dCS Scarlatti DAC

Service Manual

October 2011

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

Contents

SAFETY AND CONFIDENTIALITY

Safety Warnings

Servicing must be carried out by qualified service personnel only.

These products contain circuitry that operate at high voltages and/or currents. Removing safety covers can expose personnel to risk of electric shock or other injury.

Take special care when working on the Power Board, as much of the board is at high voltage.

These products contain static-sensitive devices which can be seriously damaged by incorrect handling. Observe standard anti-static precautions at all times.

This product is lead-free to comply with the RoHS directive. If soldering or de-soldering is required, SAC solder (tin / silver / copper) must be used to ensure reliable repairs.

Disclaimer

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Confidentiality

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UNIT DESCRIPTION

The ***dCS Scarlatti DAC*** is a 2-channel audio DAC intended for use with a ***Scarlatti Transport, Scarlatti Upsampler*** and ***Scarlatti Clock***. The unit is extensively configured by software stored in flash memory. The key features are as follows.

- The patented ***dCS Ring DAC™*** is a discrete balanced design, which uses no proprietary DAC chips. All data received by the DAC is oversampled to 5 bits at either 2.822 or 3.07MS/s, depending upon whether the data is based on a 44.1 or 48kHz clock.
- Industry standard PCM inputs: 2x AES3 or Dual AES on XLR3 connectors, 3x SPDIF on 2x RCA and 1x BNC connectors, 1x Toslink optical SPDIF, 1x SDIF-2 interface on 2x BNC connectors. The SDIF interface will also accept SDIF-2 DSD data.
- All PCM interfaces will accept up to 24-bit data at 32, 44.1, 48, 88.2 or 96kS/s. Issue 1.20 adds single-wire operation at 176.4 and 192kS/s to the AES, RCA and BNC interfaces.
- The Dual AES interface will accept up to 24-bit data at 88.2, 96, 176.4 or 192kS/s.
- IEEE1394 interface currently accepts encrypted DSD data from other ***dCS*** units. Connected by one of two 6-pin 1394 connectors. This interface must be assumed to be incompatible with iLink or IEEE1394 interfaces produced by other manufacturers due to proprietary encryption.
- Industry standard Word Clock Input and Output. The unit can either Slave to the audio data (not 1394 or SDIF), Sync to an external master clock on the Word Clock Input or act as a 44.1kHz grade 2 Master Clock, allowing a suitable source to be locked to the Word Clock Output.
- Twin crystal oscillators – one for 44.1kHz-related data, the other for 48kHz-related data.
- Discrete Phase-Locked-Loop circuitry.
- Separately buffered stereo Balanced output on 2x XLR3 connectors and stereo Unbalanced outputs on 2x RCA connectors. Both can output either 2V or 6V rms full-scale, set in the menu. The Balanced output stages are a discrete class-A design.
- Software may be updated by the user from a suitable CD, played on a standard CD Player or Transport. If the software has become corrupted, the unit may be re-booted from a ROM, fitted to a Programmer Board.
- All-aluminium case with laminated damping plates.

HARDWARE AND SOFTWARE HISTORY

Hardware History & Configuration Code

For products manufactured since early 2000, the long version of the ***dCS*** unit serial number may be read from the menu. This contains a great deal of information about the build standard of the unit, allowing ***dCS*** to advise on the suitability of software updates, whether a hardware update is advisable and (sometimes) the cause of a particular problem.

The example below is a ***Scarlatti DAC*** with serial number SDC-0S2-7G4-6C1-1C5-012-5832.

A typical serial number	This code group means:
SDC	**PRODUCT** CODE. SCK = Scarlatti Clock, SDC = Scarlatti DAC, STT = Scarlatti Transport, SUP = Scarlatti Upsampler, PPR = Puccini Player, PUU or PUC = Puccini U-Clock, PCK = Paganini Clock, PDC = Paganini DAC, PTT = Paganini Transport, PUP = Paganini Upsampler, DDC or DDP = Debussy DAC.
0S2	**OPTIONS** CODE. First character = product options (e.g. 1394 interface fitted). Second character: B = Black, S = Silver. Third character = voltage setting: 1 = 100V, 2 = 115/120V, 3 = 200V, 4 = 215/220V, 5 = 230/240V. Early versions have only 2 voltage settings: 1 = 100-120V, 4 = 200-240V.
7G4	**CONTROL BOARD** CODE. The build standard of the Control board.
6C1	**TOP BOARD** CODE. The build standard of the DAC Analogue Board.
1C5	**DISPLAY BOARD** CODE. The build standard of the Display Board.
012	**CASE & BASE** CODE. This covers the build standard of the case parts, mains transformer, Power Board, 1394 Boards, back panel wiring and anything else.
5832	**CONTROL BOARD SERIAL NUMBER**. Each Control Board has a unique serial number.

Software History

v1.00	April 2007	This is the first issue, it includes 1394 software v3.00.
v1.01	June 2007	This update corrects a tendency for some units to lose lock to the Word Clock briefly from time to time, then re-lock. The 1394 software remains as v3.00.
v1.10	May 2010	Additional 44k filters included. Additional IR commands included to allow control of sync setting remotely. DSD performance improved. Intermittent unlocking problems addressed. Menu navigation by forward/back buttons incorporated. LED "Off" function added. EasyPlay amended to suit Upsampler set to DSD - selects 1394-1 when CD loaded.
V1.20	August 2011	Adds single wire 24/176.4 & 24/192 capability to AES, SPDIF and Word Clock inputs.

The latest software should be loaded in all units.

COMMON SET-UP ERRORS

Symptom: The unit fails to power up

- Check that the rated supply voltage stated on the back panel matches the local supply voltage.
- Ensure there is power available on the power cable, connect it to the unit. Set the back panel power switch to the **I** position (ON), wait 10 seconds and press the **POWER** button.
- Check that the mains fuse under the mains inlet has not blown. If it has, correct any obvious cause then replace the fuse as described in the manual.

Symptom: The Display turns on when a control is operated, then turns off

- This happens when the Display Settings > Display On/Off menu page is set to OFF. Change the setting to ON to stop the Display blanking out.

Symptom: The unit fails to respond to the controls

- If the indicator above the **POWER** button is illuminated, press the **POWER** button once to return to normal operation.

Symptom: The DAC fails to lock to a digital source and displays "No Input"

- Ensure the source is connected with a proper cable and selected.
- If the **1394** interface is selected, the DAC's **SYNC** setting is **WClk** and a suitable dCS source is connected, "No Input" usually indicates the DAC is not receiving a valid Word Clock.
- If the **SDIF** input is selected, the unit is connected to a suitable SDIF source which is transmitting and the DAC's **SYNC** setting is **WClk,** "No Input" usually indicates the DAC is not receiving a valid Word Clock.
- If there is an Upsampler in the system, make sure it is actually locked to the source.
- If there is a Master Clock in the system, make sure the data rate received by the DAC is an exact multiple of the Clock frequency. See the Clock manual for more information.

Symptom: The DAC locks but the audio is low or absent

- Check that the indicator above the **MUTE** button is off. If not, press the **MUTE** button.
- Ensure the source is sending audio data. Non Audio data can cause an automatic mute.
- Ensure the **Volume** and **Balance** Controls are correctly set.

Symptom: The audio output is monophonic

- If the source is actually Dual AES (not just 2 single AES outputs), check that the DAC is also set to Dual AES. Check that both cables are connected and undamaged.
- If the source outputs Single AES on 2 connectors and both are connected to the DAC, make sure the DAC is also set to Single AES.

Symptom: The Left and Right channels are swapped.

- Check that the analogue output cables are not reversed.
- Check that the DAC Settings > Channel Swap menu page is not set to swap.
- If you are using SDIF, make sure the data cables are not reversed.

Symptom: The sound on one channel is low or missing

- The Output Level setting is controlled by 2 latching relays, one or both can flip over if the unit is bumped hard. To correct this, change the DAC Settings > Output Level menu page to 6V and then change it to 2V. Check that both channels are now at the same level.
- Check that the Balance control is correctly set.
- Check that the audio output cables are correctly connected and undamaged.
- It is possible to connect the balanced analogue outputs to an unbalanced input, provided that pin 3 on both XLRs is connected to ground (pin 1). Do not leave pin 3 floating, as this will make the output level unstable.

Symptom: Crackles, pops or noise occur while playing music

- The high level of out-of-band noise inherent in DSD modes can be demodulated by some power amplifiers. Try setting the Filter to a higher number.
- The digital audio cable connecting the source to the DAC, may be damaged, intermittent or of the wrong type. Some expensive cables are not correctly designed for digital audio use. Try another cable.
- The CD may be dirty –clean it carefully with a radial motion.
- The disc may be "copy protected". Check that the Compact Disc Digital Audio logo is printed on the disc. If it is not, the disc is not a CD – please complain to the disc manufacturer.
- The source medium may be damaged or contain corrupted data.
- The DAC's audio output level may be high enough to overload a preamplifier or power amplifier. Set the DAC Settings > Output Level menu page to 2V.
- Occasional clicks may be heard if the DAC is in Master Mode or is locked to a Clock, but the source equipment is not locked to the same clock. Please correct the set-up.
- The source equipment may have a very high level of jitter – servicing is required.

Symptom: The DAC will not decode Dual AES

- If the DAC Settings > Dual AES menu page is set to OFF, the DAC will not accept Dual AES data. Change the setting to ON or AUTO.
- If the DAC Settings > Dual AES menu page is set to Auto but the status flags in the data from the Dual AES source indicate that the data is not Dual AES, the DAC will automatically select Single AES. Change the setting to ON and manually select Dual AES mode.
- Make sure the source is actually generating Dual AES data.

Symptom: The DAC drops out of Dual AES mode

- Check for damaged or incorrect AES cables.
- Dual AES is only available if valid AES/EBU data streams are present on both AES1 and AES2 inputs. A corrupted data stream can cause the unit to default to Single AES.

Symptom: Erratic operation from the TosLink input at 88.2 or 96kS/s

- Check that the optical connections are clean, the connectors are properly installed and the cable is undamaged.

Symptom: Using a non-dCS Transport, the DAC does not report 16/44.1

- Some Transports (e.g. Mark Levinson ML31.7, Linn CD21) add dither, so the DAC correctly reports 17/44.1 or something similar.
- Some CD Transports upsample to 48 or 88.2kS/s, the DAC will report the format of the data it receives.

Symptom: The DAC's Display settings cannot be adjusted

- Use the rotary control to adjust the Scarlatti DAC's display settings. The Scarlatti DAC is not consistent with our other products in this respect.

Symptom: The DAC cannot be set to Master Mode

- In DAC Master Mode, the DAC generates a 44.1kHz Word Clock. DAC Master Mode is only available if the DAC is locked to a data stream at 44.1, 88.2 or 176.4kS/s or DSD, generated by a source that can lock to a 44.1kHz clock.
- In SDIF mode, the DAC must be locked to a clock at 44.1 or 88.2kHz before Master Mode can be selected. This may mean connecting a spare (inexpensive) BNC cable between the source's Word Clock Output and the DAC's Word Clock Input to make sure it can lock.

Symptom: The DAC does not lock to 176 or 192k data on the single-wire inputs

- This feature was added in software issue 1.20 - update the software.

DISMANTLING PROCEDURE

Bear in mind that you should not have to completely dismantle the unit to carry out the repair!

Tools required:

- Rachet screwdriver handle.
- Screwdriver bits: Allen key 2, 2.5 & 3mm A/F, 6mm flat blade, No1 PoziDriv.
- Allen key 1.5mm A/F.
- Nut spinners / socket spanners: 5.5mm, 7mm, 12.5mm (1/2”), 14mm (5/16”) & 16mm (5/8”) A/F.

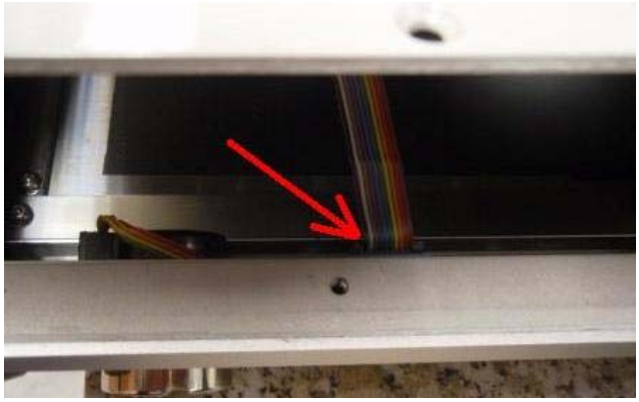
Do not use ball-ended Allen keys, as these can damage the screw heads.

Remember to observe anti-static precautions when dismantling.

Opening the case

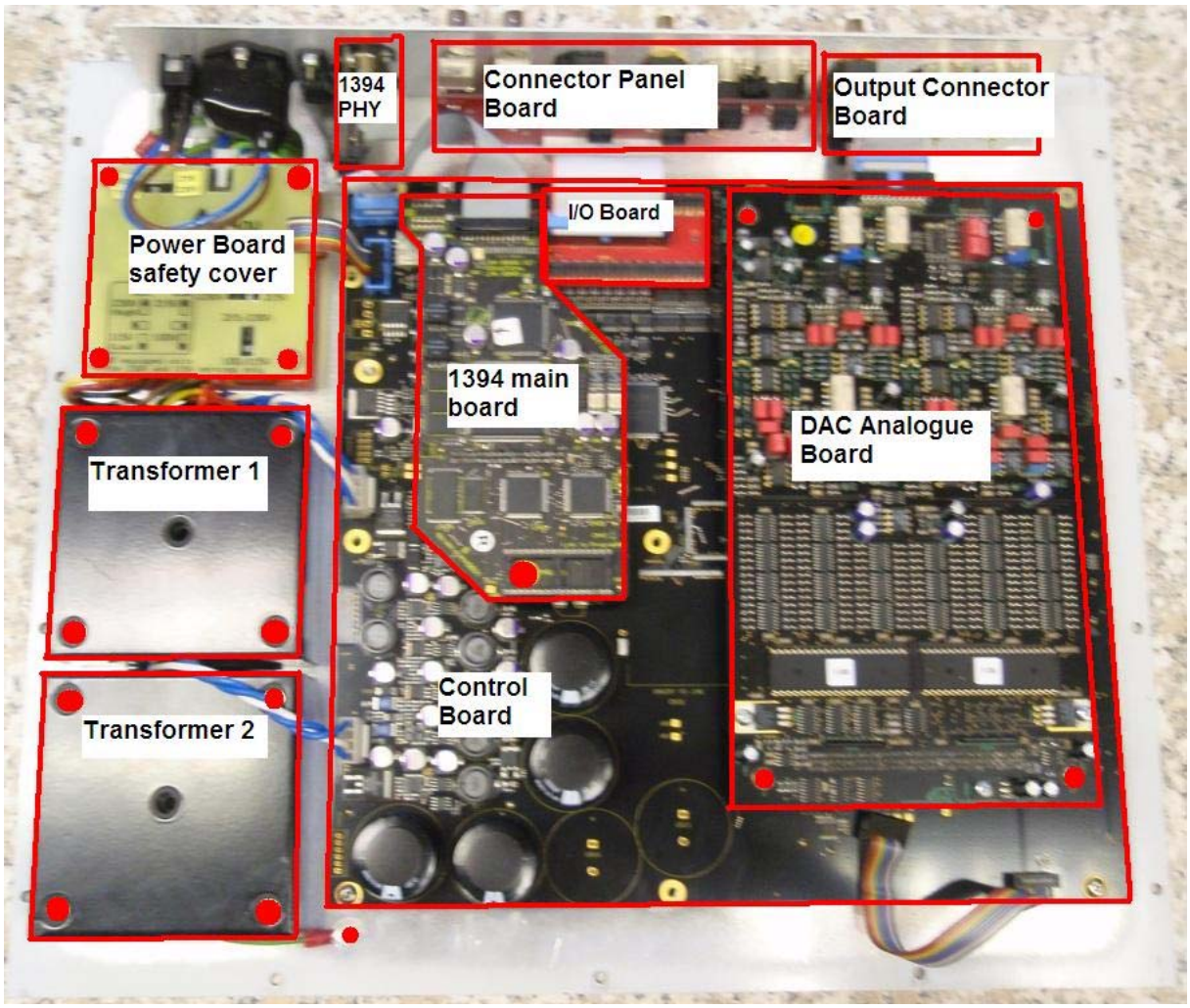
Disconnect all cables from the unit. Rest the unit on a soft anti-static surface to prevent damage to the finish. Turn the unit upside-down and remove the 14 screws shown in red below.

Lift the front edge of the base plate, reach inside and disconnect the ribbon cable from the Display Board, indicated in the picture below by the red arrow.



(Don't forget to reconnect the cable when you reassemble!) Lift the base plate out of the case, taking care that the rear panel connectors clear the back of the case.

Identification of the sub-assemblies



The fixings are indicated by red dots.

Removing sub-assemblies

The **DAC Analogue Board** is secured by a screw and washer in each corner of the board. Remove these, pull the board off the Control Board and disconnect the ribbon cable to the Output Connector Board.

The main section of the **1394 Board** is secured by one screw and washer inside the outline of the ROM socket (U405). Remove the screw and pull the board off the Control board. The 1394 Connector Board is attached to a bracket which is fixed to the back panel by 3 screws.

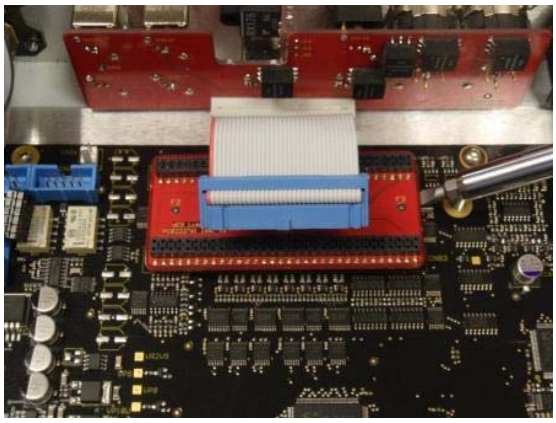
The **Power Board** is protected by a yellow safety cover, fixed by a screw at each corner. The Power Board underneath is fixed by a hex pillar at each corner. Disconnect the cables and lift the board off the 4 studs.

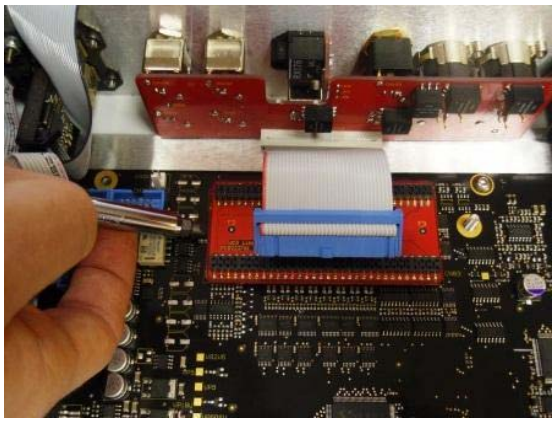
The two mains **Transformers** are fixed by a screw in each corner. To remove Transformer 2, remove Transformer 1 first, as the primary wires run under Transformer 1. Disconnect the cables from the Power Board and Control Board, then detach the green/yellow screen wire from the base plate.

The **I/O Board** (made as part of the Connector Panel Board) is a **very tight press-fit** onto Control Board headers CN82/83.

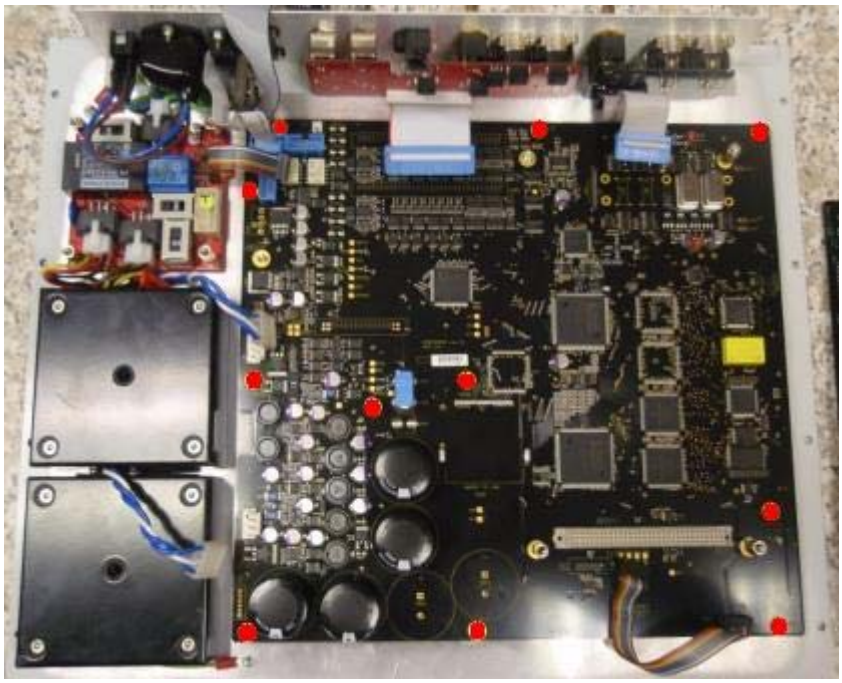
This board is difficult to remove! Careless use of tools can cause serious (and expensive) damage to the Control Board, **for which *dCS* shall not be liable**. If you really need to remove it and you are not confident you can do so safely, refer servicing to ***dCS***.

First disconnect the cable to the Connector Panel Board and remove the Control Board Pillar near the right side of the I/O Board. Use a 6mm flat-blade screwdriver to lever the right side of the board up a few mm, pivoting on the top of the stud. Carefully lever up the left side of the I/O Board in the same way, protecting the Control board with your fingers. When the I/O board has been loosened, lift it off.



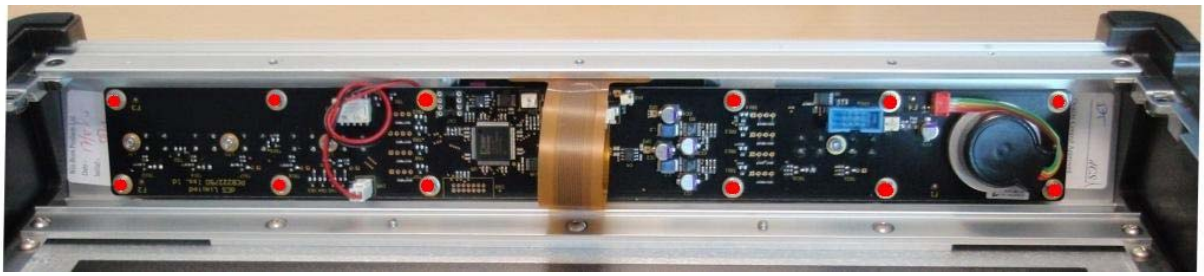


The **Control Board** fixings are shown as red dots below.

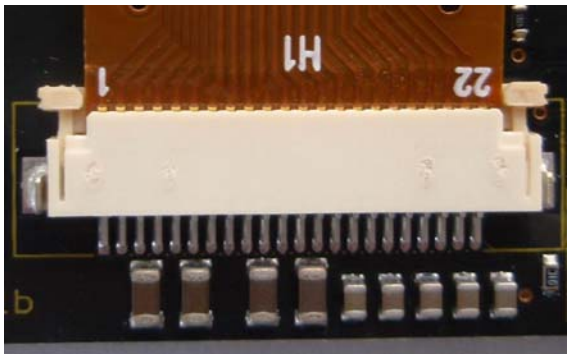


The **Connector Panel Board** and **Output Connector Board** are fixed to the back panel by the nuts and screws on the connectors themselves.

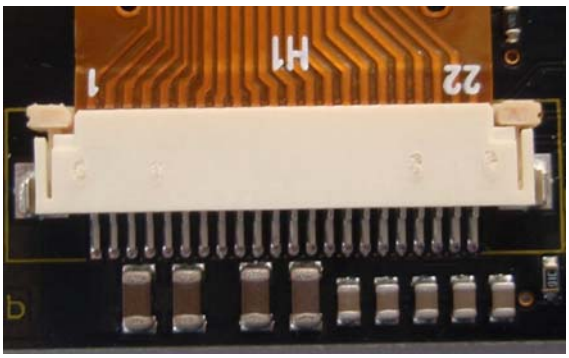
The **Display Board** is secured to the case front by 12 nuts and washers, shown as red dots below.



Before removing the Display Board, tape a strip of paper around the control knob to protect it from damage as it is pulled through the panel. Release the clamps on CN4 by pulling them out of the connector by a few mm. (When reassembling, take care to ensure the flat flex cable is fully engaged inside CN4 and the clamps are pushed back in.)



ZIF clamp open

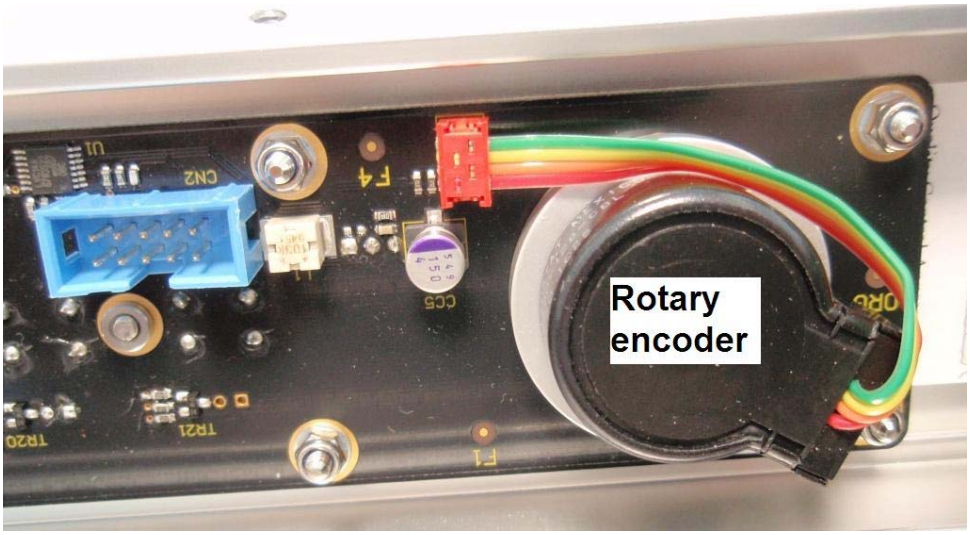


ZIF clamp closed

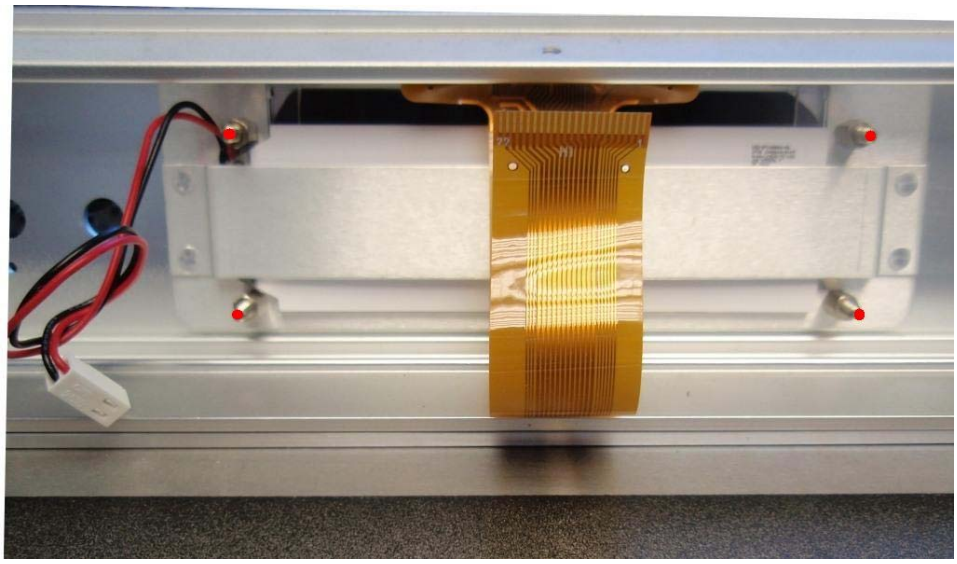
Disconnect the cables from CN4 & 5, remove the nuts and washers and ease the board off the studs.

The **control knob** is fixed to the rotary encoder by a small grub screw in the side of the knob. Loosen this with the 1.5mm Allen key and pull the knob off the shaft.

The **rotary encoder** is mounted on a spacer on the back of the board, it is secured by a nut and washer on the front of the board. Pull the red connector off the board to disconnect the encoder cable.



The **LCD module** is clamped to the front panel by a metal yoke secured by 4 nuts. When re-fitting the LCD module, tighten the nuts just enough to secure the module. Take care not to overtighten the nuts, as this can cause pale patches on the display or even damage the device. The pillars used to space the Display Board from the front panel are longer (M3 x 10), take care not to mix them up.



SUBASSEMBLY DETAILS

Subassemblies which are common to other products are detailed in separate Service Manuals.

Common Subassemblies

Control Board DCS156541 v7

The Control Board carries out all the digital processing and provides regulated DC to the unit. This board is common to most other current ***dCS*** products, it is configured by software. To date, the 7G version of this board has been used on all ***Scarlatti DAC***s.

2 mains transformers are used on the ***Scarlatti DAC*** ONLY, connecting to CN17 and CN18. If you fit a new Control Board to a ***Scarlatti DAC***, **the tab between these connectors MUST be snapped off.** This does not apply to other models.

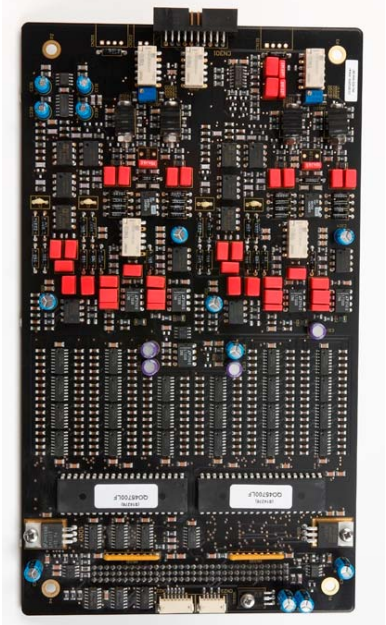
The circuit diagram file is 156540cd7g4.pdf.

The component layout file is 156540cl7g.pdf.

Earlier versions of this board were used on the Classic range.

This board is detailed in the separate **Control Board v7 Service Manual**.

DAC Analogue Board DCS002520



The DAC Analogue Board takes 2-channel 5-bit data from the Control Board and the Ring DAC™ circuit converts it to analogue. This board is common to all current ***dCS*** DACs / Players. To date, the 6C or 6E versions of this board have been used on all ***Scarlatti DAC***s.

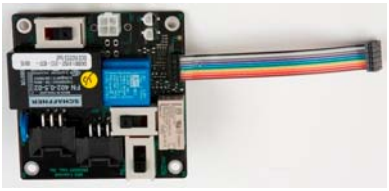
The circuit diagram file is 002520cd6e1.pdf.

The component layout file is 002520cl6e.pdf.

Earlier versions of this board were used on ***Elgar*** and ***Elgar Plus*** DACs.

This board is detailed in the separate **Ring DAC™ Board Service Manual.**

Power Board DCS152223



This board filters the mains supply and allows the power to be switched on/off safely from the front panel POWER button. The connection of the mains supply to the Mains Transformer primaries is set by 3 slide switches. It is common to most current products. The Power Board is covered by a yellow insulator board for safety. Several earlier versions of this board were used on the Classic range.

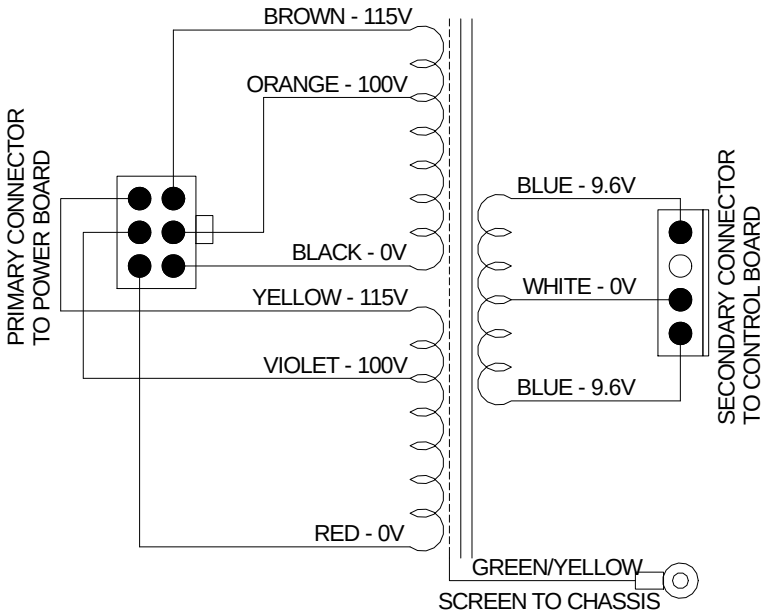
The circuit diagram file is 152223cd5a1.pdf (current version).

The component layout file is 152223cl5a.pdf (current version).

This board is detailed in the separate **Power Board Service Manual.**

Mains Transformer DCS002896

This transformer is common to all current products except the ***Puccini U-Clock***. Two transformers are used on the ***Scarlatti DAC***, to improve isolation between digital and analogue circuitry. All other products use a single transformer. The twin primaries allow the transformer to be configured for 100, 115/120, 200, 215/220 or 230/240V.



Early versions of this transformer had four primary wires instead of six and offered two ranges: 100-120V and 200-240V. The Power Board used with this early type should be set to 115/120V or 230/240V ONLY (not 100V or 215/220V – otherwise the unit will not power up).

TYPICAL winding resistances are:

- Black to Orange or Red to Violet: 22 ohms
- Black to Brown or Red to Yellow: 25 ohms
- Blue to White: 0.15 ohms

Note that there is a considerable resistance variation from one transformer to another.

1394 Interface Board set DCS160710

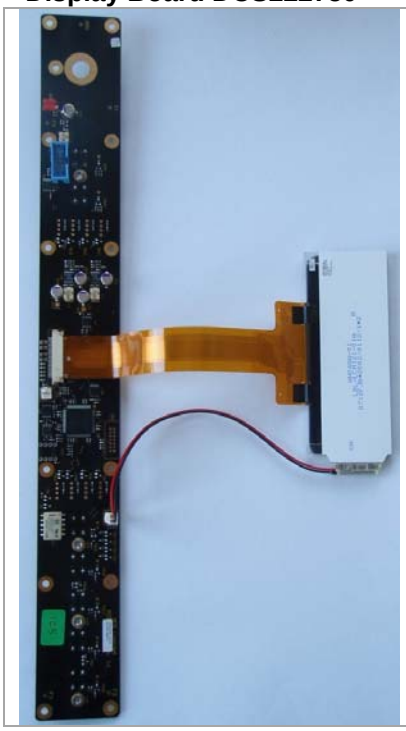
This assembly comprises a main 1394 interface board (LINK) and a small 1394 connector board (PHY), joined by a ribbon cable. It handles the 1394 interface, running its own software, which is downloaded from the Control Board as necessary. The same board set is used in the ***Scarlatti / Paganini Transport***, ***Paganini DAC*** and ***Scarlatti Upsampler***, it is NOT compatible with the Classic range.

The circuit diagram file is 160710cd4b1.pdf.

The component layout file is 160710cl4b.pdf.

This board is detailed in the separate **1394/USB Interface Board Service Manual.**

Display Board DCS222750



The Display Board carries the front panel controls and remote receiver, it drives the LCD display module MOD0160008 (shown at the right side of the picture). The same board is used on the ***Scarlatti Clock*** and ***Scarlatti Upsampler***.

To date, the 1B or 1C versions of this board have been used on all ***Scarlatti DAC***s, version 1D will be introduced shortly. The differences between these versions are minor.

CN1 connects to the rotary encoder (Volume /Balance control).
CN2 connects to Control Board CN16. This carries power (+5V / 0V), data, clock, IR remote control and power on/off signals.
C4 & CN5 connect to the LCD display module.

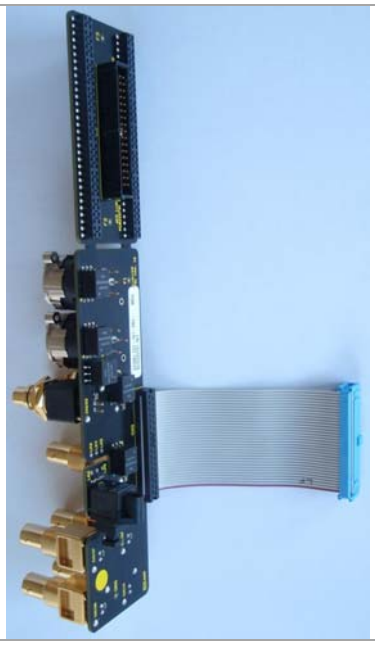
The circuit diagram file is 222750cd1d1.pdf.

The component layout file is 222750cl1d.pdf.

This board is detailed in the separate **Display Board Service Manual.**

Unique Subassemblies

Connector Panel Board DCS222761



This board is in two sections. The main part (the lower section in the picture) carries the digital I/O connectors and some digital interface components. The AES and SPDIF inputs (CN101-105) are isolated with pulse transformers T101-105. TosLink receiver U104 (mounted on a small break-off board) connects to the main part by 3 wires. All connections are brought out on ribbon cable CN1.

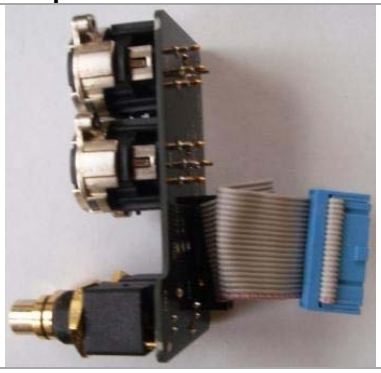
The second part (the top break-off section in the picture) fits onto the two I/O headers CN82/83 on the Control Board. CN1 connects to the ribbon cable CN2 on the main part of the Connector Panel board.

The retention force of CN82/83 is VERY high. Take great care to avoid damage if it is necessary to detach this board from the Control Board.

The circuit diagram file is 222761cd1b1.pdf.

The component layout file is 222761cl1b.pdf.

Output Connector Board DCS122770



This board carries the Analogue Output connectors and the Output Level switch. A ribbon cable connects to CN301 on the DAC Analogue Board.

The same board with a different component fit was used on late versions of ***Elgar Plus***.

The circuit diagram file is 122770cd1b1.pdf.

The component layout file is 122770cl1b.pdf.

FAULT-FINDING

Known Faults and Solutions

Make sure the latest software is loaded.

Symptom: Display contrast is poor and cannot be improved

- Usually caused by a fault on the Display Board – see the **Display Boards Service Manual**.

Symptom: The rotary encoder works in only one direction

- This can be caused by a failure of the encoder – replace the encoder assembly.
- Another possibility is a bad connection at the red IDC connector CN1. Either fit a new IDC connector or replace the encoder assembly.

Fault Finding Guide

Symptom: The mains fuse blows

This can be caused by a brief mains voltage surge. Check that the voltage setting is correct, then fit a new fuse of the correct type (20x5mm T0.5A L). If the new fuse does not blow, soak for 24 hours to verify the fix.

If the new fuse blows, the most likely causes are:

- Incorrect voltage setting. See the Power Board Service Manual for details.
- A damaged surge arrestor on the Power Board. See the Power Board Service Manual.
- The mains transformer short-circuits. This is VERY RARE, so please do not make assumptions! Test the transformer against the circuit diagram on page **16,** checking for short-circuits. Note that the secondary windings (Blue and White wires) have a very low resistance.

To date, we have never seen a fault in the rest of the unit that causes the mains fuse to blow.

Symptom: The unit fails to power up

- Is AC reaching the Power Board? If not, check the mains wiring and mains fuse.
- Is the full mains voltage AC passing though the Power Board to the mains transformers? If not, make sure the Power Board is turned on and find the point at which the circuit is broken.
- Is low voltage AC reaching Control Board at connectors CN17 & CN18? With nominal mains voltage, the AC voltage (referred to the base plate) at pins 1 & 4 (blue wires) should be 10V and at pin 2 (white wire) should be 0V. If the voltage is substantially different, check the transformers for signs of overheating.
- To check the Control Board Power Supply circuitry, measure the DC voltages between GND (or the base plate) and the various square test point pads around the board. You will have to lift the 1394 main board clear to do this (switch off the power first!). Typical measurements are:

Name	DC Voltage
VR2V5	+2.5V
VP5	+5.0V
VP9	+8.5V
VP18U	+17.9V

Name	DC Voltage
VP5PSU	+5.0V
VP3PSU	+3.4V
VP3	+3.1V
V1P8	+1.8V

Name	DC Voltage
VN18U	-18.6V *
VP6U	+6.8V
VN8X	-5.9V

***** Note that VN18U is disabled at initial switch-on and will not measure -18V until the unit has successfully booted up.
If any of these measurements are different by more than 5%, this indicates a fault in the power supply or that the power supply is being overloaded by the circuitry it is supplying. Power down, disconnect the 1394 Board and DAC Analogue Board, then check to see if this has corrected the voltages.

- If power is reaching the Control Board, check the behaviour of the red diagnostic LED, located near the front right corner of the Control Board. When power is applied, the LED should flash once and then flash twice a few seconds later. It should remain off for about 20 seconds while the board boots up, then turn on. If this does not happen but there is some LED activity, the microcontroller is not running. Try reloading the software from ROM, as described on page **27**.

- Detach the DAC Analogue Board from the Control Board and move it out of the way. At the back right corner of the Control Board, you will see 2 metal-cased crystal oscillators X01 & X02. There is provision for 4 crystals on the board, a red LED behind each turns on when the crystal is powered. At power up, the LED behind X02 should turn on and stay on. During boot-up, the LEDs behind the other 3 crystals should flash together on 2 occasions. Check that a 22.6MHz clock appears at U626 pins 3 & 4. If not, X02 or U613 may be faulty.
- If the Control Board microcontroller is running, CN12 may be connected to PC running Hyperterminal to extract diagnostic information from the Control Board. Please see the **Service Manual for the Control Board v7** for more information.

Symptom: The unit fails to lock at some sample rates

- Check that the clocking arrangements are consistent with the data rate. For example, the DAC cannot lock to a clock at 44.1kHz while receiving data at 48, 96 or 192kS/s, because the two rates are not exact multiples.
- Select the required input and set the SYNC source to Audio. If the unit locks correctly to incoming data at 44.1, 88.2, 176.4kS/s or DSD but not to incoming data at 32, 48, 96 or 192kS/s, this suggests a fault near crystal X01.
- Select the required input and set the SYNC source to Audio. If the unit locks correctly to incoming data at 32, 48, 96 or 192kS/s, but not to incoming data at 44.1, 88.2, 176.4kS/s or DSD, this suggests a fault near crystal X02.

Further tests

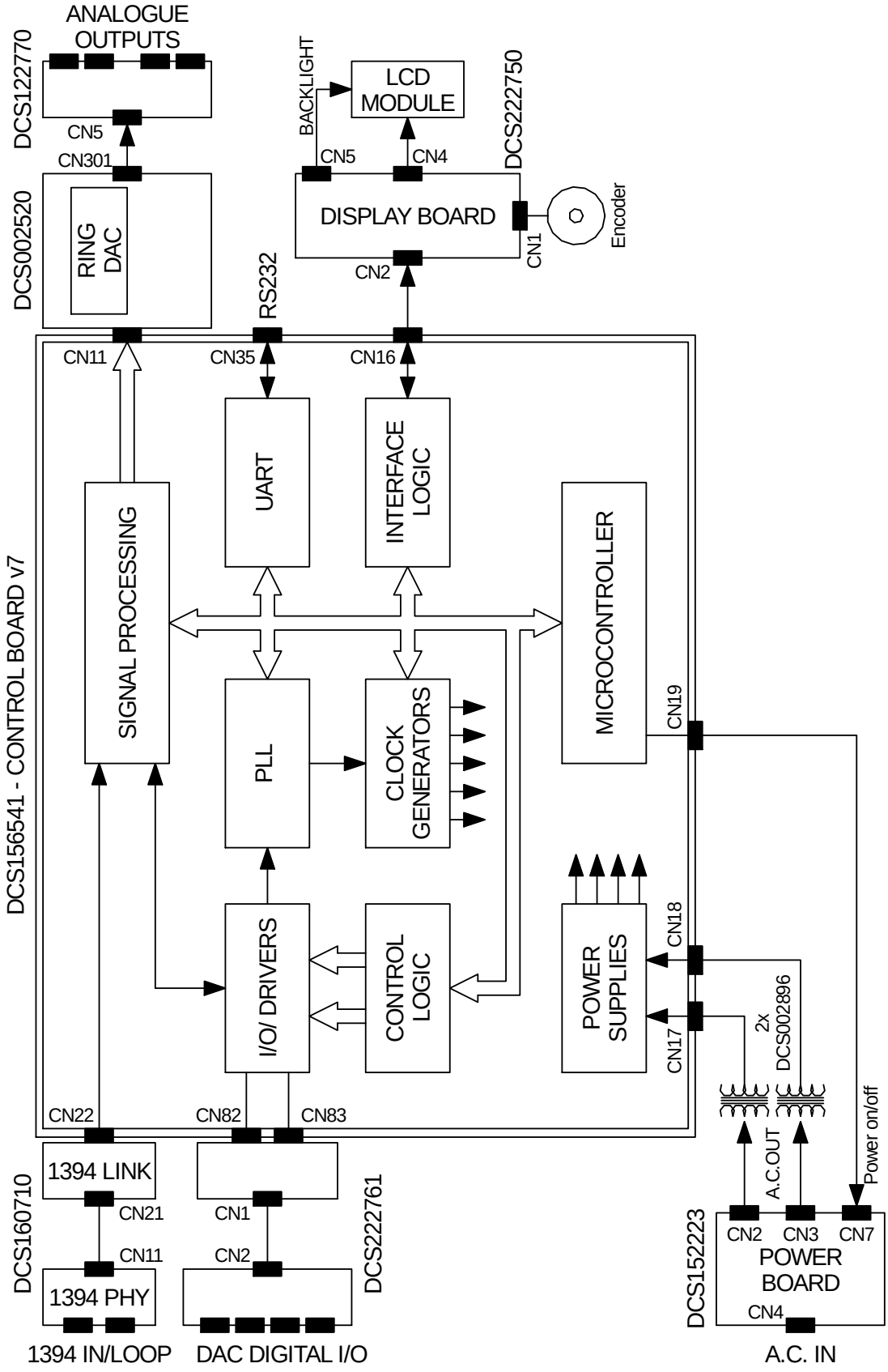
In most cases, the above information will be sufficient to get an unresponsive unit up and running, or indicate a serious fault on the Control Board – which is normally dealt with at dCS.

For faults which are restricted to the 1394 interface, please refer to the **1394 Interface Board set Service Manual**.

For faults which affect the analogue outputs, please refer to the **Ring DAC™ Board Service Manual**, as this is the most likely location of the fault.

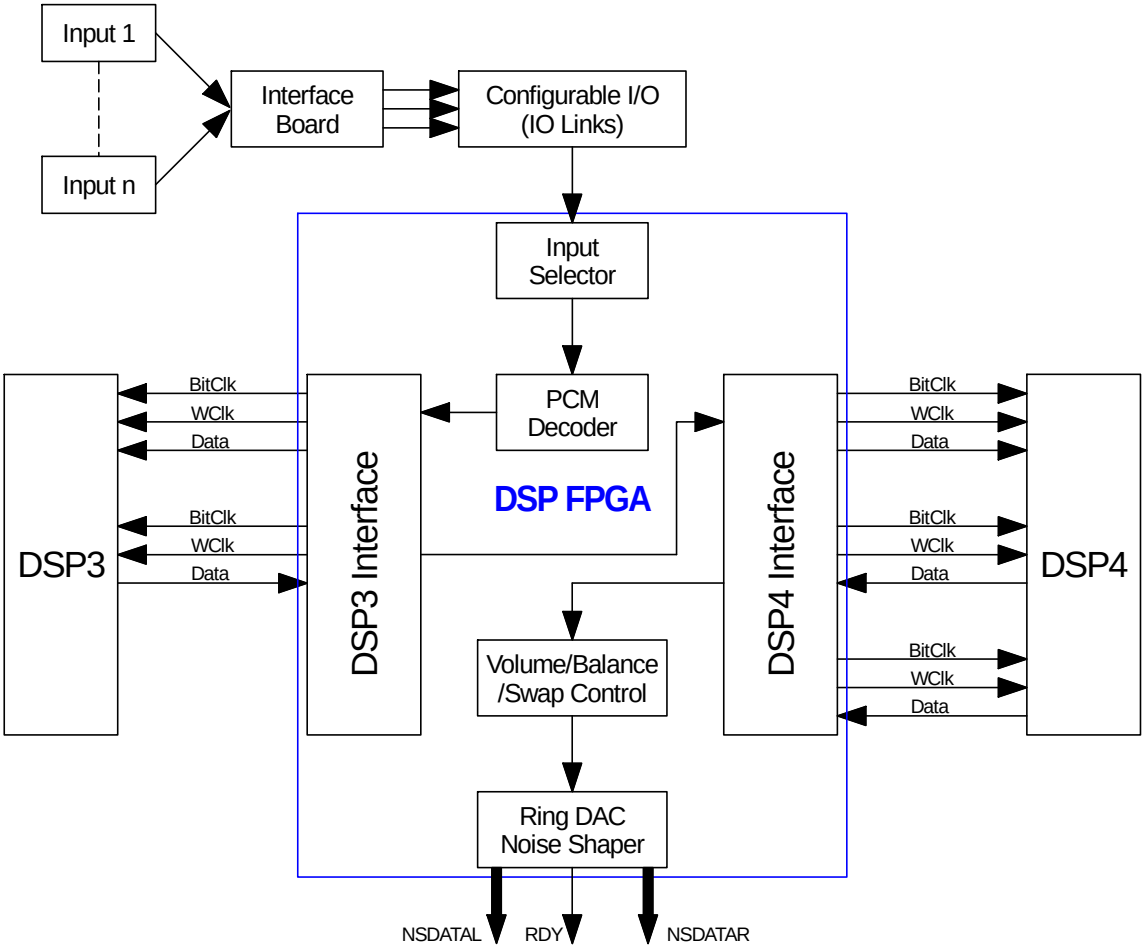
If the Display Board is not working correctly but the unit is still working correctly as a DAC, please refer to the **Display Board Service Manual**. Note that an intermittent ribbon cable connection to the Control Board is a fairly common cause of Display Board problems.

BLOCK DIAGRAM

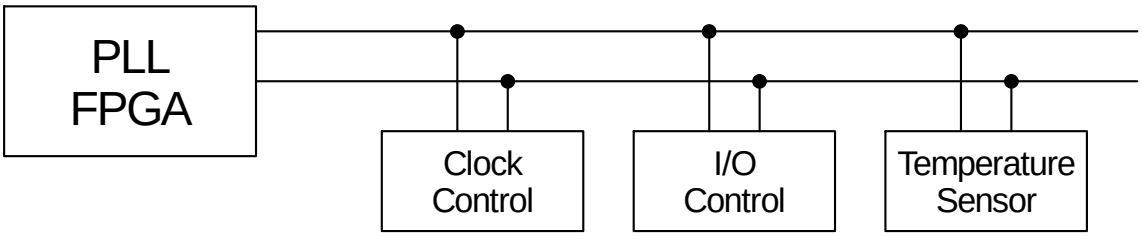


SIGNAL PROCESSING PATH

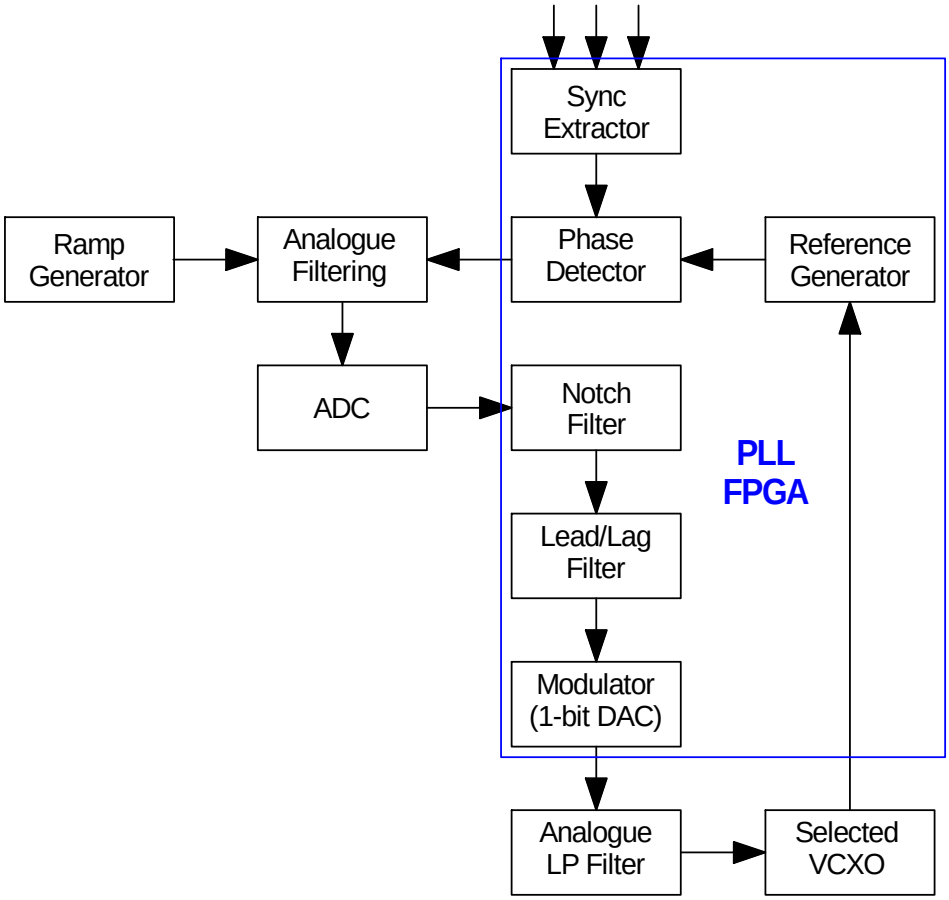
PCM Audio Path



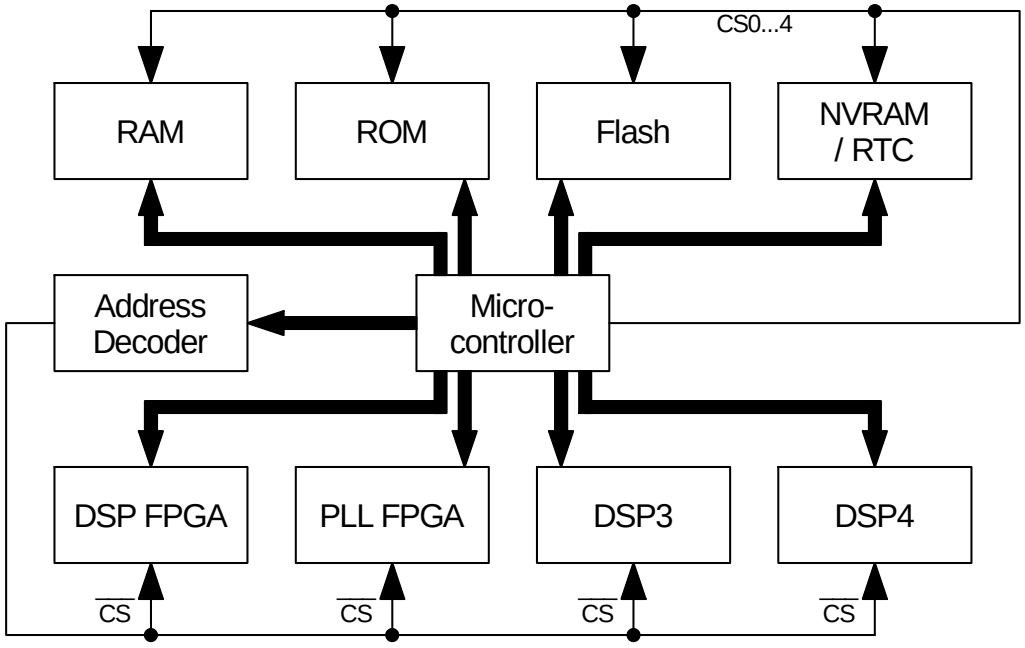
I²C Bus



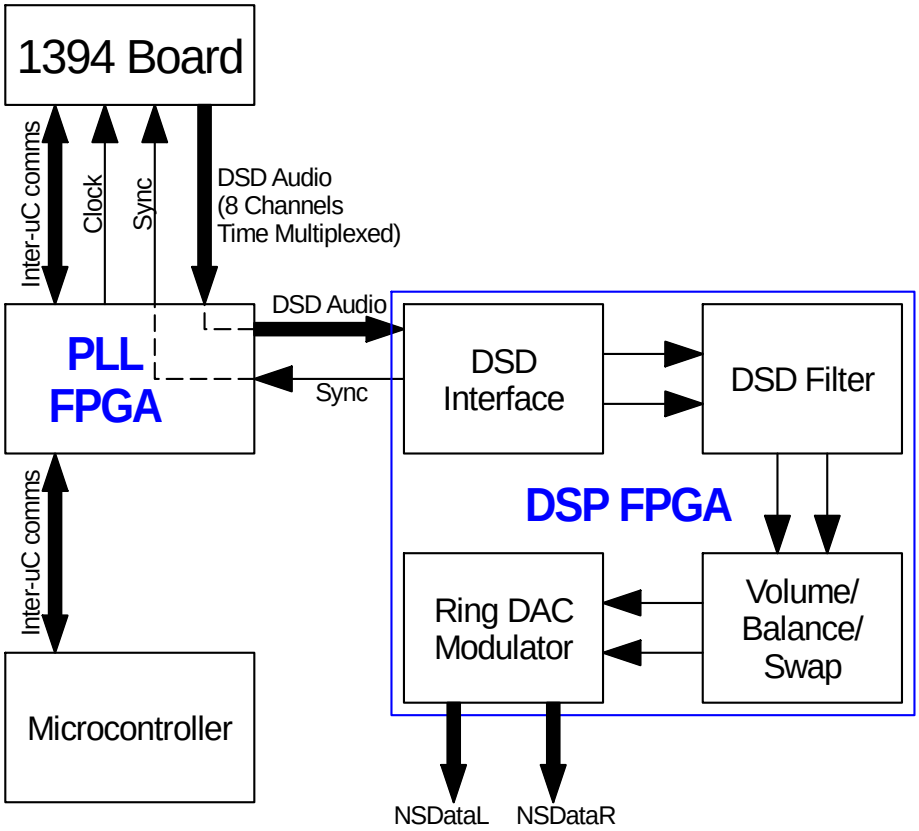
PLL



UA & UD



1394 Interface



CD UPDATE PROCEDURE

dCS Scarlatti DAC v1.20 Software Update

If you are loading a software version later than 1.20, follow the instructions provided with the disc.

Please read these instructions through fully at least once before running the update.

The CD supplied with these instructions enables the software in any ***dCS Scarlatti DAC*** to be updated to version 1.20.

To play the CD, you will need a standard CD transport, a CD player with a digital output or a ***dCS*** Transport. For simplicity, the term CD transport is used in the rest of these instructions to cover all CD playback equipment. A few CD transports are not suitable because they upsample to 48kS/s, or change the data in other ways (for example, the ML37 produces 17 bit data) – don't worry - the CD Update routine detects these and stops, preventing any changes to the internal software.

The actual displays shown on your ***Scarlatti DAC*** during the upgrade may vary slightly depending on what version software is currently installed. If this occurs, it is not a cause for concern.

Initial Set-Up

- Make sure that the Transport's PCM outputs are turned ON (in the Settings menu on the ***Scarlatti Transport***).
- Connect the ***Scarlatti DAC*** directly to the CD transport using either the AES interface (this uses a cable with XLR connectors), or the SPDIF interface (this uses cables with RCA, BNC or Toslink optical connectors). Select the input on the ***Scarlatti DAC*** that corresponds to the interface you have just connected.

The ***Scarlatti DAC*** should lock and display **0/44.1**.

- Disconnect any 1394 cables.
- If necessary, use the **Sync** button to set the ***Scarlatti DAC*** to slave mode.

Update Procedure

- Mute your power amplifier
- Insert the ***dCS*** Update CD into the transport, making sure it is in **STOP** mode. The disc must **not** be playing.
- Open the ***Scarlatti DAC*** 's menu by pressing the **Menu** button on the front panel. Press the **Menu** button again to select the Information menu. Press the → button to highlight the CD Update page and press the **Menu** button to start the update.
- **X Sure? √** will appear on the display – press the **Menu** button to continue.

The unit will display **Please wait** briefly, then **Please Start CD**.

- Press **PLAY** on the Transport. Do not wait too long, otherwise the update will abort.

The update is largely automatic from this point. The display sequence is shown below, with approximate times.

00:00 **Scanning – OK** are displayed in sequence.

If there is anything wrong with the ***dCS*** CD that has been loaded, or it does not match the product or the Transport is unsuitable, the unit will display **Wrong Disc!** and revert to normal operation. Don't worry – the internal software is unchanged. If either of the above cases occur, contact your ***dCS*** distributor or ***dCS***.

00:30	**Ver 1.20**	
01:15	**1/32**	The first block of data is read from the disc.
02:15	**2/32**	The second block of data is read ...
...		
32:15	**32/32**	The last block of data is read.
33:10	**Please wait**	The unit reboots. **DO NOT SWITCH OFF**
33:15	**Scarlatti DAC**	**DO NOT SWITCH OFF**
36:00	**00/44.1**	The update is complete.

- The 1394 interface will have stopped responding during the update. To restore normal operation, switch off completely, wait 10 seconds, then switch on again.

Your ***Scarlatti DAC*** is now ready for use.

Problems?

- If the display does not change for more than 5 minutes or there is a power failure, switch off the unit at the rear panel switch, wait 10 seconds, then switch on and start the update again.
- If the disc skips or you accidentally advance the Transport, the unit will display **Skipped!** Switch off the unit at the rear panel switch, wait 10 seconds, then switch on and start the update again.
- If the **Non Seq** message appears on the display, the most likely cause is that the update CD is faulty.
  There is no cause to worry as the original software is backed up inside the unit.

- Check the disc for dirt or damage. If the disc appears to be dirty, wipe it gently from the centre outwards with a dry soft cloth. If it is damaged, contact your local ***dCS*** distributor or ***dCS*** for a replacement. If it appears to be OK, run the **CD Update** routine again to load the new software.

If your ***Scarlatti DAC*** starts up correctly but has a problem of some kind, do not repeatedly CD Update as this **cannot** solve the problem.

Routinely CD Updating with the same software is pointless and inadvisable.

What's new in v1.20?

The new software adds some useful new features to your ***Scarlatti DAC***. For more information, please download the latest version of the ***Scarlatti DAC*** **User Manual** from www.dcsltd.co.uk/page/support. Printed copies of the ***Scarlatti DAC*** 1.2x manual may be purchased from ***dCS***.

In brief, the new features are:

1. The AES, RCA and BNC interfaces have been updated to accept single-wire data at 176.4 and 192kS/s.
2. The Word Clock Input will lock to word clock at 176.4 and 192kHz. The data rate must be an exact multiple of the clock rate.

RE-LOADING SOFTWARE FROM ROM

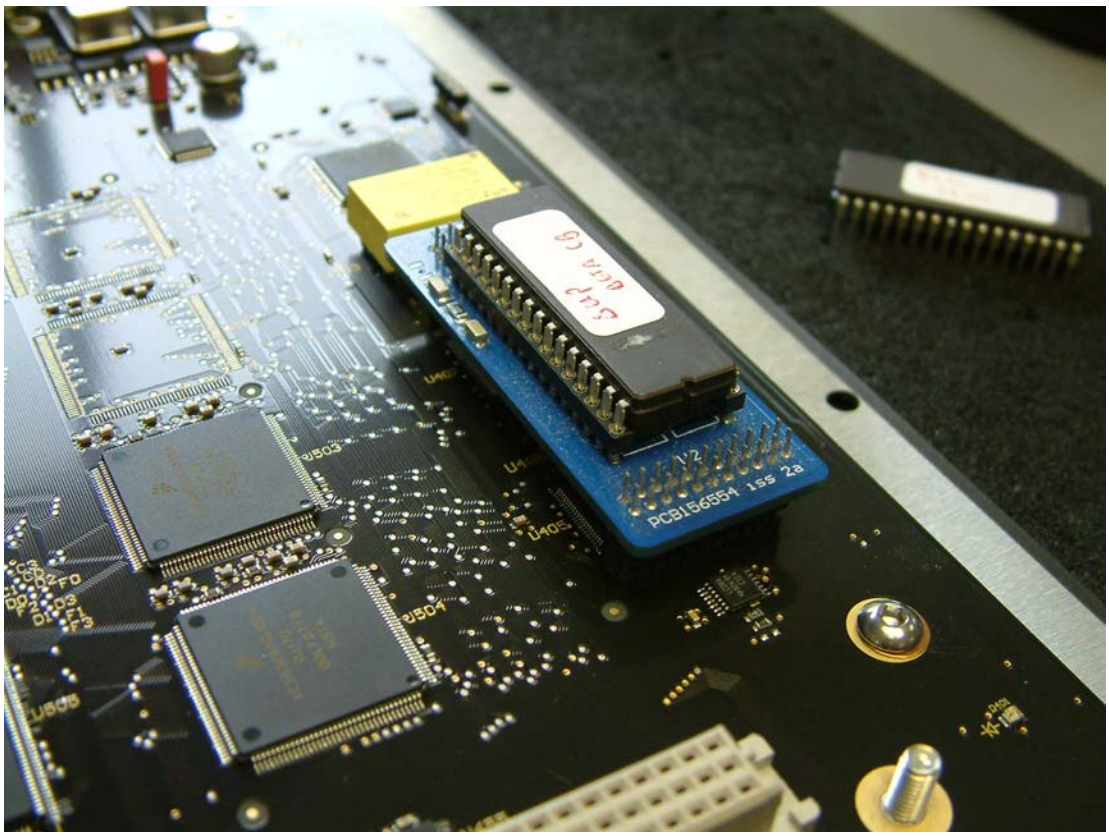
Re-loading the Control software

Normally, software can be updated from CD without opening the case, provided the unit boots up and runs correctly.

Occasionally, the software stored in the flash memory becomes corrupt, usually as a result of a power failure or user error while CD Updating. There is also some evidence that nearby electrical storms can do this. If the software has become corrupt, it is necessary to reload the unit from a ROM. To do this, you will need a DCS156554 programmer board and a ROM labelled "**SDC**" which is loaded with the ***Scarlatti DAC*** software. You can load an older version from ROM and then CD Update to the current version if necessary.

- Power the unit up and then pull out the power cable.
- Open the case, disconnect the Display Board ribbon cable and remove the top cover.
- Remove the 4 screws securing the DAC Analogue Board and pull it off the Control Board.
- Fit the **SDC** ROM to the socket in the programmer board, ensuring that the notched end is beside the "U2" label.

- Fit the programmer board onto the 3 headers near the edge of the Control Board, as shown below, making sure all pins fit into the sockets on the underside of the programmer board.



- Connect the power cable.

The Control Board will power up, red LED D401 will flash once and LEDs elsewhere on the board will turn on. The loading process takes several minutes, please be patient. When it is complete, the red LED D401 will start flashing steadily.

If D401 is still off after more than 10 minutes, the software has failed to load for some reason. Pull out the power cable, make quite sure the programmer board and ROM are correctly seated and repeat the process.

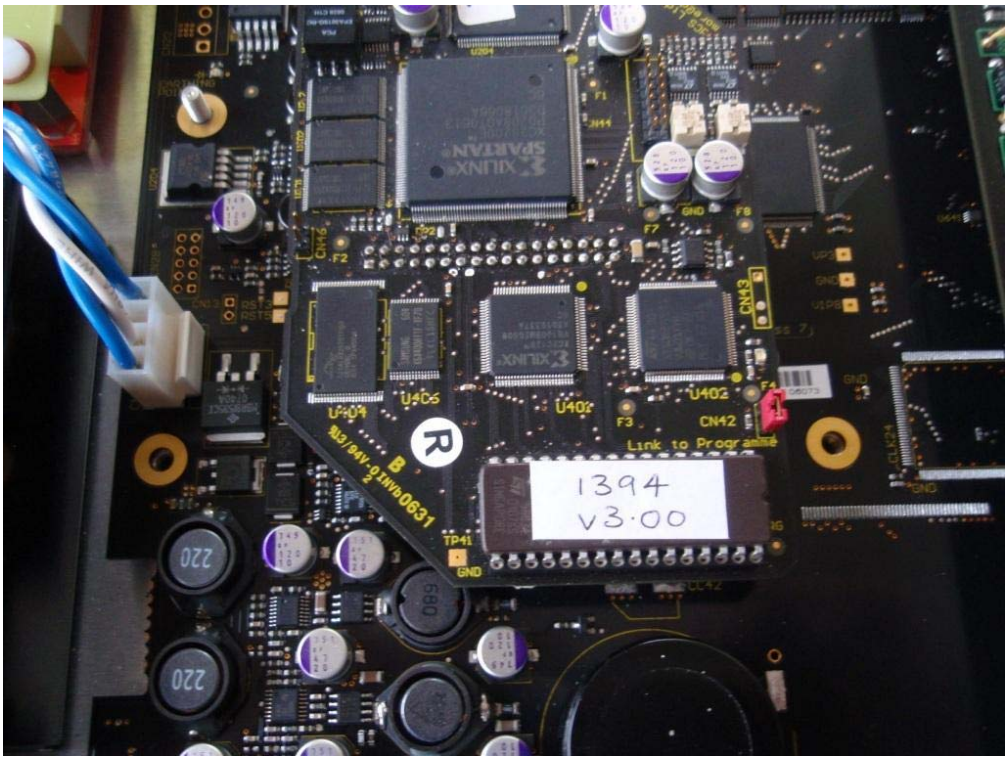
- Disconnect the power cable.
- Remove the programmer board and ROM, put them somewhere safe in anti-static packaging.
- Fit the DAC Analogue Board on the Control Board and secure it with the 4 screws.
- Reassemble the unit, remembering to connect the Display Board cable.
- Open the menu and check that on the **Information** / **Version Information** page, the **Control version** matches the ROM issue.
- Check that the unit is operating correctly.

Re-loading the 1394 code

If the 1394 Board stops responding, either due to an environmental influence or a mistake while CD Updating, the 1394 main board must be reloaded with a ROM. You will need a ROM labelled "**1394 v3 BOOT**" (or later) which is loaded with basic 1394 code and a 2-way jumper.

Note that 1394 code v1 and v2 are NOT compatible with Scarlatti and must not be loaded into Scarlatti products.

- First, make sure the Control software is up to date. If it is not, CD Update before proceeding.
- Power the unit up and then pull out the power cable.
- Open the case, disconnect the Display Board ribbon cable and remove the top cover.
- Fit the **1394 v3** ROM to the socket U405 on the 1394 main board, ensuring that the notched end is towards the RIGHT-hand side. Fit the red jumper to the nearby programming header, CN42.
- Connect the power cable and observe the red LED near CN42.



The LED will flash once per second for about 45 seconds, then turn off. After another 35 seconds, the LED will flash rapidly to indicate the re-load is complete.

- Disconnect the power cable.
- Remove the 1394 ROM and jumper, put them somewhere safe in anti-static packaging.
- Reassemble the unit, remembering to re-connect the cable to the Display Board.
- Power up the unit and select the 1394 input.

The 1394 Board is now loaded with a basic version of the 1394 code. Once the unit has booted up, the Control Board will download the current 1394 code automatically. The unit will display **1394 Update**, a progress bar and **Updating...**
DO NOT SWITCH OFF. The progress bar will fill in over the next 6 minutes, then **Updating...** will disappear. After another 30 seconds, the update is complete and the display will return to normal.

- Switch off completely (not just to Sleep mode), wait 10 seconds and switch on.
- Open the menu and check that on the **Information** / **Version Information** page, the **1394 version** is 3.00 (or later).
- Check that the unit is operating correctly.