FULCRUM

DAC64 DIGITAL TO ANALOGUE CONVERTER

~USERS MANUAL~

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Introduction

Thank you for selecting the Tube Technology Fulcrum Digital to Analogue Converter.

Please read through this manual so you will know how to operate your Fulcrum properly. After you have finished reading this manual, please put it away in a safe place for future reference.

We have done our utmost in the design and build of the Fulcrum to ensure you a low maintenance, trouble free D/A converter that will bring you many years of pleasure as an important part of your hi-fi system.

Please do not forget to complete and return the enclosed registration card.

We wish you many hours of musical enjoyment !

Contents

Conventions

This manual uses the following conventions;

Bold indicates emphasis or a minor heading.

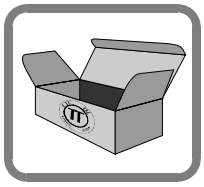
Italic Bold refers to a sub heading of a chapter.

This symbol refers to Notes containing important information set off from the text.

THIS SYMBOL REFERS TO CAUTION MESSAGES AND PROCEDURES WHICH IF NOT OBSERVED CAN LEAD TO DAMAGE OR INJURY

1

Getting Started



This chapter contains information on;

- ***Unpacking your Fulcrum D/A Converter***

Unpacking

Your Fulcrum DAC is packed in "jiffycell" end-caps. Grip the unit from the middle and simply pull it out of the box. Remove the end-caps and polythene bag.

All packing should be retained. Equipment returned can only be accepted in the original packaging.

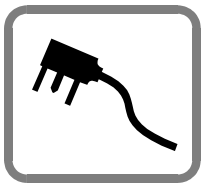
The following items are included in the packaging of a Fulcrum DAC;

1 x Fulcrum DAC
1 x IEC Mains Leads
1 x Users Manual
1 x Allen Key (Top Cover Screws)

FULCRUM

2

Mains Connection



Mains Connection

This chapter contains information on;

- ***Connecting the Fulcrum DAC to the household mains supply***
- ***Wiring a mains plug (UK)***

Your Fulcrum plugs into the mains supply via the IEC socket located on the back panel (see diagram 1). Connect your DAC to the wall socket using the IEC mains lead supplied in the packaging. The DAC has been factory set to the correct mains voltage for your country. The voltage setting is marked on the serial badge, located on the rear panel. (See diagram 1). Check that this voltage complies with your local supply. Also make sure that your mains outlet is able to deliver the required current for the equipment plugged into it. The wattage rating is also marked on the serial badge.

WARNING - THIS APPARATUS MUST BE EARTHED

DO NOT CONNECT/SWITCH-ON THE MAINS SUPPLY TO THE DAC BEFORE COMPLETING ALL OTHER CONNECTIONS. IF YOU ARE IN ANY DOUBT REGARDING MAINS CONNECTIONS PLEASE DO NOT PROCEED ANY FURTHER WITHOUT CONSULTING YOUR DEALER.

Wiring a Mains Plug

Export units for certain markets have a moulded mains plug fitted to comply with local standards. If your mains supply lead does not have a plug fitted, the coloured wires should be connected to the appropriate plug terminals in accordance with the following code.

Wire Colour	Label on Plug
GREEN/YELLOW	**E** or EARTH or
BLUE	**N** or NEUTRAL or BLACK
BROWN	**L** or LIVE or RED

If your mains plug has a fuse, please fit a fuse with **5A** rating.

If your DAC is not set correctly for the local supply or if you intend to move the DAC to a location where the supply is at a different voltage, it will be necessary to change the voltage taps on the mains transformer. We recommend that this is done by an experienced technician, please contact your dealer.

3

Audio Connection

This chapter contains information on;

- ***Connecting the Fulcrum to a CD Transport***
- ***Connecting the Clock Lock to a CD Transport***
- ***Connecting the Digital Inputs and Outputs***
- ***Connecting the Analogue Outputs***

Your DAC uses high quality connectors to ensure that maximum signal transfer is possible, therefore ensure that all cables used for connection to the DAC are terminated with connectors of similar quality.

Connection to a CD Transport

Please refer to diagram 1, figures in brackets relate to fig.1. The Fulcrum DAC can accept digital outputs from a CD transport either via Optical **(5),** AES/EBU **(9)** and BNC Digital Coaxial cable **(6,7,8)**. For optimum sound quality it is highly reccomemned to use the optical method together with the 'clock lock' function on the DAC.

Connecting Clock Lock

When using the Fulcrum DAC together with a TT CD Transport or another transport which has a clock frequency of 128 x F.S. (Frequency Sampling (44.1 kHz) it is possible to use the Clock Lock function. This allows the DAC/Transport combination to run from one master clock thus reducing jitter. Using the optical cable provided, connect the clock output **(11)** to the clock input on the CD Transport.

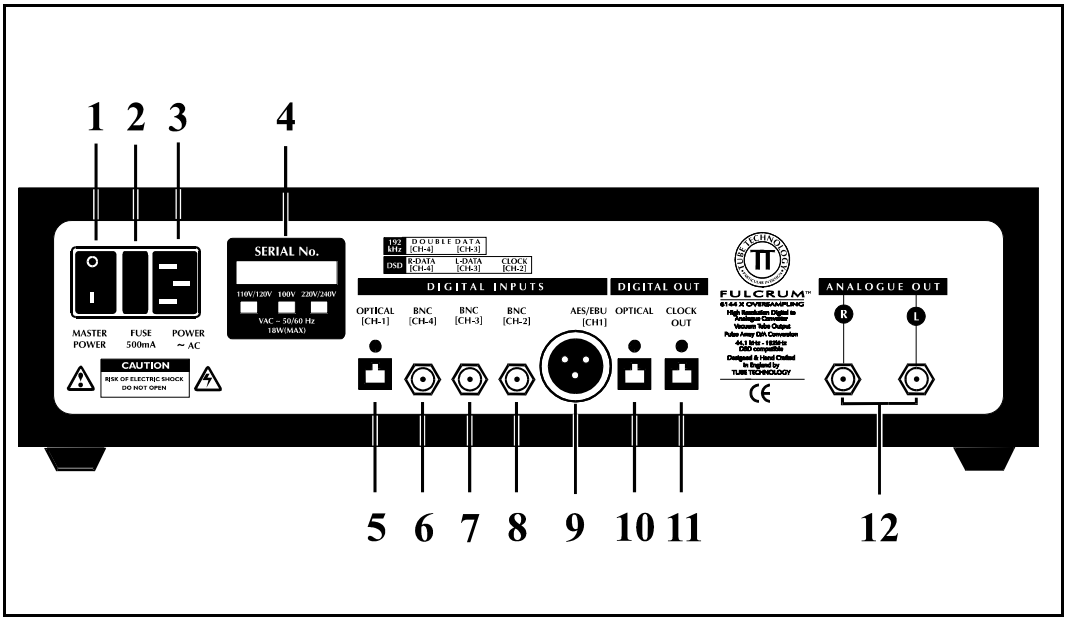
Connecting Digital Inputs and Outputs

The AES/EBU, Optical and BNC connectors will accept digital data upto 96 kHz. For 192kHz operation use both BNC inputs 3 & 4 **(6&7)** and for DSD operation use input 4 **(6)** for Right Data, Input 3 **(7)** for Left Data and Input 2 **(8)** for Clock.
The Digital Out **(10)** optical connector transmits whatever channel is selected on the front panel, this can be fed directly to a DAT or Minidisc recorder.

Connecting Analogue Outputs

Connect the Analogue Outputs **(12)** to your preamplifier or amplifier with suitable RCA leads.

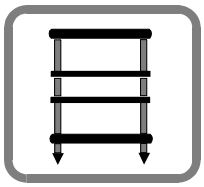
Diagram 1



DO NOT SWITCH-ON THE SYSTEM UNTIL YOU HAVE READ CHAPTER 5 Operating Your System.

4

Installation



This chapter contains information on;

- ***Installing and Ventilating your Fulcrum DAC***

Installing & Ventilation

Ensure that the DAC is placed in a stable location that is able to accept its weight, each unit weighs 7 kilograms.

Isolated shelves and/or isolating feet under the unit helps prevent micro-vibrations (generated in the room while playing music) from disturbing the internal vacuum tube structure, and digital electronics, implementing the use of these will further enhance sound quality.

Dedicated racks are available for housing your tube equipment, contact your dealer or Tube Technology for further information.

Do not locate the DAC close to radiators or any other heat source, this could increase the operating temperature.

Do not locate the DAC too close to a turntable, as the cartridge could pick up hum from the power transformers.

Burning-In

"Burning-In" is a generic term given to the basic 'running-in' of the DAC. You may notice a slight 'electronic-smell' from your unit during the first few days of operation. This smell is usually caused by various prints and dyes used on the components which takes some time to evaporate. This is quite normal and there is no need for concern as your DAC has been extensively soak tested before leaving the factory. This burning-in process continues with your use of the unit.

This process simply allows for new components like tubes, capacitors and resistors to settle and 'sweeten' enhancing the DAC's sonic performance. An estimated 80 hours of operation allows your Fulcrum this running-in period.

5

Operating your System

This chapter contains information on;

- ***Power ON Sequence and Stand-By Function***
- ***Front Panel Functions***

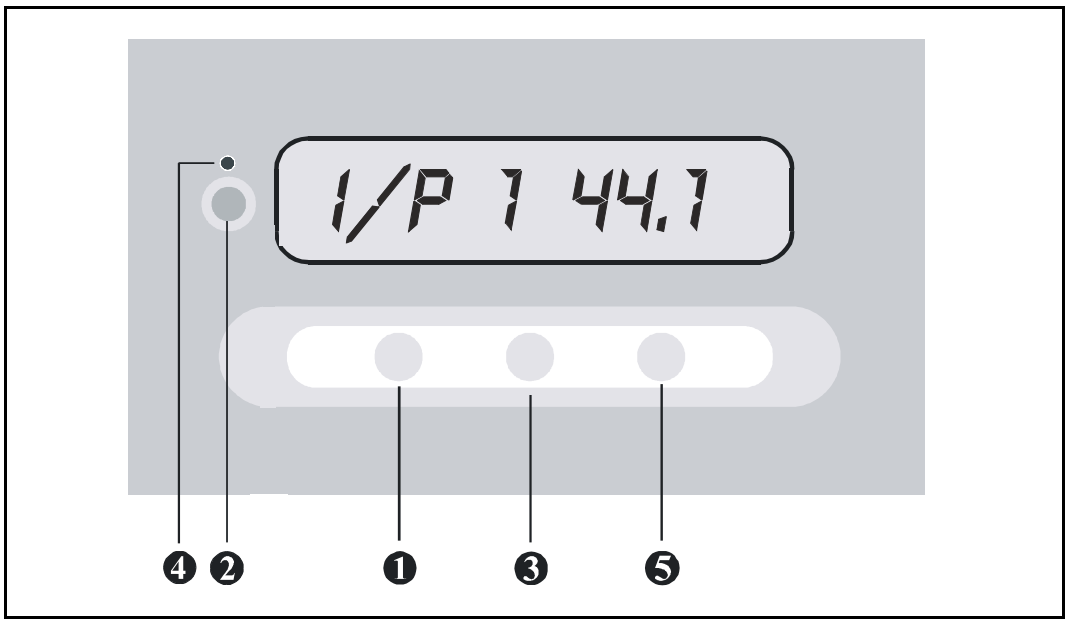
Switching On & Off

To initialise the Power ON sequence, switch the Master Power switch **(1)** *(diagram 1*) on the rear panel to the ON position. This will engage the soft start-up, the display will indicate WARM UP followed by a count-down from 9 to 0. The unit is in a mute condition during this warm up period. After this initialisation the display will indicate the input selected ie. I/P 1 followed by the speed of the signal detected on that particular input ie. 44.1. Pressing the POWER button **(2)** will put the Fulcrum into Stand-By position, the display indicates SLEEP followed by illuminating the STBY led blue **(4)**, in this mode the digital circuitry is kept running and the tube output stage is disabled except for the filaments (LT), this ensures a longer life for the tubes. To completely switch of the unit operate the master switch at the rear. When the Fulcrum is powered again it will memorise your last settings, ie. which input was last selected etc.

Front Panel Functions

The Source button **(1)** switches between the four inputs. Press this button once, the display will indicate I/P 1, turning the control knob will select from input 1 to 4, once the desired input has been selected on the display press the knob in, and the display will revert to showing the input selected and the speed of signal. The Clock button (3) switche s the clock lock on or off. If you have connected a clock sync. cable then this option can be used. Press the button once, the display will indicate CLOCK OFF, turn the knob to CLOCK ON, then press the knob in and the display will revert to the default display continue to press this button to sequnece through each input. The Clock button **(6)** switches clock lock on and off, when illuminated clock lock is on. The RAM Buffer button **(7)** enables the DAC to store 1 second or 4 seconds of music in memory. This improves sound quality as it ensures the whole system is in sync as not to rely on any clock signals from the digital source. Press once for 1 second, twice for 4 seconds and once again to disable the buffer. Note that music will continue to be heard until the buffer has been flushed.

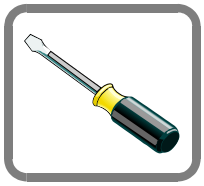
Diagram 2



Front Panel showing default display

6

Maintenance



This chapter contains information on;

- ***Care and Cleaning of your Fulcrum DAC***
- ***Vacuum Tubes***

Care & Cleaning

Do not clean the units with water as this smears the surface and can leave water marks. Anodised parts such as the front panel & painted parts such as the top & bottom cover are best cleaned with a damp cloth then buffed with a dry cloth. Polished parts are best cleaned with a soft duster, and wax free polish. A good tip to keep the front panel dust free is to regularly dust the unit with a soft make-up brush or paint brush.

Vacuum Tubes

The Fulcrum utilises 2 x 6922/ECC88/6DJ8 vacuum tubes in it's analogue output stage. The life span on these devices is approx. 8000 operating hours after which time they should be replaced, ensuring the unit is operating at it's maximum performance. If this time is exceeded there is NO danger to the unit.

Troubleshooting

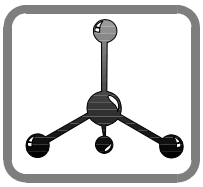
Symptom	Remedy
No Power when the POWER button is depressed.	**1.** Check you have pushed the IEC mains cable firmly into the socket on the rear panel. **2.** Check that MASTER POWER switch on the rear panel is in the ON position.
Unit is ON but no sound	**1.** The unit is in mute mode, wait 30 seconds and try again. **2.** The correct input has not been selected, ensure the lock led is illuminated.
Sound is skipping or breaking up.	**1.** Ensure the optical or digital leads are inserted correctly. **2.** If problem persists the consult your dealer

Table 1

UNDER NO CIRCUMSTANCES SHOULD AN UNQUALIFIED PERSON REMOVE THE COVERS OF A DAC, HIGH VOLTAGES ARE PRESENT.

7

Specifications



Figures given below are for a typical Fulcrum 192 DAC

FEATURES (Summary)

64 Bit Pulse Array Custom DAC
Auto Sensing Input receiver (Detects- DSD, 44.1, 96, 192kHz)
WTA Digital Filter up to 192kHz
1 x Direct DSD input
1 x Optical input (44.1 or 96kHz double speed)
3 x BNC inputs (44.1 or 96kHz or twin data lines @ 96kHz =192 kHz
1 x AES/EBU input (up to 96kHz)
64 bits 2048 Times Oversampling per channel
Class A Vacuum Tube Output Stage
"Ever-Warm" Standby for DAC & Tube Stage
1 pair RCA outputs
1 x Optical Clock Output (to Transport)
1 x Optical Digital Output (for DAT or MiniDisc)
Dimensions - 355 x 270 x 90 mm (W,D,H)
Weight = 7.0 Kg

8

Guarantee

This chapter contains information on;

- ***The Guarantee of your Fulcrum DAC***
- ***Tube Guarantee***
- ***Registration***
- ***Claims under this Guarantee***

Guarantee

This equipment has been fully tested and a full record of these tests made before despatch from the factory. Both the workmanship and the performance of this equipment are guaranteed against defects for a period of TWO YEARS from the date of purchase, provided that it was originally purchased from an authorised dealer under a consumer sale agreement, at or near the recommended retail price. (The words "consumer sale" shall be construed in accordance with section 15 of the Supply of Goods (Implied Terms) act 1973).

This guarantee covers both labour and parts and is transferable to subsequent purchasers but the liability of the manufacturers is limited to the cost of repair or replacement (at the discretion of the manufacturers) of the defective parts and under no circumstances extends to consequential loss, damage or shipping charges.

The manufacturers can accept no responsibility for defects arising from accident, misuse, wear and tear, neglect or through unauthorised adjustments and or repair, neither can they accept responsibility for damage or loss occurring during transit to or from the person claiming under this guarantee.

This equipment has a SIX MONTH guarantee on the tubes allowing for any manufacturing defects to arise. If a tube is found to be defective it should be returned to the dealer or failing this, directly to Tube Technology packed in its original packaging.

Registration

Please complete the registration card and return it to Tube Technology. **Your guarantee is invalid without registration.** To transfer this guarantee to subsequent purchasers, the new owner must notify Tube Technology of their name, address and serial numbers of the equipment.

Claims under this Guarantee

This equipment should be packaged in the original packaging and returned to the dealer from whom it was purchased or, failing this, any other authorised Tube Technology dealer. If it is not possible to return the equipment by hand then it should be sent carriage prepaid by a reputable carrier. Should the original packaging not be available replacement packaging can be purchased from the manufacturers. The equipment should not be sent by post.

DO NOT CONSIGN THE EQUIPMENT TO TUBE TECHNOLOGY UNLESS YOU HAVE FIRST BEEN SPECIFICALLY REQUESTED TO DO SO BY THE MANUFACTURERS TECHNICAL SERVICE DEPARTMENT. DO NOT UNDER ANY CIRCUMSTANCES ATTEMPT TO DISASSEMBLE THE EQUIPMENT BEFORE DESPATCH.

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