

dCS Scarlatti Transport

Service Manual

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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.



CD Players and Transports are classified as CLASS 1 LASER PRODUCTS. Removing safety covers may expose personnel to laser radiation. If it is necessary to operate the equipment with the laser(s) active, wear appropriate safety goggles and do not stare along the laser beam.

Disclaimer

Data Conversion Systems Ltd. accept no liability for any kind for loss, accident or injury resulting from service activities.

Confidentiality



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UNIT DESCRIPTION



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

- Twin laser Esoteric VRDS-NEO VMK3 CD/SACD mechanism, featuring a brushless motor and a heavy cast CD turntable.
- Industry standard PCM outputs: 2x AES3 on XLR3 connectors, 2xSPDIF on RCA & BNC connectors, TosLink optical, SDIF-2 on 2x BNC connectors. All PCM outputs carry 16-bit data at 44.1kS/s.
- The IEEE1394 interface currently generates encrypted DSD data compatible with 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.
- The Transport upsamples CD data to DSD and downsamples SACD data to 16/44.1, so the PCM and 1394 interfaces are always active, regardless of whether a CD or SACD is being played.
- Industry standard Word Clock Input and Output. The unit can either Sync to an external master clock connected to the Word Clock Input or act as a 44.1kHz grade 2 Master Clock, allowing a suitable DAC or Upsampler to be locked to the Word Clock Output.
- Discrete Phase-Locked-Loop circuitry.
- Software may be updated by the user from a suitable CD-R. If the software has become corrupted, the unit may be re-booted from a ROM, fitted to a Programmer Board.
- Heavy-duty all-aluminium case with laminated damping plates.
- Available with either silver or black anodised front and rear panels.

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 Transport* with serial number STT-0S2-7G4-1D1-1C5-012-5832.

A typical serial number	This code group means:
STT	PRODUCT CODE. SCK = Scarlatti Clock, SDC = Scarlatti DAC, STT = Scarlatti Transport, SUP = Scarlatti Upsampler, PPR = Puccini Player, PUU = Puccini U-Clock, PCK = Paganini Clock, PDC = Paganini DAC, PTT = Paganini Transport, PUP = Paganini Upsampler.
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.
1D1	TOP BOARD CODE. The build standard of the Transport Power Supply 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

April 2007 v1.00 – This is the first issue, it includes 1394 software v3.00.

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, the unit is in Sleep mode. Press the **POWER** button once to return to normal operation.

Symptom: The unit fails to lock to a Master Clock

- Make sure the Clock is set to 44.1kHz and is correctly calibrated.
- Check that the Clock cable is not damaged. Replace it with another cable.

Symptom: Problems using the Dual AES output.

- The Transport has 2 single AES outputs, they are NOT presently configured as a Dual AES interface.

Symptom: No output from the AES, SPDIF or SDIF-2 outputs.

- Check that the **Transport Settings / PCM Enable** menu page is set to **On**.

Symptom: When playing an SACD, PCM data appears on the SDIF-2 output instead of DSD.

- Our SACD license requires that SACD data is output either as encrypted DSD (over the 1394 interface) or down-sampled to CD format. SDIF-2 does not support encryption, so it must be limited to PCM.

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 DAC 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 genuine CD – please return the disc to the disc manufacturer and demand a genuine CD in exchange.

Symptom: With no disc loaded, the unit reads TOC and plays music

- A disc is stuck inside – see below.

Symptom: A disc is stuck inside

- In use, the Esoteric VMK3 mechanism presses the disc against a cast turntable. If the top face of the disc is coated with a sticky substance (e.g. glue to secure a puck in a top-loader), the disc will become stuck to the turntable and then cannot be ejected. DO NOT attempt to load another disc to dislodge it, as the extra pressure may cause damage. See page **25** for instructions on removing a stuck disc.

DISMANTLING PROCEDURE

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

Tools required:

- Ratchet screwdriver handle.
- Screwdriver bits: Allen key 2, 2.5 & 3mm A/F, 6mm flat blade, No.1 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.

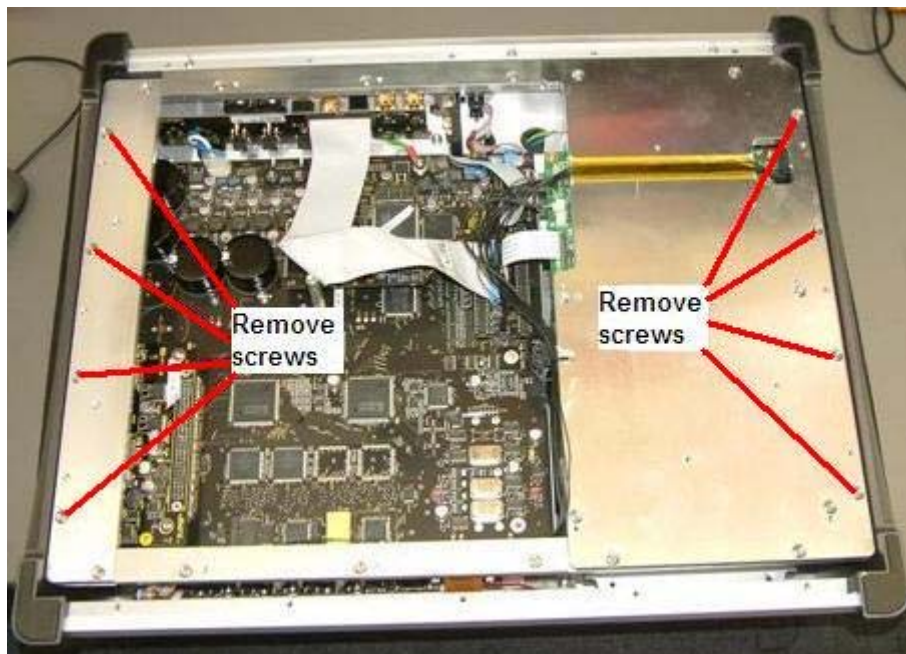


Remember to observe anti-static precautions when dismantling.

Opening the case

Before the unit can be disassembled, the front of the mechanism tray must be removed.

- Open the tray
- Turn the unit off, leaving the tray open
- Carefully remove the two screws under the front of the tray front and remove the front trim
- Turn unit on and close the tray.
- Turn unit off and remove all cables.
- Carefully turn the unit over to lay upside-down on a clean, flat, protective surface, with the front toward you.
- Remove all (24) screws from the base plate, lift it off and store securely.
- Remove the four (4) screws at each side of the chassis ONLY. Do not touch the other screws.



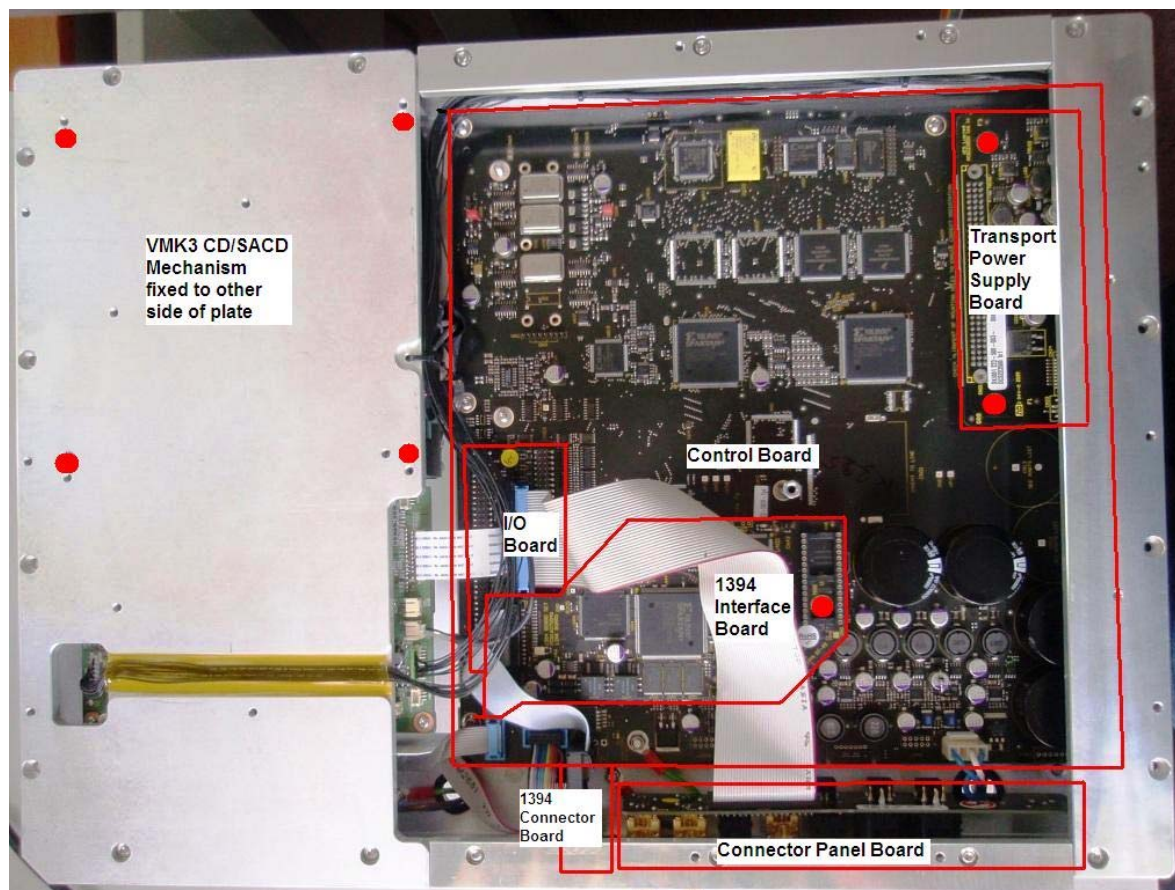
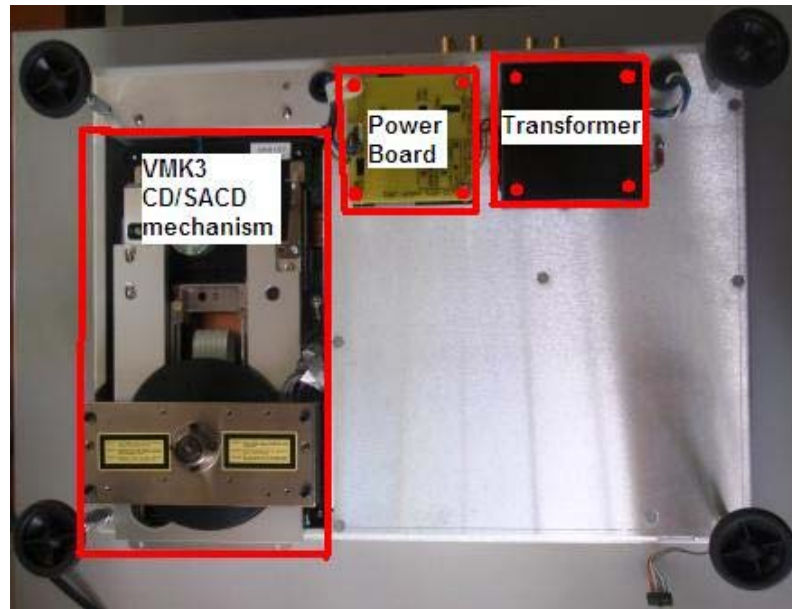
- Lift the front of the internal chassis up by enough space to allow access to the cable from the chassis to the Display Board, located on the left hand side. Disconnect the cable.
- The complete internal chassis can be lifted out by holding at the sides, tilting the front up and then forward. Take care to guide the rear panel connectors through the rear panel.



DO NOT place the chassis upside-down resting on the CD mechanism, as this can cause serious damage. Either purchase a set of feet from dCS and fit them to the chassis (see the next page) or support the chassis on a suitable support, such as a stack of books.

Identification of the sub-assemblies

The fixings are indicated by red dots. The 4 feet are used during production to protect the mechanism.



Removing sub-assemblies

Top section:

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 mains **Transformer** is fixed by a screw in each corner. Disconnect the cables from the Power Board and Control Board, then detach the green/yellow screen wire from the base plate.

The **VMK3 CD/SACD Mechanism** is secured to the sole plate by 4 screws. Detach the 4 cables from the underside - 3 near the I/O Board, one on the far side of the sole plate. Turn the chassis upright, remove the 4 screws from underneath and lift the Mechanism out of the chassis.



The Mechanism is quite heavy – there is a high risk of damage if it is detached from the sole plate while the chassis is upside-down. **dCS** cannot accept liability for such damage.

Bottom section:

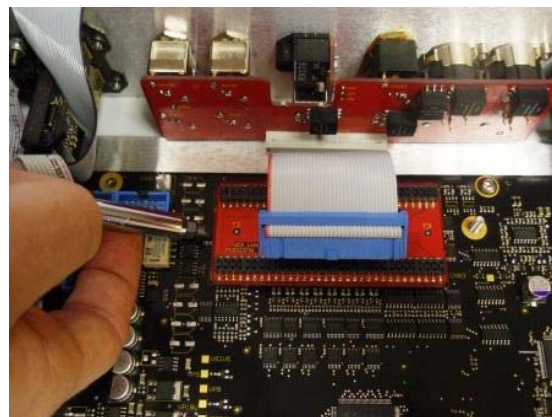
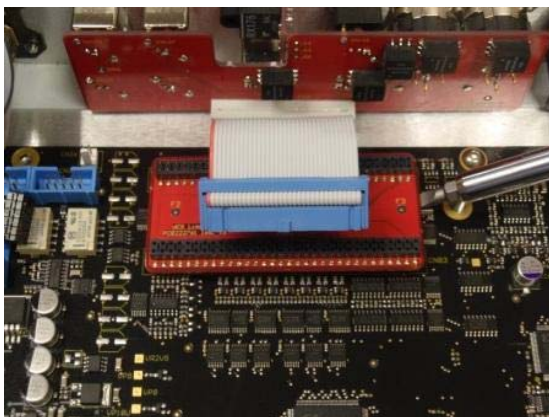
The main section of the **1394 Board** is secured by one screw and washer inside the outline of the ROM socket (U405). Remove the screw and pull the board off the Control board. The 1394 Connector Board is attached to a bracket which is fixed to the back panel by 3 screws.

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



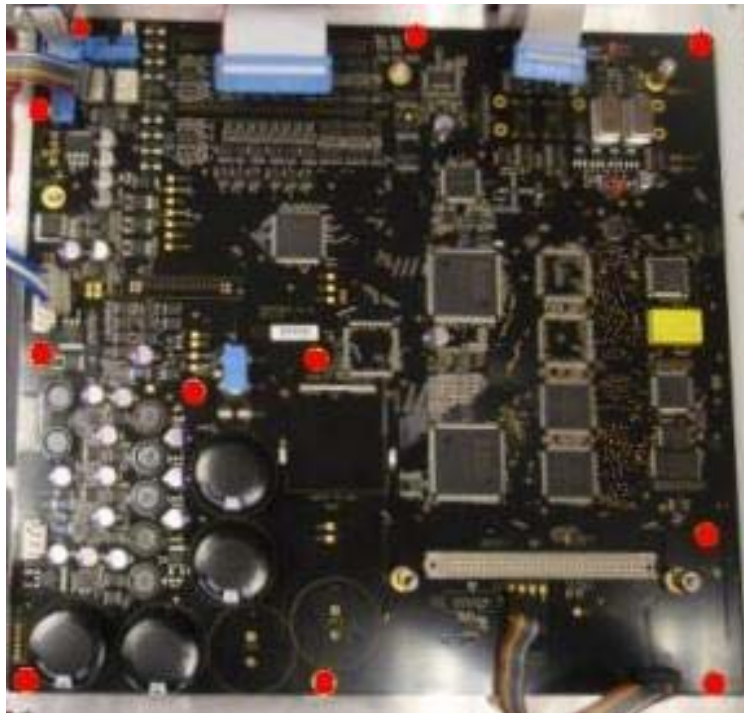
This board is difficult to remove! Careless use of tools can cause serious (and expensive) damage to the Control Board, **for which dCS shall not be liable**. If you really need to remove it and you are not confident you can do so safely, refer servicing to **dCS**.

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.



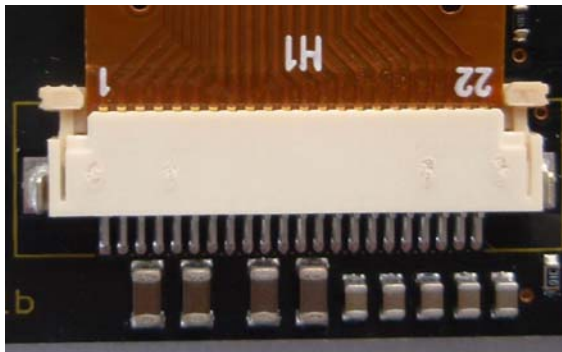
The **Transport Power Supply Board** is secured to the Control Board by 2 screws. Remove the screws and pull the board off the large connector.

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

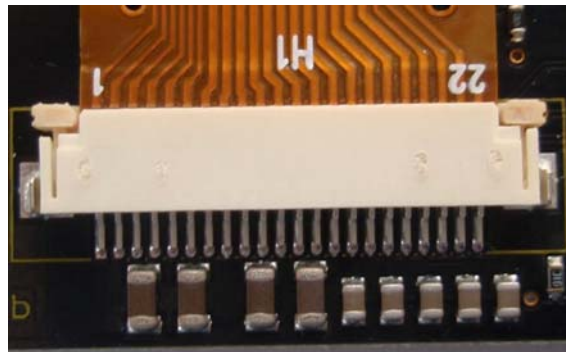


The **Connector Panel Board** is fixed to the back panel by the nuts and screws on the connectors themselves.

The **Display Board** is secured to the case front by 10 nuts and washers. Release the ZIF 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, detach the ribbon cable connector from the chassis, remove the nuts and washers and ease the board off the studs.

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.



LCD module mounting

Reassembling



DO NOT ATTEMPT TO LOAD OR PLAY A DISC WHILE THE UNIT IS UPSIDE-DOWN.

- Refitting the internal chassis is generally the reverse of removing it.
- Holding the internal chassis by the sides, tilt the chassis down at the rear and locate the rear panel connectors through the rear panel
- Take care of the plastic instruction strips.
- Refit the front panel cable before lowering the front of the chassis.
- Fit, do not fully tighten, the eight (8) securing screws (4 each side).
- Turn the unit upright.
- Fit the power cable and power up.
- Open the tray and check it is located centrally in the slot.

If there is a larger gap on one side, the internal chassis needs to be moved slightly:

- Remove power, leaving the tray open.
- Fit the tray front.
- Carefully turn the unit over – TAKE EXTREME CAUTION WITH THE EXPOSED TRAY
- Loosen the eight securing screws to allow the internal chassis to be moved
- When the tray is located centrally, tighten the eight screws to firmly secure the internal chassis
- Before fitting the base, turn the unit upright and power up to check operation of the unit, especially the control buttons and tray movement.
- If everything is OK, fit the base plate.

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 and 7J versions of this board have been used on all *Scarlatti Transports*.

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**.

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 *Paganini Transport* and *Scarlatti /Paganini DACs*, 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**.

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).

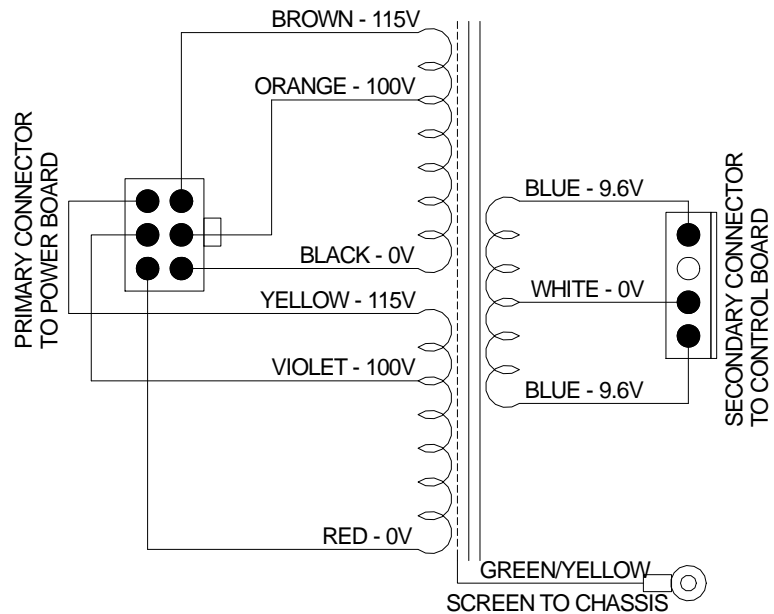
The component layout file is 152223cl5a.pdf (current version).

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*. 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.

Unique Subassemblies

Transport Power Supply Board DCS223500



The Transport Power Supply Board carries 4 regulators to supply the VMK3 CD mechanism. The power rails are VP12 (+12V), VP8 (+7.7V), VP5BE & VP5FE (both +5V). All 4 regulators can be turned on/off under the control of ANBRD[1] to ensure the mechanism controller boots up correctly. The power supplies are protected by four 1.5A SM fuses FS101-104.

CN21 mounts the Transport Power Supply Board onto CN11 on the Control Board, supplying power, ground, control, data and clocks. The board is then secured with 2 screws.

CN22 (2-way) connects 27MHz clock line ANBRD[2] to P803 (Clock Input) on the VMK3 Main Board.

CN23 (7-way) connects the 4 power rails and ground to P401 on the VMK3 Main Board.

CN24 (9-way) connects mechanism control data lines to P701 on the VMK3 Main Board.

The circuit diagram file is 223500cd1d1.pdf.

The component layout file is 223500cl1d.pdf.

Display Board DCS223750



The Display Board carries the front panel controls and remote receiver, it drives the LCD display module MOD0160008.

To date, the 1B, 1C or 1D versions of this board have been used on all *Scarlatti Transports*. The differences between these versions are minor.

CN1 is not used.

CN2 connects to Control Board CN16. This carries power (+5V / 0V), data, clock, IR remote control and power on/off signals.

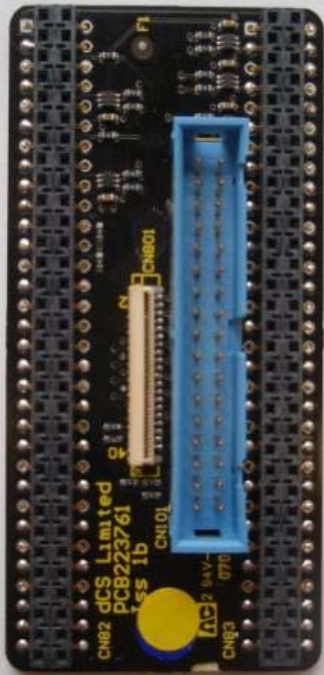
CN4 & CN5 connect to the LCD display module.

The circuit diagram file is 223750cd1d1.pdf.

The component layout file is 223750cl1d.pdf.

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

I/O Board DCS223761



This board fits onto the two I/O headers CN82/83 on the Control Board.

CN101 carries digital audio data via a ribbon cable to CN102 on the Connector Panel Board.

FFC CN801 takes 6 channel DSD / PCM data, mute & select signals from P801 on the VMK3 Main Board (note that the Scarlatti system is currently 2-channel only). Multiplexers U101-105 controlled by ASEL2 select DSD or PCM data which is passed to the Control Board via CN82/83.

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 223761cd1b1.pdf.

The component layout file is 223761cl1b.pdf.

Connector Panel Board DCS223765



This board carries the digital I/O connectors and some digital interface components. The AES and SPDIF outputs (CN105-108) are isolated with pulse transformers T103-106. TosLink transmitter CN10 (mounted on a small break-off board) connects to the main part by 3 wires. All connections are brought out on ribbon cable CN102.

The circuit diagram file is 223765cd1b1.pdf.

The component layout file is 223765cl1b.pdf.

Esoteric VMK3 CD/SACD Mechanism

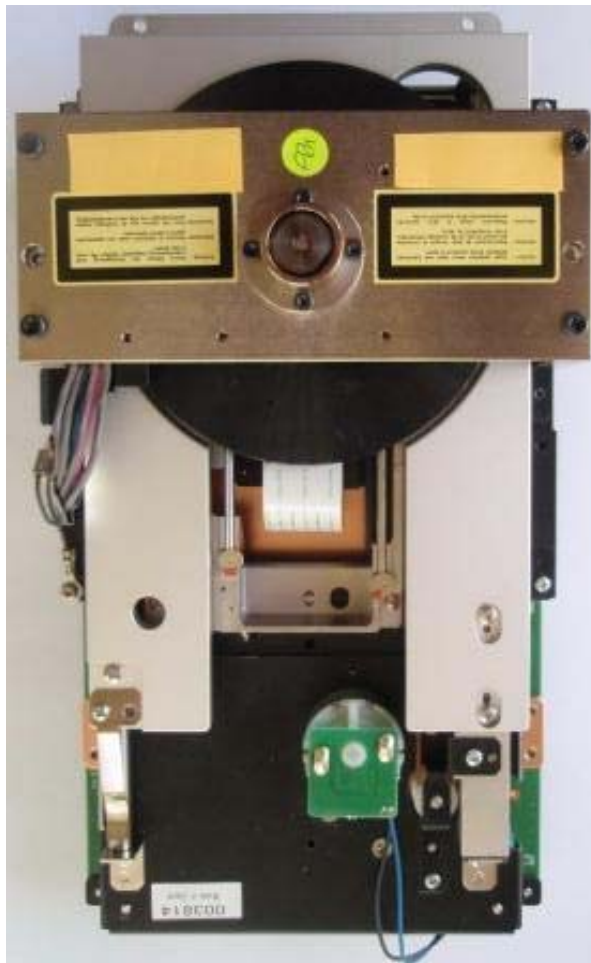
The VMK3 is a heavily built CD/SACD mechanism with the Main Board attached to the underside. In use, the disc is pressed against a cast duralumin turntable which is driven by a brushless motor.

3 cables connect the mechanism to the Transport Power Supply Board: P803 connects a clock line to CN22, P401 connects power from CN23 and P701 connects data lines to/from CN24.

An FFC socket P801 connects digital audio data to CN801 on the I/O Board.

The circuit diagram and component layouts for these third-party assemblies are restricted and cannot be published.

Servicing the mechanism is detailed on page 21.



Top view



Bottom view

FAULT-FINDING

Known Faults and Solutions

Make sure the latest software is loaded.

Symptom: The Transport fails to read any disc

- If the unit suddenly stops reading CD and SACD layers, the cause is likely to be crystal oscillator X03 running at a frequency outside the range 27MHz +/-300ppm (we have seen faulty crystals running at 33MHz and 15MHz). If the frequency at X04 pin 8 (or U617 pin 1) is out of range, replace X03, dCS part No. XTL0034270.

Symptom: Difficulty operating some front panel switches

- If some switches and the remote control work correctly, the cause is likely to be corrosion of the switches. The switches were replaced by parts with improved sealing in August 2007, so units with a Display Board code of **1B2** or later should not suffer from this fault. If corrosion is confirmed, replace the Display Board (part No. DCS223750).

Symptom: Transport plays the surround L/R tracks of a 5.1 SACD

- This has been seen on some units shipped in 2007. The mechanism defaults to the surround tracks, the layer change cycles through **SACD – CD - SACD 2-channel**. Open the menu, go to **Transport Information** and note the **Mech Version**. Request a VMK3 firmware v3.63 update disc from dCS, telling us the current **Mech Version**. Load the disc into the unit, it will read the file and eject it after a few seconds. Remove the disc, re-boot the unit and check that the **Mech Version** is 3.63. The Transport will now default to the stereo tracks.

Symptom: The unit displays “Error 001”, the mechanism fails to respond

- “Error 001” indicates a communication problem in the Teac Esoteric hardware between the signal processing micro (B/E) and the servo controller (F/E). This is often cleared by re-booting the unit.
- Check the **Mech Version** as described above and update if necessary.
- If the fault recurs, check that the OPU cable is correctly located. Check the 2 Esoteric boards for build errors or dry joints.

Symptom: The unit cannot read certain discs

- Make sure that the disc or discs causing problems are genuine Red-Book CDs or genuine Scarlet-Book SACDs – see the User Manual for details.
- If the problem is CD playback, make sure that the discs are printed with the Compact Disc Digital Audio logo. Discs that do not have this logo are likely to be “copy protected discs” – these are not genuine CDs, they have been recorded with data in a deliberately non-standard format and we have no obligation whatever to explain why they do not play correctly.
- Over time, dust or dirt accumulates in the optical system and eventually blocks the lasers, interfering with disc reading. Hybrid discs are generally the first to show reading errors.
- The intensity of the laser diodes fade over time, causing increasing difficulty reading discs.

See page **21** for instructions for cleaning the lens and replacing the OPU.

Symptom: Display contrast is poor and cannot be improved

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

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 14, 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 AC mains voltage passing through 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 connector CN17? 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	+2.500V
VP5	+5.0V
VP9	+8.5V
VP18U	+17.9V

Name	DC Voltage
VP5PSU	+5.0V
VP3PSU	+3.4V
VP3	+3.3V
V1P8	+1.8V

Name	DC Voltage
VN18U	0V *
VP6U	+6.8V
VN8X	-5.9V

* Note that VN18U is disabled on this model.

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, 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 32.
- At the back right corner of the Control Board, you will see 3 metal-cased crystal oscillators X01, X02 & X03. 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 powers up but the CD mechanism does not operate

- Check that the connections to the mechanism are secure.
- Power for the mechanism is generated by the Transport Power Supply Board and protected by 4 SM fuses. Check the DC voltages on both sides of these fuses (indicated in red below). If the measurements are more than 5% different from the typical measurements in the table below, this indicates a fault on the Power Supply Board or that the power supply is being overloaded by the circuitry it is supplying or that a fuse has blown.

Name	DC Voltage
5V F/E	+5.0V
8V	+8.0V
12V	+12.1V
5V B/E	+5.0V



- If a fuse has blown, replace it with a new 1.5A SM fuse. If the replacement blows, there is a fault in the mechanism or mechanism controller.
- Try powering down, disconnecting the 4 cables to the mechanism, then power up again and re-check the voltages. If some of the voltages are not in range, this suggests a fault in the Transport Power Supply Board.
- Check that a 27MHz clock is present at CN22 pin 2 on the Transport Power Supply Board, and that it is reaching the Esoteric Main Board. If not, check the circuitry around X03 on the Control Board.

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 either the Control Board or CD mechanism – which is normally dealt with at dCS.

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

If the Display Board is not working correctly but the unit is still working correctly as a Transport, 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.

SERVICING THE CD MECHANISM



**Laser diodes are easily damaged by electrostatic discharges (ESD).
Ensure ESD precautions are in place before servicing the CD Mechanism.**

The causes of disc reading problems

Over time, dust and dirt collect on the focusing lens and penetrate the optical system, causing difficulty reading discs. Among the worst contaminants are tobacco residue and construction dust, because these can coat all the optical parts and quickly build into a film that blocks or disperses the laser light.

CDs are read by an infra-red laser and have relatively coarse features, so they are inherently easier to read than SACD layers. SACDs are read by a red laser, which is much more easily blocked or dispersed by contaminants.

The first symptom is usually difficulty reading hybrid discs – the mechanism fails to read the SACD layer and defaults to the CD layer. Hybrid discs have a lower reflectivity than single-layer SACDs, so they are inherently harder to read.

Laser diodes have a limited life, gradually growing dimmer over a number of years. Eventually, this causes reading problems, usually of either CD or SACD layers.

For these reasons, OPUs are considered consumable items.

Cleaning the focusing lens

In many cases, loose dust can be removed by TWO 1-second blasts of Air Duster directed into the open tray. Do not spray excessively, as the lens suspension is easily damaged.

More severe contamination of the focussing lens requires opening of the CD mechanism.

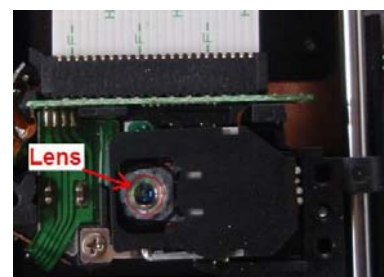
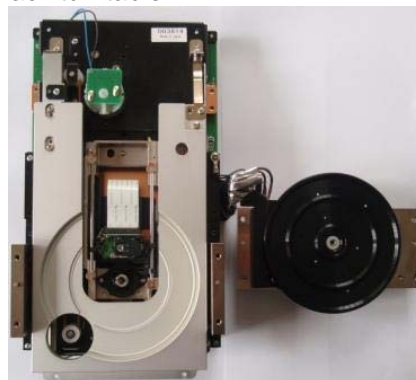
Additional tools required: Torque screwdriver with 3mm A/F hex bit.

- Identify a sample CD, SACD or hybrid disc that the unit used to read correctly but is now difficult to read. Make sure the disc is in good condition.



Note that there are many billions of discs in circulation, and some do not meet the Red Book or Scarlet Book standards. We cannot take responsibility for all the discs in circulation, whether they play correctly on another machine or not.

- Remove the chassis from the case.
- Remove the 4 screws (indicated by red blobs below) securing the bridge. Lift the bridge clear, taking care not to knock the black turntable.

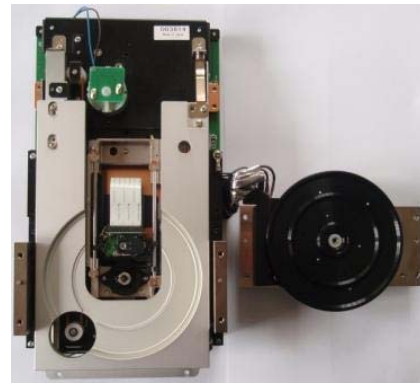


- Wipe the top of the focussing lens VERY GENTLY with a cotton bud moistened with a small amount of isopropyl alcohol.
- Lift the bridge and fit it to the top of the mechanism, taking care not to knock the turntable as this can damage the bearing. The bridge locates on pegs.
- Secure the bridge with the 4 screws using the torque screwdriver set to 1.6Nm.
- Replace the chassis in the case, remembering to re-connect the Display Board.
- Test the unit with the sample disc to see if the reading problems have cleared. If not, OPU replacement is recommended.

Replacing the OPU

Additional tools required: Philips 00-point screwdriver, needle-nosed pliers, ESD-safe soldering iron, solder wick.

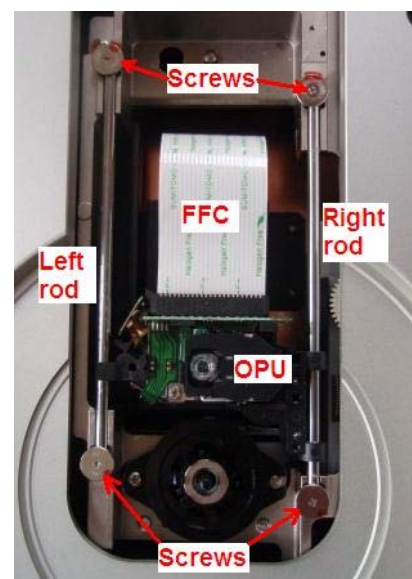
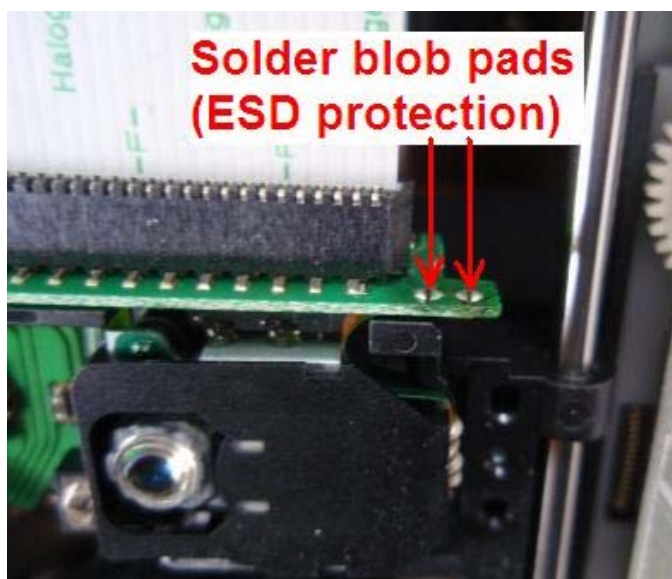
- Order a replacement OPU from *dCS*, the part number is MOD0190019.
- Remove the chassis from the case.
- Remove the 4 screws (indicated by red blobs below) securing the bridge. Lift the bridge clear, taking care not to knock the black turntable



- In most cases, the old OPU will be disposed of in a safe manner. If you intend to return the old OPU to *dCS* to support a warranty claim, use an ESD-safe soldering iron and some solder to short the 2 protective blob-pads on the OPU before removing it from the mechanism. These short-circuit the lasers, protecting them from ESD.



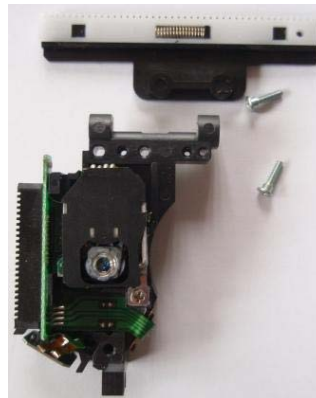
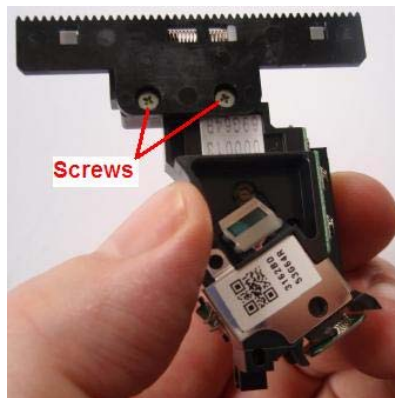
OPUs returned with the solder blobs missing or that show obvious contamination or with no identification cannot be considered for a warranty claim.





Laser diodes are easily damaged by electrostatic discharges (ESD). Ensure ESD precautions are in place before servicing the CD Mechanism or unpacking the new OPU.

- Disconnect the FFC from the old OPU.
- Check the contacts at the end of the FFC for signs of corrosion (black or blue-green film or crystals). If corrosion is present, remove it with a clean cloth soaked in iso-propyl alcohol. Re-fit the FFC, remove the solder blobs from the OPU, reassemble and test. If there is no corrosion or cleaning does not solve the problem, continue with replacing the OPU.
- Remove the 4 screws securing the two guide rods.
- While supporting the OPU, gently lift the Left rod - the OPU will swivel around the Right rod and the rack will disengage from the gears. Lift the OPU and both rods clear of the mechanism, put it down with the lens upward.
- Remove both rods. DO NOT wipe off the lubricating grease.
- Hold the OPU in your hand and remove the 2 screws securing the old OPU to the rack.



- Hold the new OPU in your hand, fit the rack onto the new OPU and secure with the 2 screws. Attach the 2 rods to the OPU.
- Carefully locate the rack teeth onto the gear wheel at the right side of the mechanism, locate the right rod into its slot and then the left rod. DO NOT USE ANY FORCE! If the rack does not locate immediately, move it around a little until the teeth mesh.
- Secure the rods with the 4 screws. Make sure the OPU can move stiffly over the full range.
- Fit the FFC firmly into the connector on the OPU (with the metal contacts upward) – it is a tight press-fit.
- Use an ESD-safe soldering iron and a small length of solder wick to remove the two solder blobs near the FFC connector. There must be no solder bridging the pads, or the lasers will not work.
- Lift the bridge and fit it to the top of the mechanism, taking care not to knock the turntable as this can damage the bearing. The bridge locates on pegs.
- Secure the bridge with the 4 screws, tightening them with the torque screwdriver set to 1.6Nm.
- Replace the chassis in the case, remembering to re-connect the Display Board.
- Test the unit with the sample disc to confirm that the reading problems have cleared.



If you find the Transport powers up but won't read any disc, the most likely cause is that the solder blobs have not been removed.

Replacing the bearing



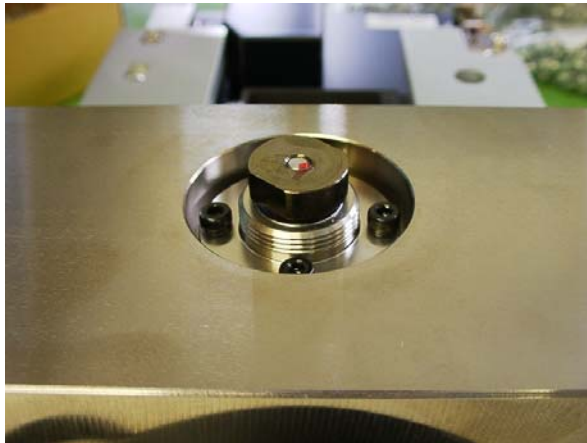
The main bearing in the Esoteric VMK3 mechanism disc motor may require replacing if it becomes noisy. This is RARE and we suspect the problem may be limited to the first 10 mechanisms supplied to us (of which most have been corrected).



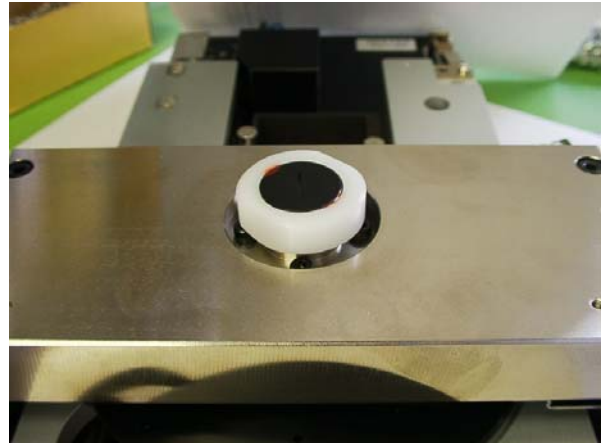
Sound is caused by moving air, so everything that moves in air makes a noise! The difference between a typical VMK3 and a noisy one is about 12-15dB, which is obvious during a comparison with a typical STT. We have never seen a unit that is "slightly noisy" (e.g. 6dB noisier than typical) so this is a good/bad judgement. Please make sure the bearing is genuinely noisy before replacing it. dCS will not supply a replacement bearing under warranty unless the original has been verified as noisy.

Special tools required: Esoteric bearing removal tool, torque screwdriver.

- Order a replacement bearing from dCS, the part number is MOD0190020.
- Remove the chassis from the case.
- Unscrew the cylindrical metal collar from the top of the bearing, exposing the threaded bush shown below.
- Fit the white plastic bearing removal tool onto the bush at the top of the bearing as shown below.



Threaded bush and black spindle nut



White plastic bearing removal tool fitted

- Unscrew the tool; the black spindle nut will be loosened also. Remove the nut and the spring shown below.
- Remove the 4 screws (indicated by red blobs below) securing the bridge. Lift the bridge clear, taking care not to knock the black turntable.



Nut removed, revealing the spring



4 screws secure the bridge

- Ease the black turntable away from the underside of the bridge and remove it.
- Remove the 4 screws (2.5mm A/F Allen key) securing the old bearing. Remove the bearing.
- Fit the new bearing. Secure with the 4 screws with the torque screwdriver set to 1.6Nm.
- Carefully ease the turntable back into place.
- Fit the spring, large end uppermost. Fit the black nut onto the end of the spindle and tighten up by hand. Screw the cylindrical collar onto the bush.
- Lift the bridge and fit it to the top of the mechanism, taking care not to knock the turntable as this can damage the new bearing. The bridge locates on pegs.
- Secure the bridge with the 4 screws with the torque screwdriver set to 1.6Nm.
- Reassemble the unit and perform a full function and sound check.

The unit is ready for use.

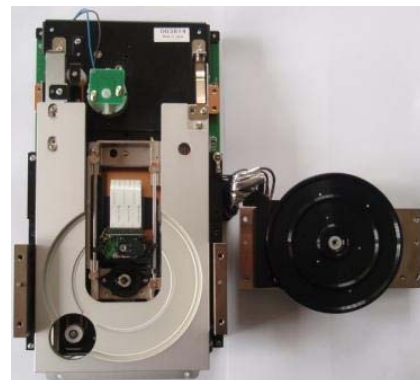
Removing a trapped disc

A surprising number of customers have discs in their collection that have glue on the top face. This is fine for top loaders, but a sticky disc is very likely to become stuck inside the *Scarlatti Transport* (or any other CD Transport using this style of mechanism), because the disc is pressed up against a large turntable.



We have seen 5 cases of trapped discs so far in and, in every case, there was glue on the disc. As there is a clear warning about sticky discs in the manual and we have never seen this problem caused by a mechanical failure, dCS cannot consider a stuck disc to be a valid warranty claim.

- Remove the chassis to expose the top of the mechanism.
- Remove the 4 screws (3mm A/F Allen key) securing the bridge. Lift the bridge clear, taking care not to knock the black turntable.

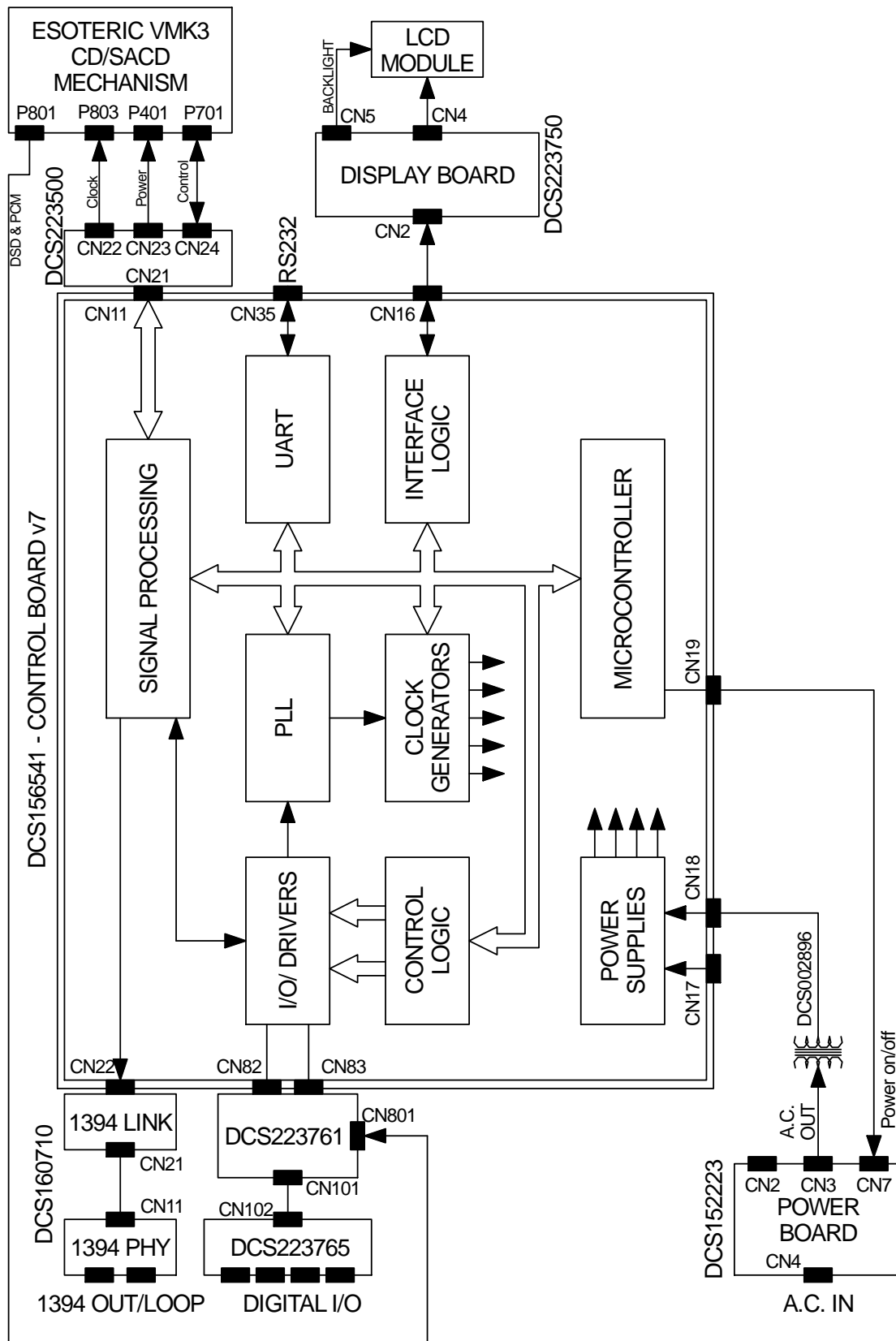


- Free one edge of the disc and “peel” the disc off the turntable. Place the disc in a plastic wallet for return to the customer.
- Wipe the face of the turntable with a soft lint-free cloth moistened with a small amount of isopropyl alcohol. If this does not remove the remaining glue, contact dCS for advice.
- Lift the bridge and fit it to the top of the mechanism, taking care not to knock the turntable as this can damage the bearing. The bridge locates on pegs.
- Secure the bridge with the 4 screws with the torque screwdriver set to 1.6Nm.
- Reassemble the unit.
- Test the unit with a non-sticky disc.



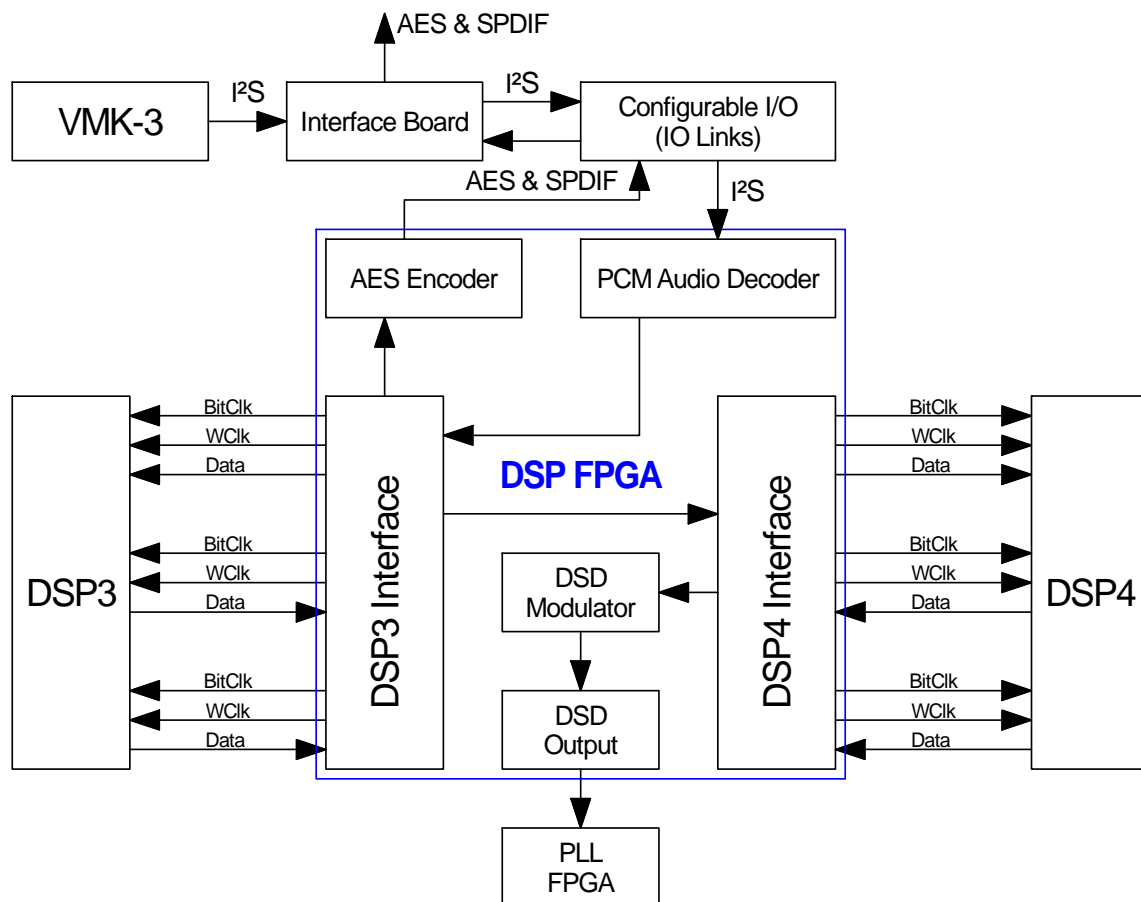
Please ask the customer to make sure he does not load sticky discs into the Transport!

BLOCK DIAGRAM

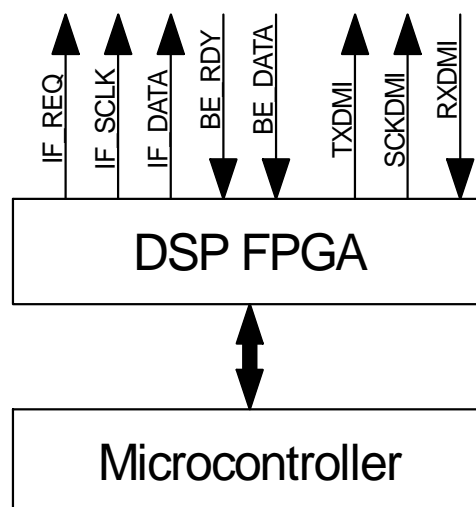


SIGNAL PROCESSING PATH

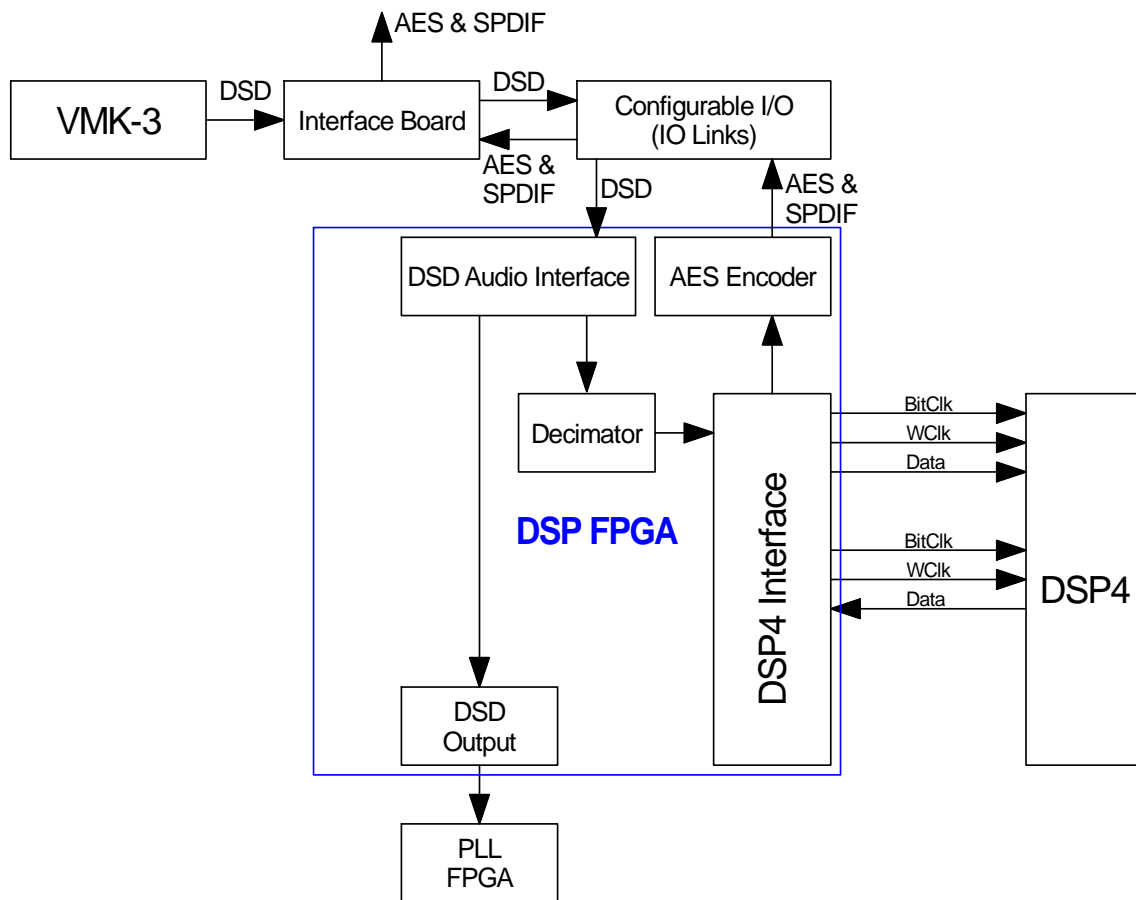
PCM Audio Path



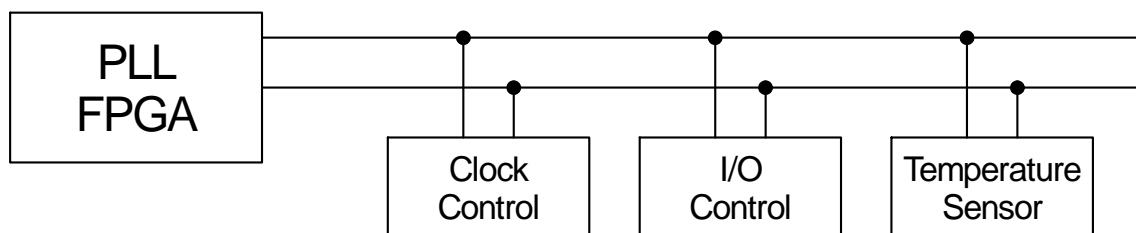
Mechanism Control Interface



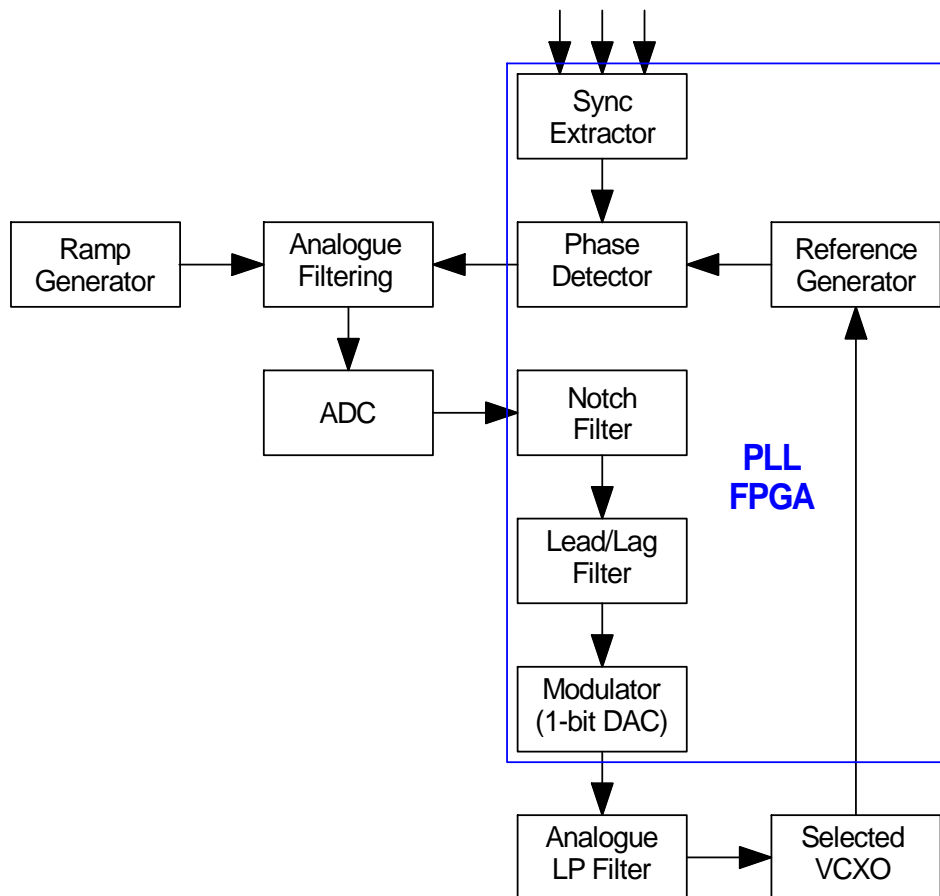
DSD Audio Path



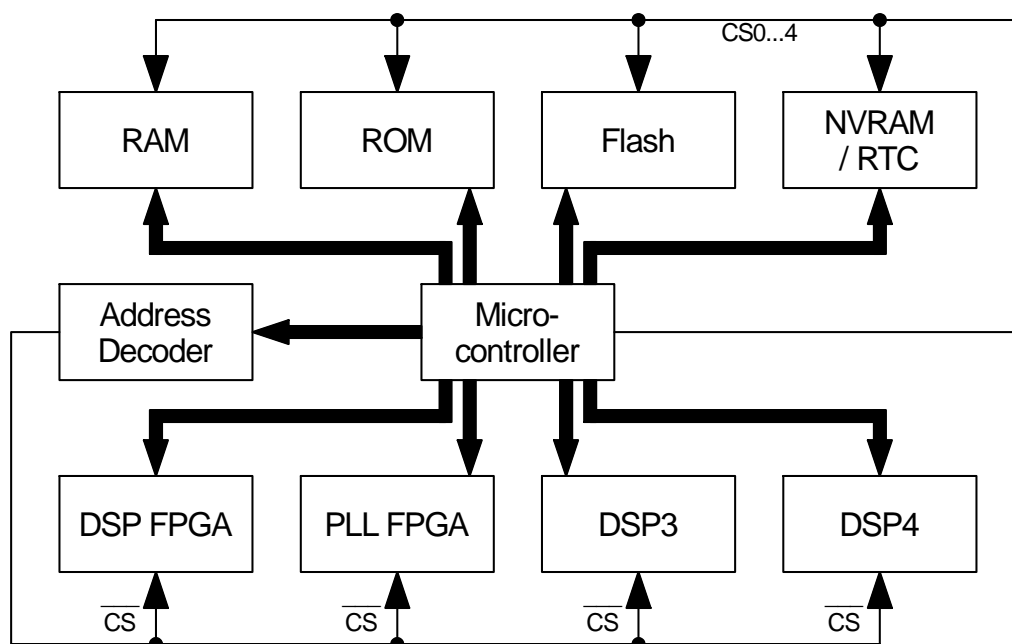
I²C Bus



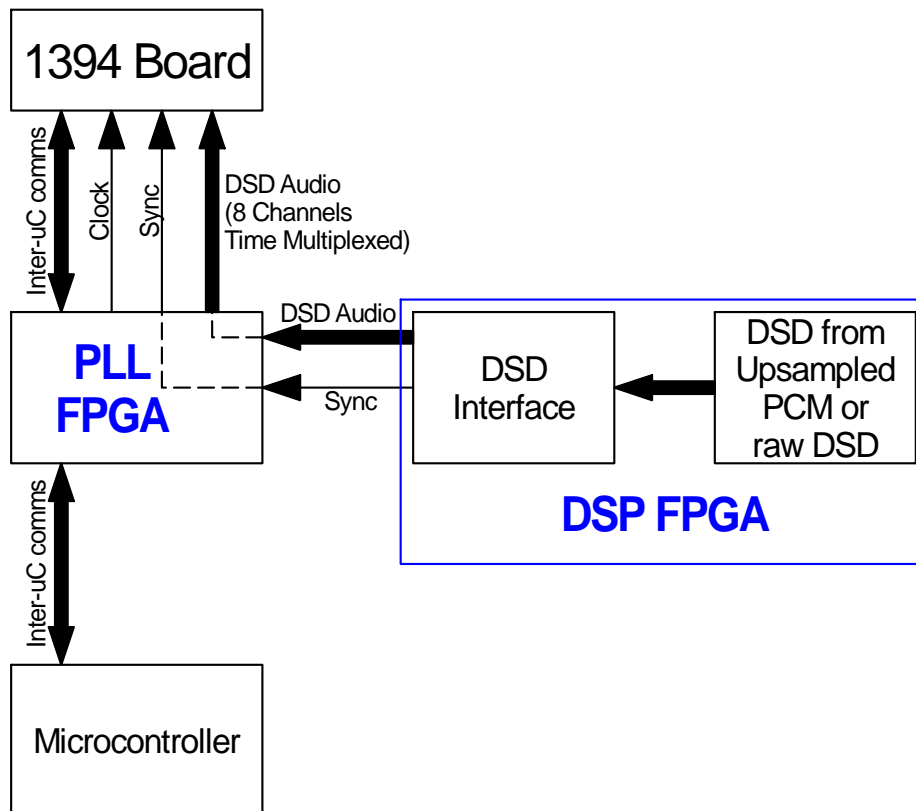
PLL



UA & UD



1394 Interface



CD UPDATE PROCEDURE

dCS Scarlatti Transport Software Update



The *Scarlatti Transport* software is still at version 1.00 at the time of writing, so no update CDs have been issued. When an update is issued, follow the instructions provided with the disc. The procedure below is given for reference only.

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

Update Procedure

- Disconnect any 1394 cables from the Transport.
- Mute your power amplifier.
- Load the *dCS* Update CD into the Transport, **PLAY** the disc for about 10 seconds and then press **STOP**. The disc must **not** be playing at this point.
- Open the *Scarlatti Transport*'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.

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

00:00 **Please wait - Starting CD – 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 new software will not run without a hardware update, 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*.

00:25 **Ver 1.00**

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.

33:15 **Scarlatti Transport**

35:50 **Welcome**

36:00 The unit finishes uploading the new software and reads the disc.

- Switch the *Scarlatti Transport* off (NOT just to sleep mode), wait 10 seconds, then switch on again.

Your *Scarlatti Transport* is now ready for use. Remember to re-connect the 1394 cable.

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

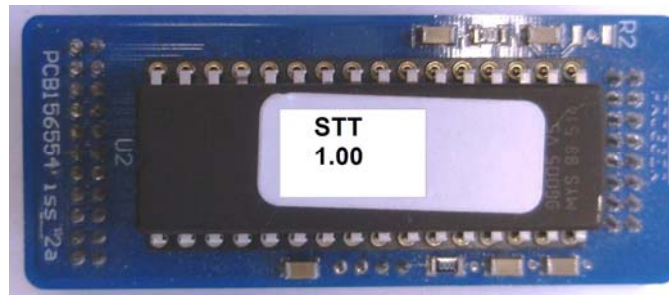
RE-LOADING SOFTWARE FROM ROM

Re-loading the Control software

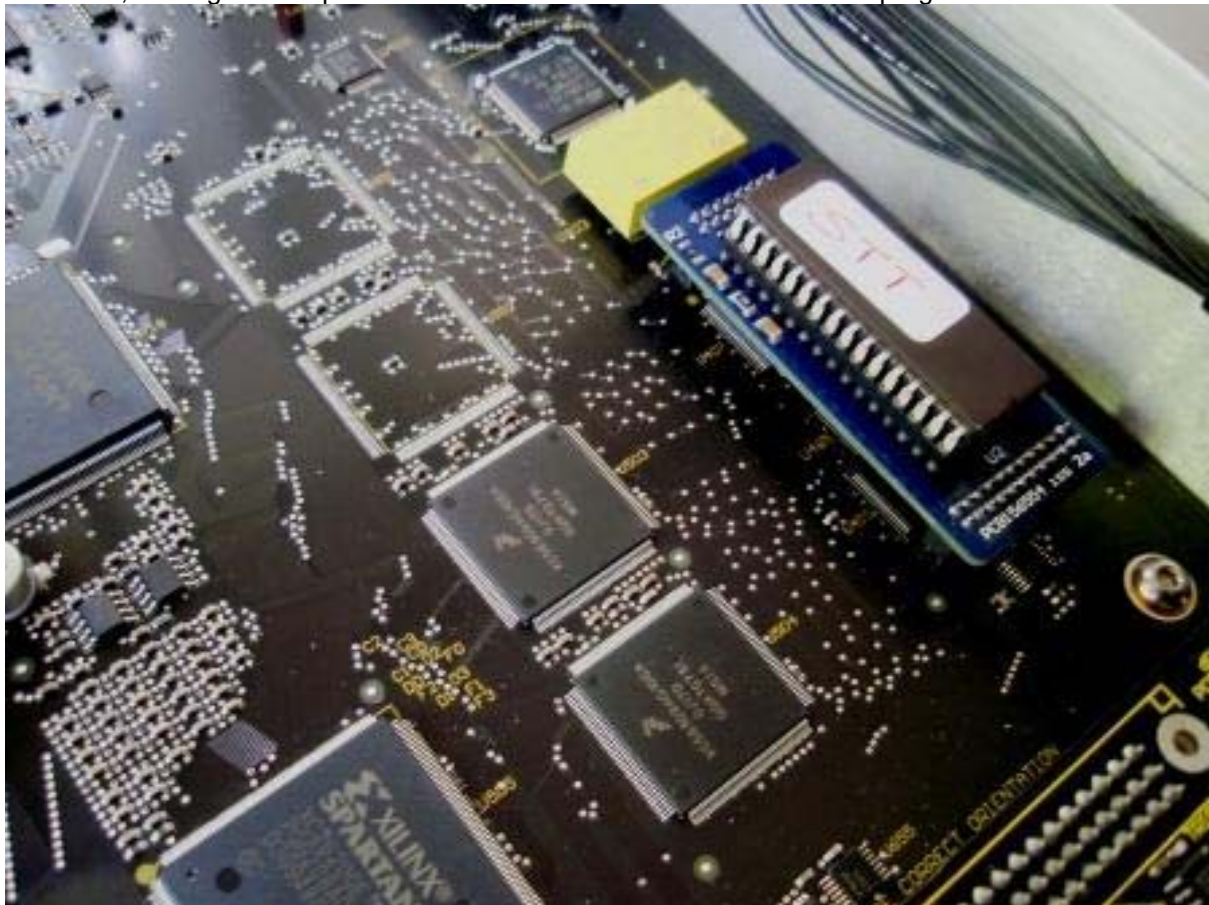
Normally, software can be updated from CD without opening the case, provided the unit boots up and runs correctly.

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 "**STT**" which is loaded with the *Scarlatti Transport* software. You can load an older version from ROM and then CD Update to the current version if necessary.

- Ensure the CD tray is empty. Place the Transport upside-down and remove the base plate.
- Fit the **STT** 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 front 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 and switch on.

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.
- Replace the base plate and turn the Transport upright.
- Power up, open the menu and check that on the **Information / Version Information** page, the **Control version** matches the ROM issue. It may be necessary to CD Update to the current 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.
- Ensure the CD tray is empty. Place the Transport upside-down and remove the base plate.
- Fit the **1394 v3** ROM to the socket U405 on the 1394 main board, ensuring that the notched end is towards the tall pillar. Fit the jumper to the nearby programming header, CN42.
- Connect the power cable, power up 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.
- Replace the base plate and turn the unit upright.
- Power up the unit.

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.

- 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.