audio mutes for a fraction of a second between selections. Inputs may also be selected directly by using the numeric buttons. Note that the DAC button must have been pressed previously for these buttons to address the Elements Precision DAC.

Volume
This function only operates if the DAC has it's volume mode enabled or is operating as a LIPS master for an amplifier connected via LIPS.

Two buttons, one for up (+) and one for down (-) control the volume. Short presses on the volume buttons will change the volume in small increments. Press and hold the volume up or down buttons to smoothly raise or lower the volume.

Setup Menus

1> INPUT NAMES

All input names are fully editable.

Explanation > The rear panel is labeled optical IN 1, IN 2, IN 3, etc. These are the default names used by the firmware, however, the name may be changed as the user requires to make it easier to identify an audio source.

For example, if a satellite receiver is connected to the optical input 1, this input could be renamed to SAT' .

EDITING AN INPUT NAME

Press the MENU button.
Using the volume knob, locate item 2, INPUT NAMES" and select by pressing the knob.
Rotating the volume knob, locate the input name to be edited.
Press the volume knob.

The display will now show:

EDIT   :input name>
ALIAS: Original name>

Notice that the first letter of the input name is flashing as a block.

Input name editing continued

To change the letter, press the volume knob. The letter will now be underlined. Rotating the volume knob will scroll through the available letters and symbols. These are: ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789\-+:,

When the required letter or symbol has been located, press the volume knob. This will return the display to a flashing block. The volume knob can now be used to locate the next letter to edit. Repeat the process until the name is displayed as required.

Finally, press the MENU button to exit the editor and once again to exit the MENU function. During the edit process, the original name (as used on the rear panel) is shown as ALIAS for reference.

2 > CD INPUT SETUP

Options:

1: No CD
2: Analogue
3: Coax 1
4: Coax 2
5: Coax 3
6: Optical 1
7: Optical 2
8: Optical 3

Explanation> The Elements Precision DAC can be used with an Elements CD player as a two box CD solution. This menu defines which digital input is to be used by the CD transport.

3> DISPLAY MODE

Options

1: Volume Bar

2: DAC Status

Explanation> This menu selects between the two available display layout options. "Volume bar" displays a conventional graphic representation of volume level, shown as a variable length rectangle extending from left to right, together with a reduced set of information regarding the incoming digital stream.
"DAC Status" displays the volume level numerically in the top left corner of the display which allows extended information about the incoming digital stream to be displayed.

4 > LCD OFF TIME

Options:

1: ALWAYS ON
2: OFF 5 SECS
3: OFF 10 SECS
4: OFF 30 SECS

Explanation > Many users prefer to turn off LCD displays on audio or aesthetic grounds. It is possible to define an automatic shutdown period for the LCD display. The LCD will then shutdown after the preset period has elapsed following the use of any controls. If a control or the remote handset are used subsequently, the display will power back up for the defined period. Note that the display is locked on when using the menu system.

5 > LIPS Setup

Options:

1: DAC
2: OFF
3: PREAMP

Explanation > The Leema Precision DAC can be used within a Leema LIPS connected system as a conventional DAC only, or as a preamplifier with analogue volume control. Select the appropriate option for your system. If LIPS is not required then simply select OFF.

6 > INPUT VOLUME DROP

Options:

1: DROP IP VOL
2: DON'T DROP

Explanation > By default, all Leema amplifiers reduce their volume to a low level when the input is changed. This protects the speakers (and user) from unexpected high volume levels.
However, some users prefer the input level not to drop when the input is changed. In this case select DON'T DROP. Please note, this mode should be used with caution.

7 > **OUTPUT MODE**

Options:

1: VARIABLE VOL
2: FIXED VOLUME

Explanation> Enables the built in analogue volume control for when the Elements Precision DAC is being used as a pre-amplifier. OPTION TWO MUST ONLY BE SELECTED WITH EXTREME CAUTION AND WITH NO AUDIO SOURCE RUNNING.

8 > **SYSTEM RESET**

Options:

1: DON'T RESET
2: LEAVE NAMES
3: RESET ALL

Explanation > Allows the system to be quickly reset to factory defaults.

Option 1 will not reset and will exit the reset sub menu.

Option 2 will reset all menu options but leave edited input names.

Option 3 will reset all menu options and reset input names to defaults.

DAC

The high-performance DAC uses a class leading Wolfson digital receiver in conjunction with Leema's usual choice of Crystal CS434x DAC. The DAC is followed by analogue filters which are optimised for time, as well as amplitude performance. Leema do not use variable filter characteristics for high sample rate audio. The reason for such high bit rate recordings is to get more data and therefore more audio information in to the audio band as perceived by humans. Allowing high levels of ultra sonic audio through the system is a nonsense unless you are a bat.

The DAC offers 24bit/192kHz performance with excellent audio quality and very low jitter.

USB CODEC

Please refer to the Leema digital board section of this manual, starting on page 21.

The following section is intended for installers, system integrators and third party manufacturers.

What is LIPS?

LIPS or Leema Intelligent Protocol System, facilitates communication between various items in a Leema audio system. It allows units such as the Elements Integrated and Tucana II, to control other items in a chain. Leema's 5.2 surround system is a good example, where a Tucana II controls a Hydra II and Corvus. Key information including volume level, input selection and power control is passed through the bus enabling other units to operate in synchronisation. Intelligence is added within each receiving unit, for example, a Hydra II installed as part of a surround system 'knows' that it won't be required when listening to a stereo source such as CD. Therefore, when the Hydra II 'sees' the CD input, it powers itself down.

Each Leema unit can be controlled via the LIPS bus. Controlling an Elements Integrated externally for example, enables it to be used within a home automation system.

LIPS Specifics

The LIPS bus is driven by an open-drain output. Leema can supply a full RS232 interface if required. The communication standard follows the common RS232 format of No Parity, 8 data bits and 1 stop bit. The baud rate is 38400.

LIPS Packets

Each communication on the LIPS bus contains a packet of four data bytes as follows:

First a header is sent with a value of 255. This alerts the receivers to incoming data.
Next, a command header is sent. For a volume command, this would be 40.
Next, a value relating to the command is sent. For volume this would be 0 to 248.
Finally a tail byte is sent with a value of 0.

Infra-red codes. For further information, please contact Leema Technical Support.

The following codes may be used to program universal remotes in Sony 12 bit protocol:

IR DEVICE = 20 (DAC)
IR Commands:

0 to 7 = NUMERIC SOURCE ENTRY, 0=ANALOGUE, 1, 2 AND 3 = COAXIAL INPUTS 1, 2, AND 3, 4, 5 AND 6 = OPTICAL INPUTS 1, 2, AND 3, 7= USB, 16 = INPUT UP, 17 = INPUT DOWN, 18 = VOLUME UP, 19 = VOLUME DOWN, 20 = MUTE TOGGLE, 21 = POWER (TOGGLE), 84 = DISPLAY (TOGGLE).

Audio Specifications

Frequency response, 20Hz to 20kHz +/- 0.25dB.
Distortion at 1kHz, better than 0.001%
Crosstalk at 20kHz, better than -95dB.
THD at 0dBFs, better than 0.005%
Jitter at 1kHz, less than 50ps.
Output levels in fixed gain mode, 0dB at 1kHz, unbalanced=2.1v rms, balanced = 4.2v rms

DAC: Quattro 24bit/192kHz with low jitter receiver. Leema USB-M1 24/192 Module.

Specifications subject to change without notice.

WEEE Scheme

Disposal of Electronic Equipment in the European Union and other countries with collection procedures:

The wheelie bin symbol on this product indicates that it shall not be treated as household waste. It should be disposed of via a collection point for the recycling of electrical and electronic equipment. Leema is fully registered under WEEE/HK 0757 ZX

HANDBOOK

Leema Acoustics Elements Digital Interface Board

LEEMA ACOUSTICS

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Table of Contents

Environmental Issues

Leema operates a 100% recycling program. All waste materials generated as part of the manufacturing process at Leema's headquarters are recycled via a licensed specialist company.

Although Leema electronics operate in standby mode as opposed to being fully switched off, the power drain has been optimised to a negligible level. Contrary to popular audiophile practice, we do not recommend leaving our products permanently powered. All Leema products have been designed to attain full operational specifications and sound quality within a few minutes of switch-on.

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Made in the UK

Leema electronics are designed and manufactured in the UK. This includes metalwork and packaging.

Contact Us

Leema may be contacted via our website: www.leema-acoustics.com or by telephone: +44 (0)1938-811900

Introduction

Congratulations on your purchase of Leema's class-leading Precision DAC.

The Leema range of products has been painstakingly engineered in the United Kingdom to offer genuine state-of-the-art performance.

Partnered with suitable equipment, Leema products will provide audio performance far beyond that of their competitors and will equal or better the performance of products costing many times their purchase price.

The Elements Precision DAC provides playback for SPDIF and USB digital sources. The board comprises two separate interfaces, one for SPDIF sources and one for USB playback. The SPDIF interface offers three co-axial inputs via RCA (Cinch) connecters and three optical inputs using standard TOSLINK type connectors. Both interfaces offer all common sampling rates, the Toslinks, from 32kHz to 96kHz at 16 and 24 bit resolution. The coaxial and USB inputs offer all of the common data rates from 32kHz to 192kHz at 16 and 24 bit resolution. The USB interface operates in asynchronous mode using Leema's own hardware platform and firmware. The interface provides full electrical isolation from the source computer, ensuring that noise from the computer's power supply does not degrade the audio performance. Both interfaces feature ultra-low jitter, due to their precision master clocks.

Purchasers should read and follow this instruction manual, paying particular attention to the hardware and driver installation sections.

This manual has been written to enable you to achieve the very best performance and maximum listening pleasure from your investment.

We wish you many years of pleasurable listening… Move Your World!

With best regards.

Windows® USB Driver

A driver is provided for use with the Microsoft Windows® operating system. The driver supports all versions of Windows from XP to Win7 in 32 bit and 64 bit versions (with current service packs). If the user has an option, Win7 is preferred. The driver <u>must</u> be installed if the Elements Precision DAC is used with Windows, otherwise the unit will not be installed correctly by the operating system.

Apple OSX® and Linux® operating systems do not require an additional driver.

Driver Installation

The driver is supplied on CD.

Step 1. Ensure that the USB port on the rear of the Elements Precision DAC is connected to a high speed USB port on the computer. Note that the port must be high speed - the Elements digital interface cannot be used on a full speed port.

Step 2. Ensure that the Elements Precision DAC is powered on.

Step 3. Insert the CD into the computer's CD drive and navigate to the Leema USB Audio Driver folder.

Step 4. Double click 'setup.exe' and follow the instructions on screen.

The following screen shots show a Windows 7 installation. Installation in other Windows versions is similar.

Asynchronous USB

Leema Acoustics are one of only a select few manufacturers that can offer the very highest quality audio playback via USB by invoking a system called Asynchronous playback.
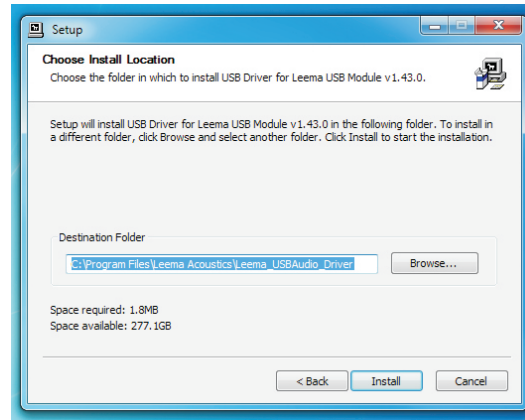
In a conventional USB playback scenario, the computer varies the speed of the digital audio stream out of its USB port to suit itself. The DAC has no option but to slavishly follow this variable data rate. This is not a suitable method for producing high quality audio since it results in high jitter which in turn results in distortion.

Asynchronous USB playback requires the DAC to accurately regulate the data output speed of the computer in order to practically eliminate jitter based distortion.
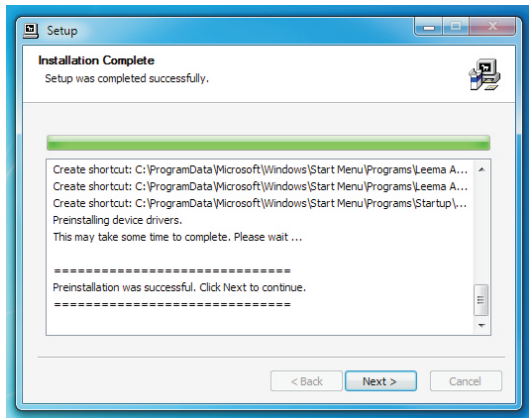
In practice this is a very complex task and requires the computer to have a free USB 2.0 port, connected to the DAC via a suitable high speed USB 2.0 cable. The Leema Precision DAC is a USB high speed device which upon connection, invokes the USB ports high speed mode. This mode is only available under USB 2.0.   Windows does not natively support High data rate audio formats, hence the need for a driver to be installed.
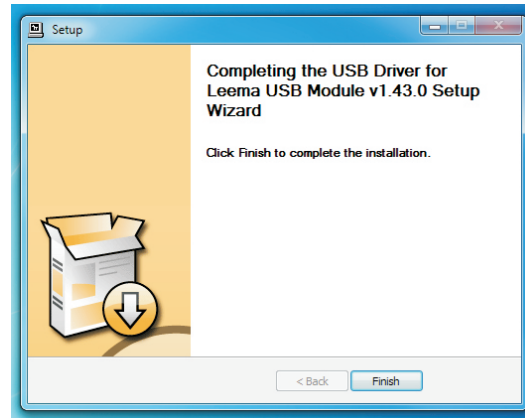
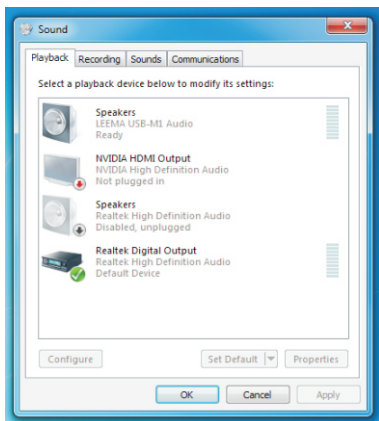The Installation Welcome Screen

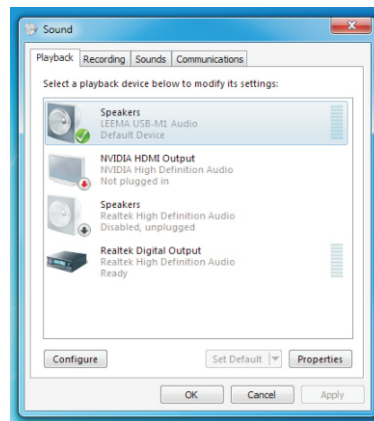Choose a location for the installation
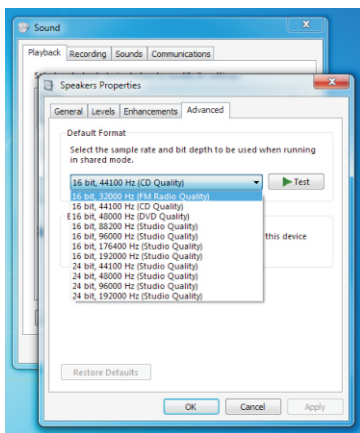

Completing the Installation

Leema USB-M1 shown in audio devices

Select USB-M1 and set as default

Available sample rates shown in Windows 7

Note: In Windows XP, the sample rate cannot be changed in Properties. In this version of Windows, the sample rate can only be selected in the application in use.

To ensure that Windows does not re-sample the audio causing a loss in quality, select a sample rate which matches the audio material to be played.

If the program is able to use an ASIO driver, select the Leema ASIO driver in the application.

Using the ASIO driver will give the best quality playback.

Finalising Driver Installation

In some versions of Windows, the machine must be re-booted after driver installation, so this is recommended.
If the Leema USB-M1 is still not found, switch off the amplifier and then switch back on. This will cause the USB device to detach and re-attach. The operating system should then find it and configure the driver.

Using the USB interface

The USB interface can be used for playing audio from media players such as Windows Media Player etc.
It may also be used to render audio playback from applications such as Spotify™ and Napster™.

Note that the USB interface is a playback only device - It is not possible to record using the USB connection.
To assemble recordings on the PC, it is better to RIP CDs or use downloads including the high resolution offerings from companies such as HD Tracks.

The USB interface can be used with all sample rates from 32kHz to 192kHz at 16 or 24 bits.

SPDIF Interface

The SPDIF interface offers three optical inputs, which can operate at all of the standard data rates between 32kHz and 96kHz at 16 or 24 bit. The three co-axial RCA (Cinch) inputs may be used with sample rates from 32kHz to 192kHz at 16 or 24 bits. All sample rates from 32kHz to 96kHz are configured automatically.

Cables

Use a dedicated SPDIF or video cable to connect an SPDIF source. Using an audio cable will degrade the data.

EC Declaration of Conformity

In accordance with EN ISO 17070-1:2004

We   **Leema Electro Acoustics Limited**

of   **Llanfair Caereinion**
                        Welshpool
                        Powys
                        UK

in accordance with the following Directive(s): **2006/95/EC The Low Voltage Directive**   **2004/108/EC The Electromagnetic Compatibility Directive**

hereby declare that: **Equipment: Digital Audio Interface Model Name: USB - M1**

is in conformity with the applicable requirements of the following standards

Standard. No.	Name	International Equivalents
BS EN60065; 2002	Electrical Safety Requirements	EN60065; 2002 / IEC60065; 2001
BS EN 55020; 2002	EMC Immunity	EN55020; 2002 / CISPR 20; 2002
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I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all applicable Essential Requirements of the Directives and Standards.

Signed by: ....

Name: Mallory Nicholls
Position: Technical Director
Done at: Leema Electro Acoustics Ltd.
On: 31/8/2011

CE 11