

dCS Puccini U-Clock
System Clock with 24/192 USB Converter

User Manual
Software Release 2.0x

July 2013

© Data Conversion Systems Ltd. 2008-2013

Price UK £8.00 / Euro 12.00

All rights reserved. No part of this publication may be reproduced, stored in or introduced into a retrieval system, or transmitted in any form, or by any means (electronic, mechanical, photocopying, recording or otherwise) without the prior written permission of *dCS*¹. Any person who does any unauthorised act in relation to this publication may be liable to criminal prosecution and civil claims for damages.

Information contained in this manual is subject to change without notice, and whilst it is checked for accuracy, no liabilities can be accepted for errors.

¹ *dCS* is Data Conversion Systems Ltd. Company registered in England No. 2072115.

Contents

Using the dCS Puccini U-Clock for the first time.....	4
What's in the box?	4
Positioning the unit	4
Safety Notice	5
Patent Pending	5
Step-by-Step Guide	6
Preliminaries	6
The GOLDEN RULES for using a System Clock	6
Using the <i>Puccini U-Clock</i> with a <i>Puccini Player</i>	7
Setting up the USB source	8
A word about Music Playing Software	8
Setting the USB Audio Class	8
Loading the Windows drivers for USB Class 2	9
Selecting the <i>Puccini U-Clock</i> as your Audio Output device	9
Using the <i>Puccini U-Clock</i> with a <i>Paganini Transport & DAC</i>	10
Front Panel.....	11
DITHER Button	11
FREQUENCY Button	11
POWER indicator	11
Rear Panel	12
Mains Inlet	12
Word Clock Outputs	12
SPDIF Outputs	12
USB Input	12
Serial Number Label	12
Specification	13
Maintenance and Support.....	14
Service and Maintenance	14
Replacing a Blown Mains Fuse	14
Cleaning the case	14
Limited Warranty	15
Software	16
Which Software Issue is loaded?	16
Updating the Software	16
Software History	17
If you need more help	17

USING THE *dCS Puccini U-Clock* FOR THE FIRST TIME

Congratulations on purchasing your *dCS Puccini U-Clock*. This version of the *U-Clock* is fitted with new hardware and software to add 24/192 USB capability.

Before using your unit, please read this section and the Step by Step Guide. This will enable you to set the unit up quickly and safely with your hi-fi system.

The *U-Clock* is a combination of a system clock with a sophisticated USB to SPDIF converter. You can use it as a clock or a converter or both together. Locking your digital system to the *U-Clock* reduces jitter and improves the sonic performance. Use the converter as a gateway for a PC, Mac or sound server to connect computer-based music into your system, while avoiding the high levels of jitter and other compromises commonly found in such sources.

The *U-clock* is simpler than most other *dCS* products, it does not feature remote control or software that can be updated by the user.

What's in the box?

Check that the box contains the following items:

- *dCS Puccini U-Clock*
- Manual
- *dCS* USB Audio Class 2 drivers disc for Windows
- Power cable
- USB cable
- BNC cable
- Spare fuses

Notify your dealer as soon as possible if anything is missing or damaged. We suggest that you retain the original packaging for possible future use. If this is not possible, replacement packaging can be ordered from *dCS* or our distributors. Details can be found on our web site at www.dcsLtd.co.uk.

Positioning the unit

Place the unit on a firm, vibration free base, allowing convenient connection to the other parts of your system. To prevent overheating, we recommend that you leave some free space around the unit to allow for ventilation.

3 feet are fitted as standard, this may be changed to the 4-foot arrangement shown below, if you prefer. Spare feet are available as an optional extra. The mounting points are M4 size, maximum screw depth is 10mm.

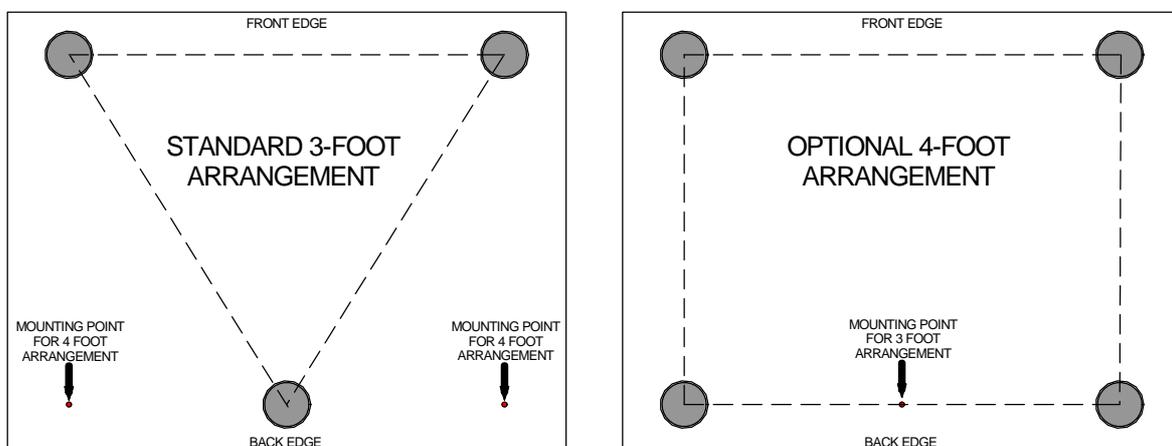


Figure 1 – 3-foot and optional 4-foot arrangements

Safety Notice



Your *dCS Puccini U-Clock* contains no user serviceable parts. **DO NOT** attempt to open the case as there are potentially dangerous voltages present inside. In the event of the unit developing a fault, please contact your dealer in the first instance.

To maintain protection from electric shock, the unit **MUST** be connected to mains earth (ground) via the power cable. Also, unearthed systems do not give the best sonic performance.



This product is lead-free to comply with the RoHS directive.

Before connecting the power cable to the unit for the first time, please check that it has been set to the correct operating voltage for your mains supply. The unit's voltage setting is shown on the serial number label. If this does not match your local supply voltage, **DO NOT** attempt to use the unit. Contact your dealer to have the unit reset. Using the unit with the wrong mains setting for your local supply may result in serious damage to the unit and will invalidate the warranty. Do not attempt to reset the voltage yourself.

We do not recommend the use of mains regenerators. However, if you do wish to use a mains regenerator with variable voltage and frequency, we recommend that you set the voltage to match your local voltage and the frequency to either 50Hz or 60Hz **ONLY**.



Damage caused to your *Puccini U-Clock* by misuse of a mains regenerator or by a malfunctioning mains regenerator is not covered by the warranty.



Disposal at end-of-life - the symbol indicates that this product should not be treated as normal household waste. It should be recycled, so please take it to an approved collection facility.

Patent Pending

This product contains novel features that are the subject of patent application GB0817141.5.

STEP-BY-STEP GUIDE

This section guides you through setting up the unit for basic operation.

Preliminaries

For digital interfaces, use with cables designed for digital audio:

- for Word Clock interfaces, use 75Ω coax cables fitted with BNC plugs.
- for SPDIF RCA interfaces, use 75Ω coax cables fitted with RCA Phono plugs.
- for the USB interface, use a screened USB type B cable.

Connect the power cable supplied to the power inlet on the rear panel, plug the other end into a convenient power outlet. Set the rear panel switch on (the “I” position).



Please do not use an excessively heavy or inflexible power cable as this may damage the power inlet connector.

The GOLDEN RULES for using a System Clock

- The source equipment **MUST** be locked to the System Clock.
If it is not, you will either have locking difficulties or hear occasional clicks and the advantages of using the Clock will be lost.
Most non-dCS CD transports, DAB radios and other equipment do not have a Word Clock Input and so CANNOT be locked to a Master Clock. If you are using such equipment, make sure the DAC is set to slave to the audio input, not to the system clock.
- The clock frequency **MUST** match the sample rate(s) used in the system.
If it does not, the system cannot lock and the DAC may remain muted. Please check the manuals for the equipment used in your system.

When the *Puccini U-Clock* is set to 44.1kHz, it may be used with DSD-based systems, CD systems without an upsampler running at 44.1kS/s or CD systems upsampling to 88.2kS/s or 176.4kS/s Dual AES.

When the *Puccini U-Clock* is set to 48kHz, it may be used with a DVD player or DAT recorder fitted with a Word Clock Input running at 48kS/s, or upsampling to 96kS/s Dual AES or 192kS/s Dual AES.

The *Scarlatti* and *Paganini Upsamplers* are exceptions to this rule – we have designed a very flexible clocking arrangement for the *Upsampler* to make it easier to use. It will lock to Word Clock at 32, 44.1, 48, 88.2 or 96kHz, regardless of the input and output sample rates.

To make best use of the *Puccini U-Clock*, all the digital audio units in the chain should be locked to it.

Using the *Puccini U-Clock* with a *Puccini Player*

Connect the system as shown below. You can use any of the *U-Clock*'s four **Word Clock** Outputs and either of the two **SPDIF** outputs.

When playing a disc, make sure the *U-Clock* is set to 44.1kHz, so that the *Puccini Player* can lock to it and benefit from the improved clock quality.

Set up the USB source as described on the next page and set the *Puccini Player* to the **RCA1** input. When using a USB source, the *U-Clock* will set its clock frequency to suit the sample rate of the data stream on the **USB** input.

If you need to override the USB automatic frequency setting, press the **FREQUENCY** button. This is necessary if you play a 48 or 96kS/s file (this sets the frequency to 48kHz) and then want to play a disc (which requires a 44.1kHz clock) while the computer is still running.

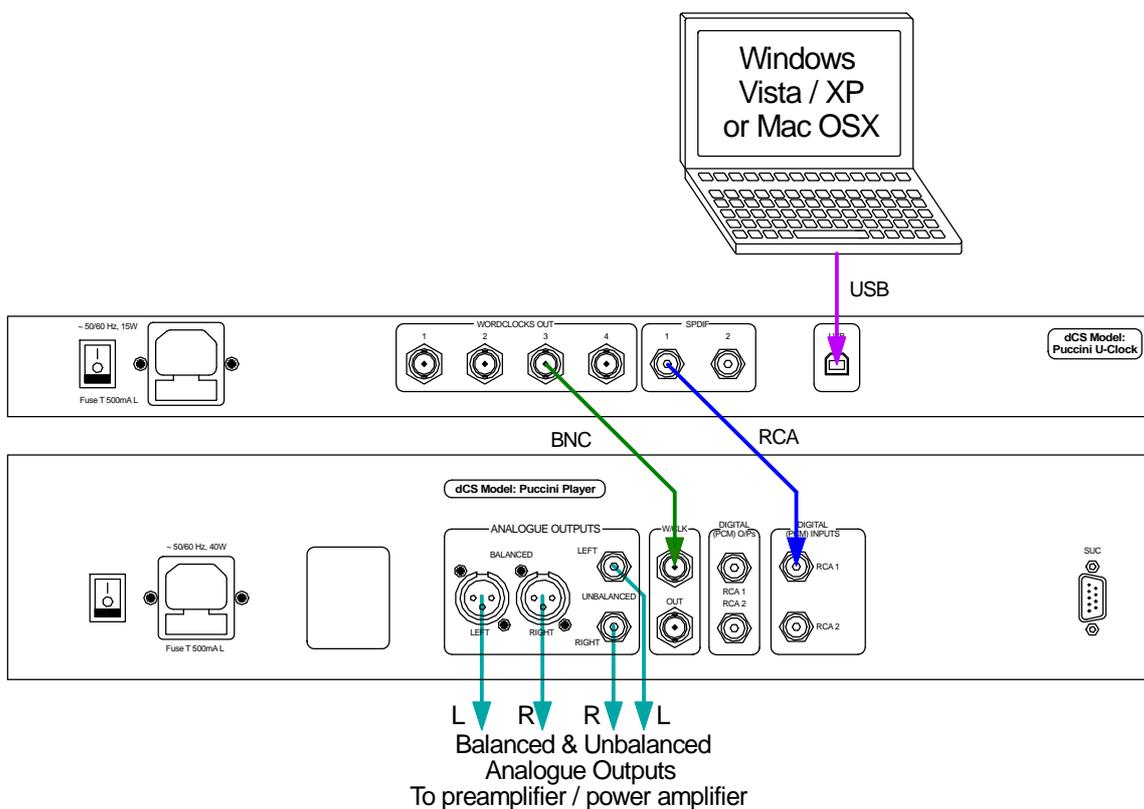


Figure 2 – Using the *Puccini U-Clock* with a *Puccini Player*



Puccini Player software v1.12 and later support locking to the **Word Clock Input** while an external input is selected.

Puccini Player software v1.30 and later support playback of files sampled at 176.4 or 192kS/s through a single-wire SPDIF interface.

If your *Puccini Player* is loaded with earlier software, please contact your distributor to request an update disc.

Setting up the USB source

The USB interface can be connected to a Windows™ Vista or XP PC, Apple Mac™ OSX systems or sound server, running software to generate PCM data.

If you do not want to use a USB source, go to the next page.

A word about Music Playing Software

There are countless programs that can play music on Windows™ PC and Apple Mac™ OSX systems. Unfortunately, not all of them present the data completely unprocessed to the USB ports. For example, Windows Media Player re-samples all data to 24 bits, albeit at the original sample rate, whilst iTunes rate converts data as necessary to the output sample rate set in the OSX Audio set-up panel.

With such a proliferation of playing software, and with updates being issued daily, it is impossible for *dCS* to be fully up-to-date with the behaviour and performance of all programs. If you have questions or problems, we would urge you to take them up with your software vendor. What we will say is that different programs operate very differently and it is well worth finding out exactly how your particular program processes the audio.

One particular problem that has been identified concerns the popular iTunes program when running on Windows systems. The default output word length is 16 bits and must be changed to 24 bits for correct operation. To do this, click on **Start > Control Panel > Quicktime**. Click on the **Audio** tab of the Quicktime panel and select **24 bit** in the **Size** field of the **Sound Out** section.

Setting the USB Audio Class

There are two USB Audio classes, one of which must be set during system set-up. The U-Clock is shipped set to USB Audio Class 2.

Audio Class 1: The interface operates without special drivers at up to 96kS/s.

To select Class 1, switch off, wait 10 seconds, then hold down the **DITHER** button and switch on. Keep the button pressed until **DITHER** LED flashes continually. Release the button and wait. When the Power LED starts flashing, switch off, wait 10 seconds, switch on again.

The unit is now in Class 1 mode.

Audio Class 2: The interface operates at up to 192kS/s.

For Mac OSX, version 10.6 (Snow Leopard) or later is required.

For Windows XP (SP3), Vista (SP2) or Windows 7, the driver files on the disc supplied must be loaded onto the computer before use (see below).

To select Class 2, switch off completely, wait 10 seconds, then hold down the **FREQUENCY** button and switch on. Keep the button pressed until **DITHER** LED flashes continually. Release the button and wait. When the Power LED starts flashing, switch off, wait 10 seconds, switch on again.

The unit is now in Class 2 mode.



The *Puccini U-Clock* outputs 176.4 and 192kS/s data in single-wire SPDIF format. To play these rates through a *dCS Puccini Player*, it must be loaded with software 1.30 or later.

Loading the Windows drivers for USB Class 2

- If ASIO4ALL or another ASIO driver is loaded on your computer, please uninstall it - otherwise the *dCS* drivers will not work correctly.
- Make sure the U-Clock is set to USB Class 2 - otherwise the driver installation will fail.
- Power up the U-Clock and the computer. Do not connect the USB cable yet.
- Load the *dCS* USB Audio Class 2 drivers disc for Windows into the computer's CD drive.
- If the installation does not start automatically, select "**Run setup.exe**".
- Follow the on-screen prompts.
- When prompted, connect the U-Clock to the computer's USB port.
- Wait until installation is complete (this takes a few minutes), then remove the drivers disc and re-start the computer.



If you connect a *Puccini U-Clock* set for USB Audio Class 2 to a Windows computer without first loading the drivers, the interface will not work and the computer will display the warning message: **Device cannot start**.

Selecting the *Puccini U-Clock* as your Audio Output device



This section gives basic advice for setting up the computer. For more detailed advice and more advanced options, please visit www.dcsltd.co.uk/page/support and download the current version of the "*dCS Guide to Computer Audio*".

Whichever program you are using to play your music, your computer may not automatically select your *U-Clock* as the preferred playback device. You can correct this as follows :

Windows XP - Once you have connected the *U-Clock* and switched it on, go to **Start > Control Panel > Sounds and Audio devices**. On the **Audio** tab, select **dCS Puccini** from the drop down list in the **Sound Playback** Default device list.

Windows Vista - Once you have connected the *U-Clock* and switched it on, go to **Start > Control Panel > Hardware and Sound > Sound**. Select **dCS Puccini** in the list of available devices on the **Playback** tab.

Windows 7 - Once you have connected the *U-Clock* and switched it on, go to **Start > Control Panel > Sound**. Select **dCS Puccini** in the list of available devices on the **Playback** tab.

Apple Mac™ OS X - Once you have connected the *U-Clock* and switched it on, open **Finder**, click on the **Go** tab and select **Utilities**. In the Utilities panel, select **Audio MIDI Setup** and click on **Audio Devices** in the Audio MIDI setup panel. Select **dCS Puccini** from the drop down list in the **System Output** section. You can also set **dCS Puccini** as the default output from the same panel.

Using the Puccini U-Clock with a Paganini Transport & DAC

Connect the system as shown below. You can use any of the U-Clock's four **Word Clock Outputs** and either of the two **SPDIF** outputs. At the time of writing, the Paganini DAC's SPDIF inputs are limited to 96kS/s but an update is planned.

When playing a disc, make sure the U-Clock is set to **44.1kHz**, so that the Puccini Player can lock to it and benefit from the improved clock quality. Set the DAC to the **1394** input. During initial set-up, use the DAC's **Sync** button to set the sync source to **WCik**.

When the USB source is in use, set the DAC to the **RCA1** input. During initial set-up, use the DAC's **Sync** button to set the sync source to **WCik**.

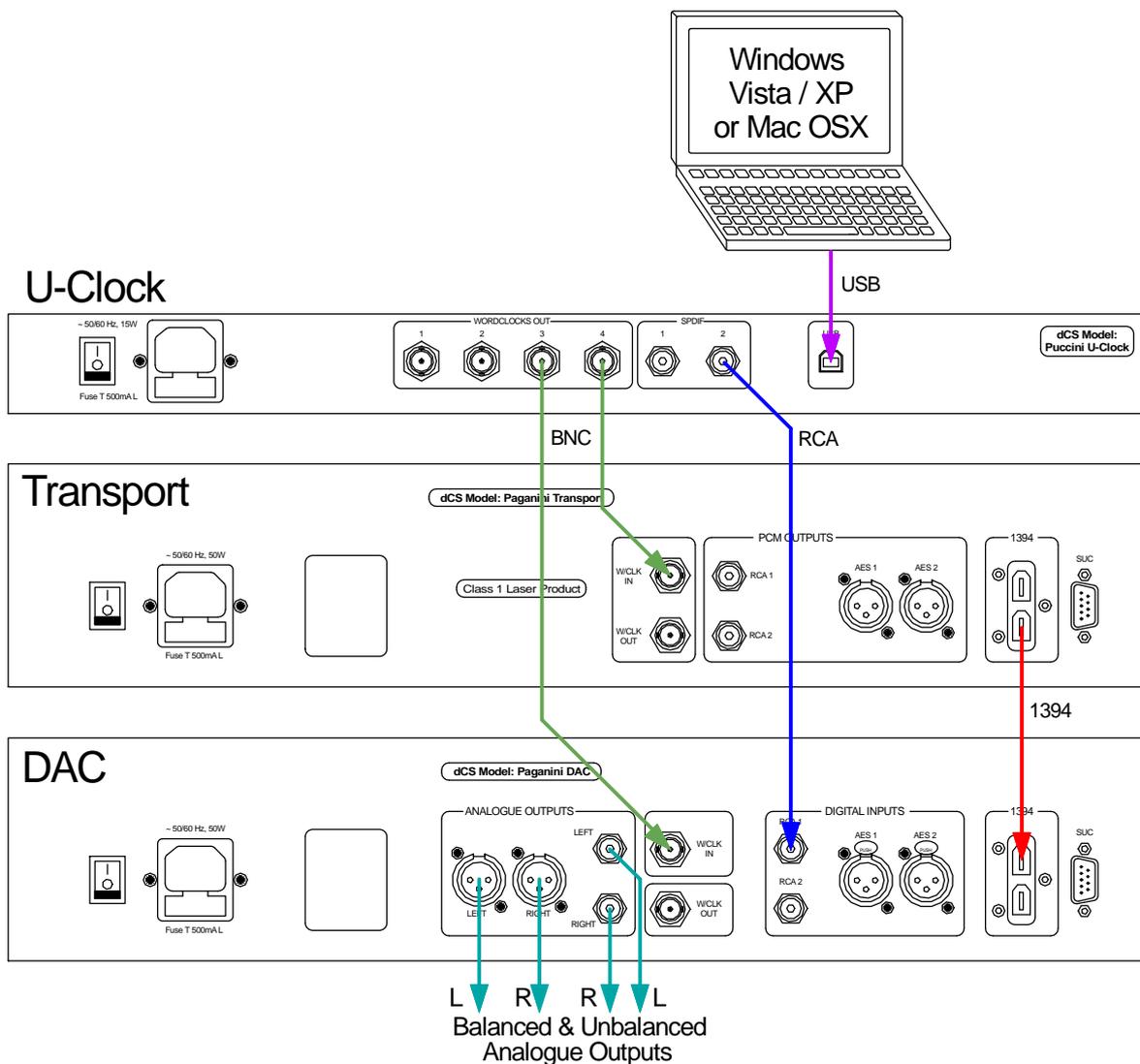


Figure 3 – Using the Puccini U-Clock with a Paganini Transport & DAC

The next step is crucial – sit back and enjoy the music.

FRONT PANEL

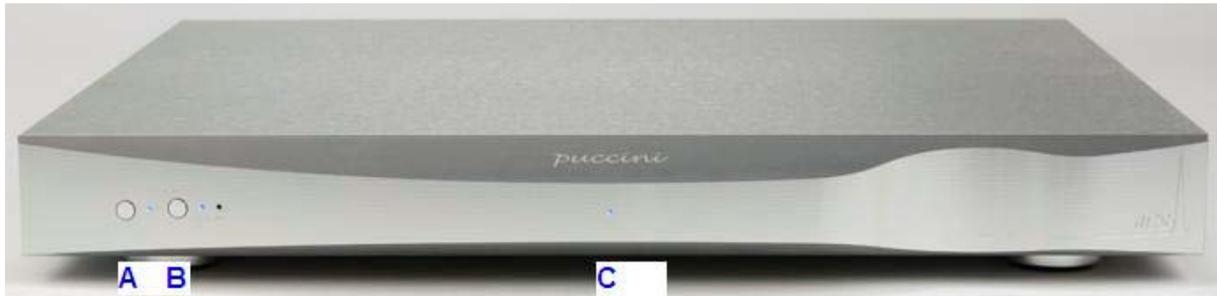


Figure 4 – Front panel

DITHER Button

Press the **DITHER** button (A) to turn the Dither feature off and on. When the Dither is on, the LED to the right of the button will illuminate.

The Dither feature is designed to exercise the Phase-Locked-Loop in the DAC and Transport to improve the correction of small timing errors. Try it and see what you think!

FREQUENCY Button

Press the **FREQUENCY** button (B) to set the system clock frequency to **44.1kHz** or **48kHz**. One of the two LEDs to the right of the button will illuminate to indicate the clock frequency.

When the USB interface is active, the clock frequency is set to suit the sample rate of the received data. The **44.1kHz** and **48kHz** LEDs illuminate together to indicate the USB interface is active. Pressing the **FREQUENCY** button repeatedly cycles the unit through **44.1k**, **48k** and back to USB automatic mode, allowing you to override the USB setting.

The correct clock frequency depends on the source sample rate:

- Use **44.1kHz** if the sample rate is 44.1, 88.2, 176.4kS/s or DSD. (Typically CD or SACD Transports / Players.)
- Use **48kHz** if the sample rate is 48, 96 or 192kS/s. (Typically DVD Players.)

POWER indicator

This indicator (C) illuminates when the unit is powered up.

REAR PANEL



Figure 5 – Rear panel

Mains Inlet

Power is connected via a standard IEC320 connector (E) which incorporates a fuse, it is isolated by a 2-pole power switch (D).

Word Clock Outputs

The four **Word Clock Out** connectors (F) all carry identical TTL-level word clock at either 44.1 or 48kHz. You can use all four outputs at the same time if you wish.

Word clock is used for synchronisation only, it does not carry digital data.

SPDIF Outputs

2 SPDIF outputs are provided, **RCA1** and **RCA2**, on RCA phono connectors (G). Each outputs the same SPDIF data at the same sample rate that is present on the USB interface, if it is active. You can use both outputs at the same time if you wish.

USB Input

The **USB** interface on a 'B' type connector (H) accepts uncompressed PCM data up to 24 bits, sampled at 44.1, 48, 88.2 or 96kS/s from a Windows™ PC, Apple Mac™ or sound server equipped with a USB 2.0 interface or later.



We have tested this interface with several common formats running on Windows™ Vista, Windows™ 7, Windows™ XP and Apple Mac™ OSX but we cannot accept responsibility for correct operation with all source devices, operating systems or software.



Please see page 8 for details on setting the interface to Class 1 (up to 96kS/s without special drivers) or Class 2 (up to 192kS/s, no drivers are required for OSX 10.6, drivers are required for Windows).

Serial Number Label

This is attached to the underside of the unit.

SPECIFICATION

Clock Accuracy	Better than +/-1ppm when shipped (guaranteed for 12 months from shipping) over a temperature range of 10°C (50°F) to 30°C (86°F), typically +/-0.1ppm when shipped and stabilised.
Start-up time	Starting from 20°C, typically 2 minutes to rated accuracy, maximum 3 minutes. Once warm, the unit recovers from a short power interruption in a few seconds.
USB input	<p>USB interface on a B-type connector, will accept up to 24 bit PCM at:</p> <ul style="list-style-type: none"> • 44.1, 48, 88.2 or 96kS/s when set to Class 1 (no drivers required), or • 44.1, 48, 88.2, 96, 176.4 or 192kS/s when set to Class 2 (no drivers are required for OSX 10.6, drivers are required for Windows). <p>Operates in asynchronous mode.</p>
Word Clock Outputs	4x Word Clock Outputs on 4x BNC connectors, output standard TTL-compatible word clock at either 44.1 or 48kHz.
SPDIF outputs	2x SPDIF on RCA Phono connectors. Each outputs the same SPDIF data at the same sample rate that is present on the USB interface, if it is active.
Size and weight	<p>460mm (18.1") wide x 400mm (15.8") deep x 58mm (2.3") high, excluding cable connectors.</p> <p>7.6kg (16.7lbs).</p>
Power requirements	<p>Internally set to either 100 - 120 or 220 - 240V AC, 49 – 62Hz.</p> <p>Power consumption: 3W typical, 6W maximum.</p>

These specifications are subject to change without notice.

MAINTENANCE AND SUPPORT

Service and Maintenance

dCS audio products are designed not to need regular maintenance, and contain no user serviceable parts apart from the mains fuse. If your unit is damaged in any way, please contact your dealer.

Replacing a Blown Mains Fuse

There is a mains fuse below the power inlet, accessible from the outside of the unit. If the fuse blows, it may be changed by the user. The current consumption of the unit is very low, so it only blows if power surges occur, or there is a fault in the unit. Usually power surges cause no other damage, but if the fuse blows repeatedly on replacement, some other damage will have been done and the unit must be returned to dCS for repair.

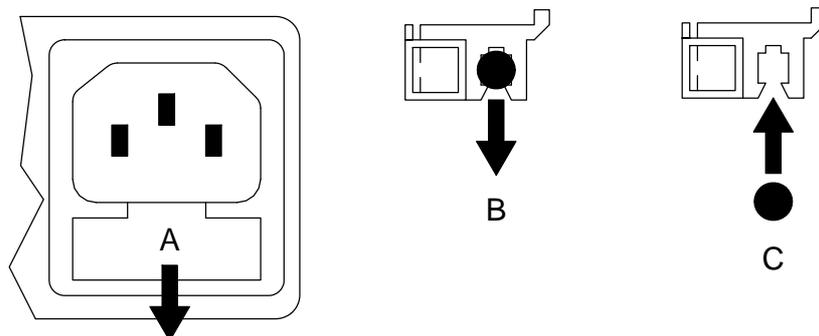
Fuse type: 20 x 5mm T 0.5 amp L fuse



If the fuse should fail, it is essential that it is replaced with one of the same type and rating. Failure to do so could result in damage to the unit, risk of fire or electric shock and will invalidate the guarantee.

Referring to the diagram below, remove the power cable, use a small flat bladed screwdriver to pry up the tab on the fuse carrier (A) and pull it out. Push the blown fuse out of the clip in the carrier (B) and dispose of it. Fit a new fuse in the clip (C) and push the carrier back into the unit so that it clicks home.

Spare fuses are provided with the unit.



Cleaning the case

The front panel of your dCS equipment is machined from very high grade aluminium. Great care has been taken to create the finish of the aluminium throughout the engineering process from the raw solid material to the finished piece.

To remove loose dust or finger marks from the case, we recommend that you use a clean, dry, lint-free cloth.

To restore the finish on the front panel, we recommend applying small quantities of a lanolin based cleaner, using a clean, dry, lint-free cloth and then wiping off. Do not allow lanolin to collect around the buttons.

Small amounts of glass cleaner containing ammonia may be used to clean other surfaces, but avoid spraying onto the connector contacts.

Limited Warranty

General

dCS warrants this product against defects in materials and workmanship for a period of 3 years from the date the unit was originally shipped from dCS. During the warranty period, dCS will repair or, at our absolute discretion, replace a faulty product. Warranty repairs must only be carried out by dCS or our authorised service agents. Please contact your dealer if your unit requires service.

Your dealer should have completed on your behalf an **Owner Registration** form at the time of sale and returned it to dCS. On receipt of the Owner Registration form, dCS will add your contact details to our customer database. dCS will use this information for warranty purposes only, we will not contact you directly for reasons relating to sales and marketing.

This warranty applies to the original owner.

Warranty Exclusions

The Warranty does not cover wear and tear.

The Warranty on this product will be void if:

- the product is misused in any way.
- any unauthorised modifications or repairs are carried out.
- the product is not used in accordance with the Operating Conditions stated in this manual.
- the product is serviced or repaired other than by dCS or our authorised service agents.
- the product is operated without a mains earth (or ground) connection.
- the unit is returned inadequately packed.

dCS reserve the right to apply a service charge if a product returned for warranty repair is found to be operating correctly, or if a product is returned without a returns number being issued.

This warranty covers parts and labour only, it does not cover shipping charges or tax/duty.

Our dealers or distributors are NOT authorised to extend the terms of this warranty, dCS cannot accept responsibility for any attempt to do so.

Products re-sold by dCS on a "used" basis may be subject to reduced warranty terms.

Obtaining Service

Should you encounter a problem, contact your authorised dCS dealer for advice, quoting the model, the full serial number and giving a detailed description of the fault. Your dealer will advise you fully on actions that need to be taken. When returning a unit, the original packaging should be used to avoid transit damage. Replacement packaging sets may be purchased from dCS.

During the Warranty period, there will normally be no charge for parts or labour.

Operating Conditions

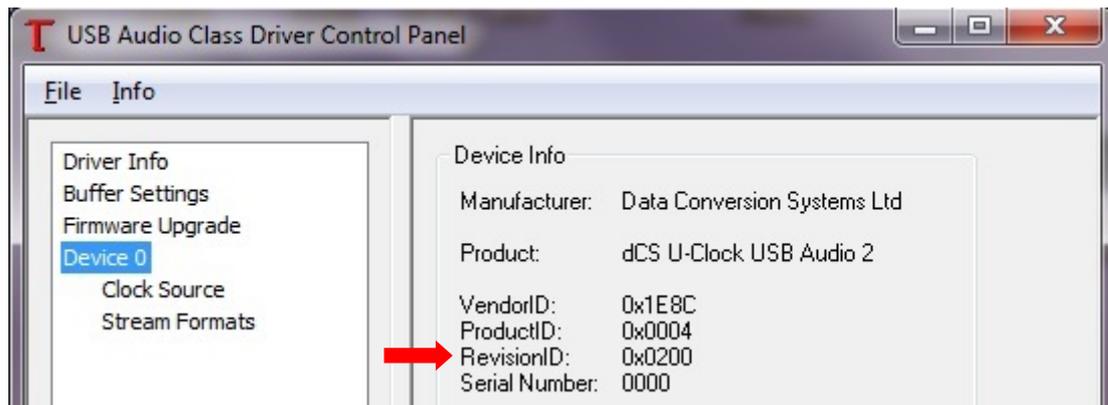
- The supply voltage must remain within +/-10% of the A.C. voltage specified on the back panel.
- The supply frequency must be in the range 49Hz to 62Hz.
- Ambient temperature range: 0°C (32°F) to 40°C (104°F), non-condensing.
- Do not install the unit near heat sources such as radiators, air ducts, power amplifiers or direct strong sunlight.
- If in doubt, the easy test is – the unit is happy to work anywhere a human is.

Software

Which Software Issue is loaded?

The *Puccini U-Clock* does not have a display, but if the USB port is connected to a computer, you can find the software issue in the USB device descriptor for firmware version. To do this:

Windows, U-Clock in Class 2 mode: Click the  icon in the lower right corner of the screen to open the driver control panel. In the left pane, click **Device 0**. In the right pane, find the **Revision ID - 0x0200** indicates the software issue is 2.00.



Windows XP™, U-Clock in Class 1 mode: Go to **Start > Control Panel > System > Hardware > Device Manager > Sound, Video and Game Controllers**. Double click on **USB Audio Device**, select the **Details** tab and choose **Hardware Ids** from the drop-down box. The first line of text that appears will include the software issue prefixed by **Rev_**. For example, **Rev_0103** in the picture below indicates the software issue is 1.03.



Windows Vista™ / Windows 7™, U-Clock in Class 1 mode: Go to **Start > Control Panel > System > Device Manager > Sound, Video and Game Controllers**. Double-click on **dCS Puccini**, go to **Details** and select **Hardware Ids** in the **Property** box. The software issue will appear among the text in the **Values** box, prefixed by **REV_**. For example **REV_0100** indicates software issue 1.00.

Mac™ OSX: Open **Finder. Menu Bar > Go > Utilities > System Profiler**. Now go to **Hardware > USB > USB Bus > dCS Puccini**. The revision will be the software issue.

Updating the Software

Unlike our other products, the U-Clock does not have the CD-Update feature. When new U-Clock software is available, your unit can be updated by the distributor for your country. Please visit our website to find your distributor. Occasionally, a hardware upgrade may be necessary also to increase the "capacity" of the electronics.

Software History

Please note that not all software updates make an earth-shattering change. You should have a clear idea of what you expect to gain before updating to the latest issue. We recommend that you keep your software up to date. Check the *dCS* web-site for the latest software updates.

This manual is for *Puccini U-Clock* software version 2.0x.

Software for U-Clocks with PUU serial numbers

- Issue 1.01 - The first issue.
- Issue 1.02 – Dither bug corrected.
- Issue 1.03 – Corrects a bug which can occasionally disable the outputs.
- Issue 1.04 – The **FREQUENCY** button overrides USB automatic frequency mode, so that it is not necessary to disconnect the USB cable or turn the computer off to regain control.
USB code updated to improve compatibility with Windows Vista / Windows 7 WASAPI mode and Spotify. Improved sample rate switching when used with Puccini Player v1.21 or later.

Software for U-Clocks with PUC serial numbers



Do not request a software update for v1.0x U-Clock to v2.0x without arranging for a USB hardware upgrade at the same time. The new software is not compatible with the original hardware.

- Issue 2.00 – Adds support for USB Audio Class 2 operation at up to 192kS/s.

If you need more help

In the first instance, you should contact your dealer. If they cannot resolve the issue, contact your national distributor.



dCS, our dealers and distributors cannot accept responsibility for I.T. support issues. In such cases, please ask the computer or software vendor for advice.

Manufactured by:

Data Conversion Systems Ltd.
Unit 1, Buckingway Business Park,
Anderson Road,
Swavesey,
Cambridgeshire. CB24 4AE
UK

www.dcsLtd.co.uk

This user manual may be downloaded free of charge from our web-site.

A bound copy of this manual may be ordered from *dCS*.