

dCS Paganini Transport

Service Manual

October 2011

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

- Twin laser Esoteric UMK-5 CD/SACD mechanism with aluminium tray.
- Industry standard PCM outputs: 2x AES3 on XLR3 connectors, 2x SPDIF on 2x RCA 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 44.1kHz master clock connected to the Word Clock Input or act as a 44.1kHz grade 2 Master Clock, allowing a suitable DAC 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.
- All-aluminium case.

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 *Paganini Transport* with serial number PTT-0S2-7G4--1C5-012-5832.

A typical serial number	This code group means:
PTT	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.
-	TOP BOARD CODE. The Transport has no top board, so this slot is not used.
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

- August 2007 v1.00 – This is the first issue, it includes 1394 software v3.00.
- November 2007 v1.01 – The unit un-mutes correctly after loading a disc by pressing “Play”. Occasional problems with upsampler overload have been corrected, Factory reset no longer turns the display off.
- March 2008 v1.02 - Corrects a tendency for some units to fail to boot-up when warm.

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 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: 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.

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.
- 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.

The design of the case has changed over time, the unit you are servicing may be slightly different from that shown.

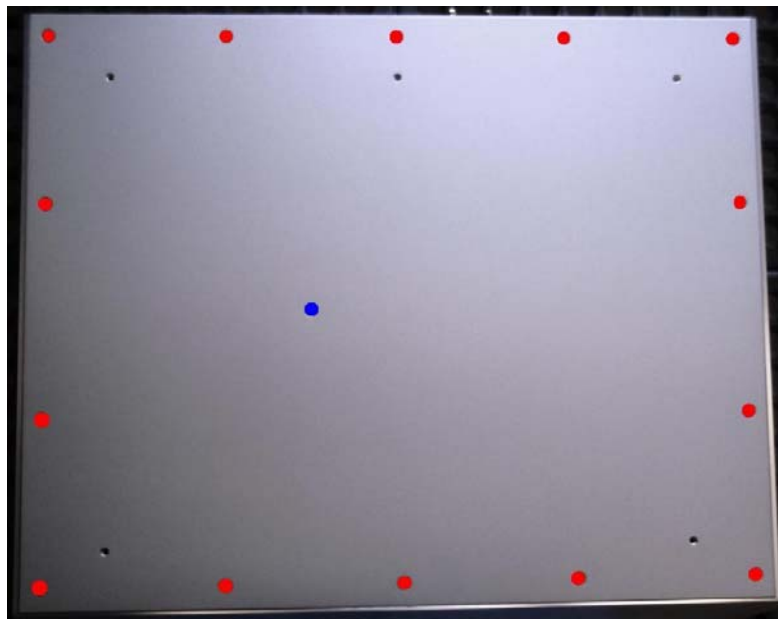


Remember to observe anti-static precautions when dismantling.

The Paganini metalwork has evolved since it was first designed, there are now 3 distinct versions in circulation, which we will describe as Mk1, Mk2 and Mk3. Disconnect all cables from the unit. Rest the unit on a soft anti-static surface to prevent damage to the finish.

Opening the case – Mk1 - units shipped from September 2007 to March 2008

Turn the unit upside-down and remove the 14 screws from the base plate, shown in red below. Also remove the screw near the middle of the plate marked in blue. Remove the base plate.



To detach the top cover, first remove the 2 screws in the middle of both side plates, shown in red below.



Inside the unit, remove the 5 screws in the well near the back panel, shown in red below.

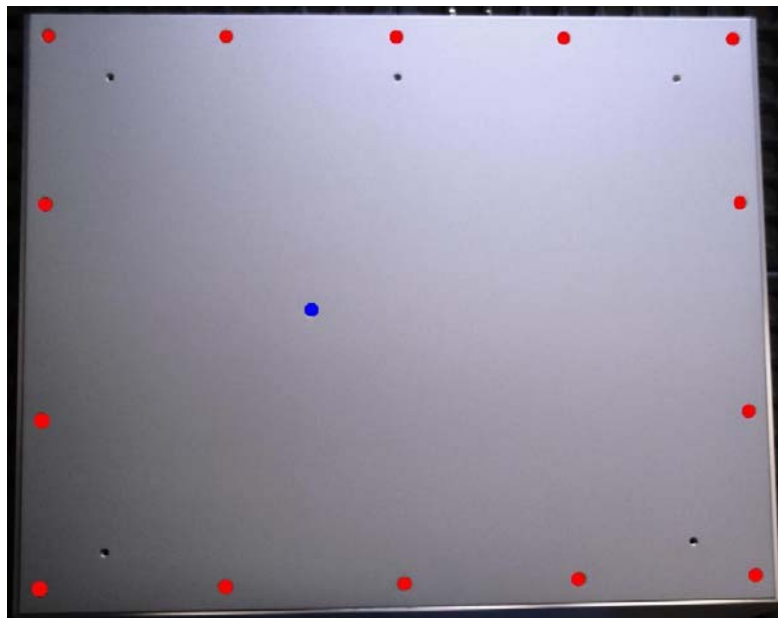


Turn the unit over and slide the top plate backwards about 10mm to clear the slot at the front of the case, then lift the top plate off, complete with 2 small brackets. This gives access to the Power Board and mains transformer.

The top edge of the front panel is attached to the chassis by 4 screws, the bottom edge is attached to a slim bracket by 4 screws. Remove the 8 screws to detach the front panel and access the Display & Switch Boards. Disconnect the ribbon cable from the Display Board.

Opening the case – Mk2 - units shipped from March 2008 to March 2009

Turn the unit upside-down and remove the 14 screws from the base plate, shown in red below. Remove the base plate. It should not be necessary to disturb the screw indicated by the blue dot.



To detach the top part of the case, first remove both side plates (each fixed by 6 screws).

Inside the unit, remove the 5 screws in the well near the back panel, shown in red below.

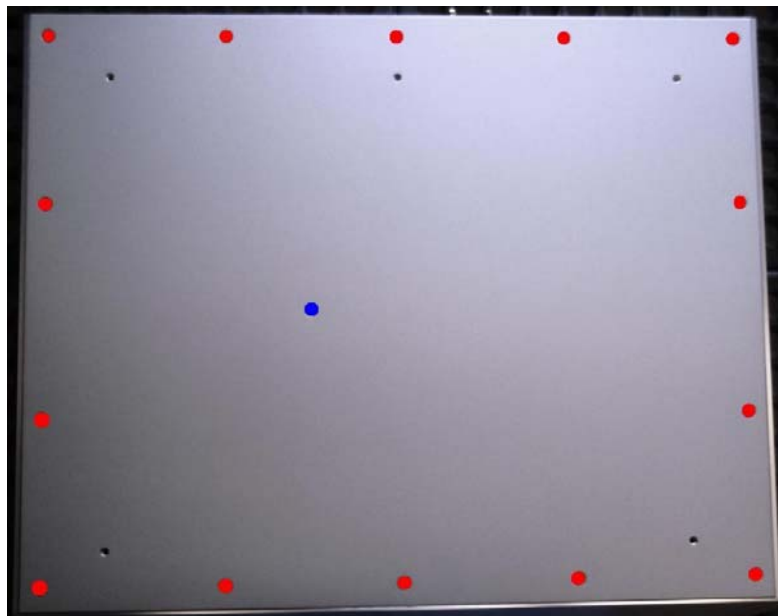


Remove the 2 nuts at the front of each side of the unit (the upper screws are accessed through slots in the side of the chassis) and a third nut near the bottom centre of the chassis. Disconnect the ribbon cable from the Display Board. Slide the upper section of the chassis back 10mm and lift it off.

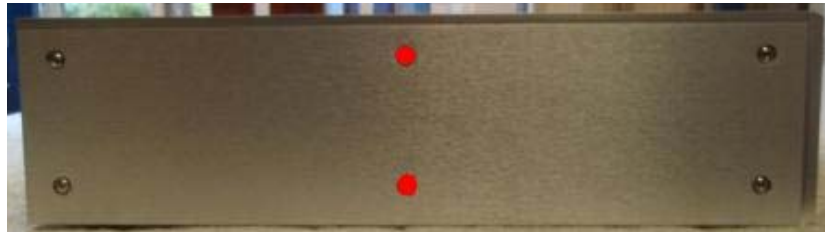
The front panel bracket & front panel are secured to the top cover by 2 screws on each side. The top and bottom edges of the front panel are attached to the chassis by 4 screws each. Remove the 8 screws to detach the front panel and access the Display & Switch Boards.

Opening the case – Mk3 - units shipped from March 2009 to present

Turn the unit upside-down and remove the 14 screws from the base plate, shown in red below. Remove the base plate.



To detach the top cover, first remove the 2 screws in the middle of both side plates, shown in red below.



Inside the unit, remove the 5 screws in the well near the back panel, shown in red below.



Turn the unit over and slide the top plate backwards about 10mm to clear the slot at the front of the case, then lift the top plate off, complete with 2 brackets. This gives access to the Power Board and mains transformer.

To remove the front panel, first remove both side plates. The front panel bracket is secured to the chassis by three M4 nuts on studs: one near the bottom centre and one near the top of each side. The two (Puccini Player) pictures below indicate the location of the nuts with red arrows.

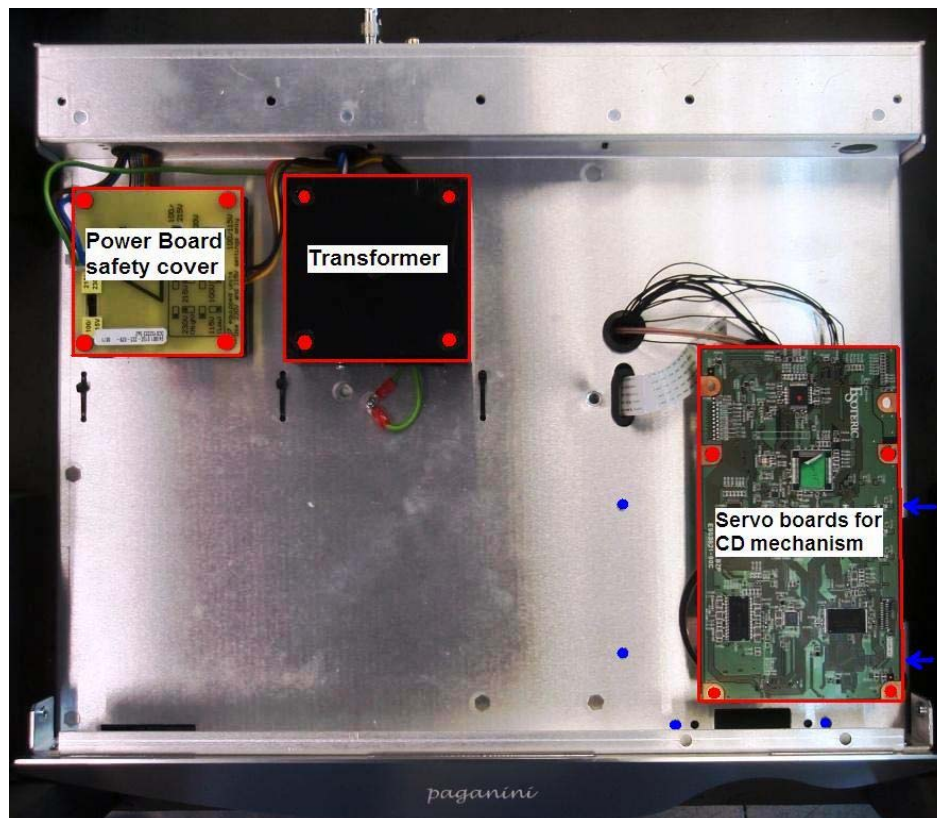
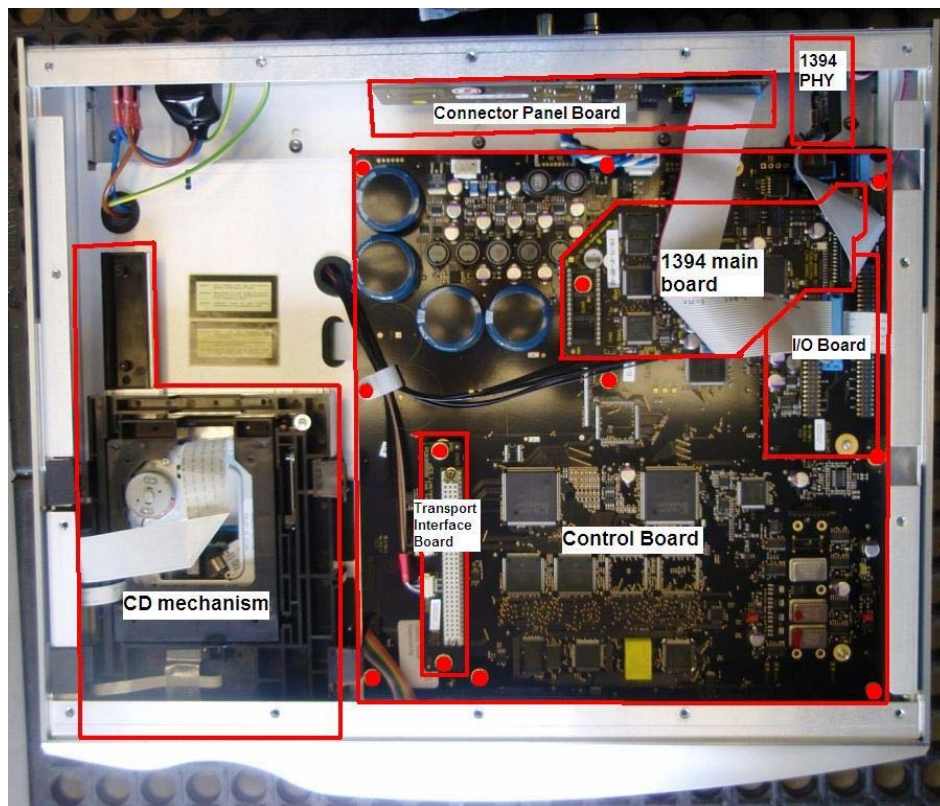


Remove the 3 nuts, then ease the front panel and its fixing bracket off the front of the unit. Carefully disconnect the ribbon linking the Display Board to the Control Board.

Detach the front panel from the bracket to expose the Display & Switch Boards.

Identification of the sub-assemblies

The fixings are indicated by red dots.



The 6 fixings for the CD mechanism are shown by 4 blue dots and 2 blue arrows.

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 **Esoteric Main Board** is secured by 4 screws – remove them, disconnect the cables and lift the board off. The **Esoteric Front-End Board** is secured by 4 hex pillars – remove the pillars, disconnect the cables and lift the board off the studs.

The **Esoteric UMK5 Mechanism** located under the 2 Esoteric boards, it is secured to the underside of the chassis by 6 screws. Disconnect the 3 Flat Flex Cables from the Front-End Board, then support the mechanism while removing the 6 screws.

Bottom section:

Remove the 2 screws securing the **Transport Interface Board**. Gently pull out the locking clip by a few mm to disconnect the cables, then pull the board off the large DIN connector.

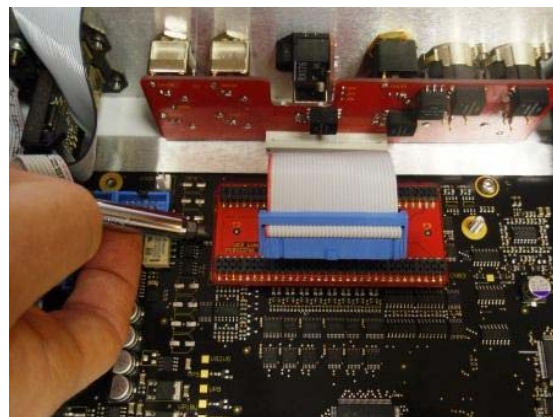
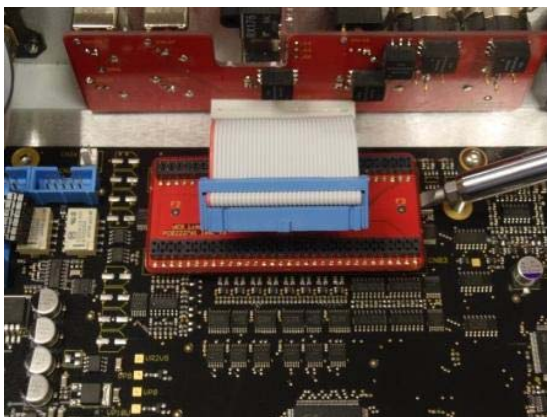
The main section of the **1394 Board** is secured by one screw and washer inside the outline of the ROM socket (U405). Remove the screw and pull the board off the Control board. The **1394 Connector Board** is attached to a bracket which is fixed to the back panel by 3 screws.

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.

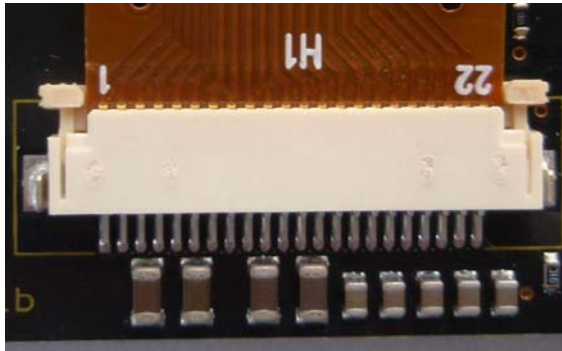
First disconnect the cable to the Connector Panel Board. Use a 6mm flat-blade screwdriver to lever the right side of the board up a few mm, pivoting on the top of the stud. Carefully lever up the left side of the I/O Board in the same way, protecting the Control board with your fingers. When the I/O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



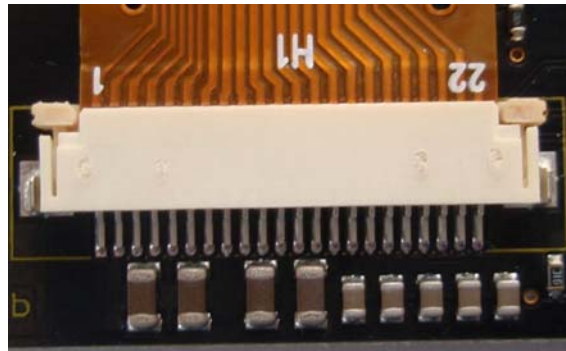
The **Control Board** is secured to the chassis by 9 screws and the pillar that supports the main 1394 Board. Disconnect all cables, remove the fixings and lift the Control Board out of the chassis.

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 back face of the front panel by 4 screws and washers. Release the clamps on CN4 by gently 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

The **Switch Board** is secured to the front panel by 5 screws and washers.

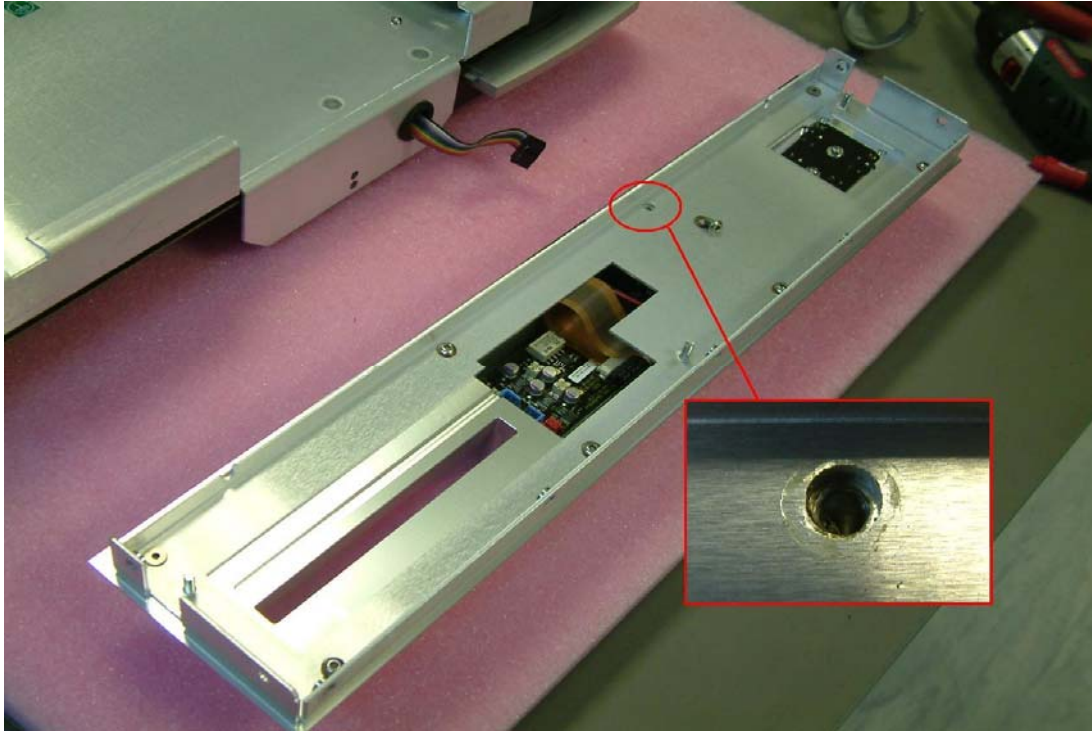
The **LCD module** is clamped in place by foam pads fitted to the back of the **Display Board**. When re-fitting the LCD module, make sure it is correctly located in its machined recess before fitting the Display Board on top.

REASSEMBLY OVERVIEW

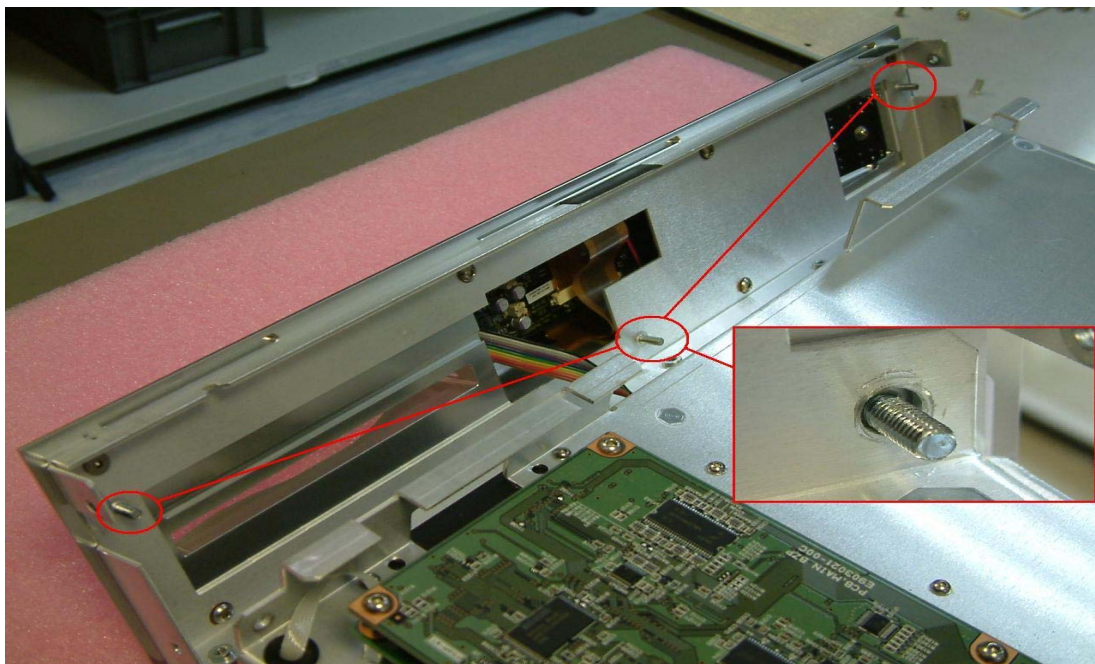
This section deals with squaring and aligning the case parts for when a high degree of dismantling has been necessary. These instructions were written primarily for the Mk3 case (units shipped from March 2009 onwards). (The pictures show a Puccini Player, but the case design is the same.)

Front panel

Secure the front panel to the front bracket using M4x6 button head screws. As shown below, align the front panel screw holes to the holes in the bracket before tightening.



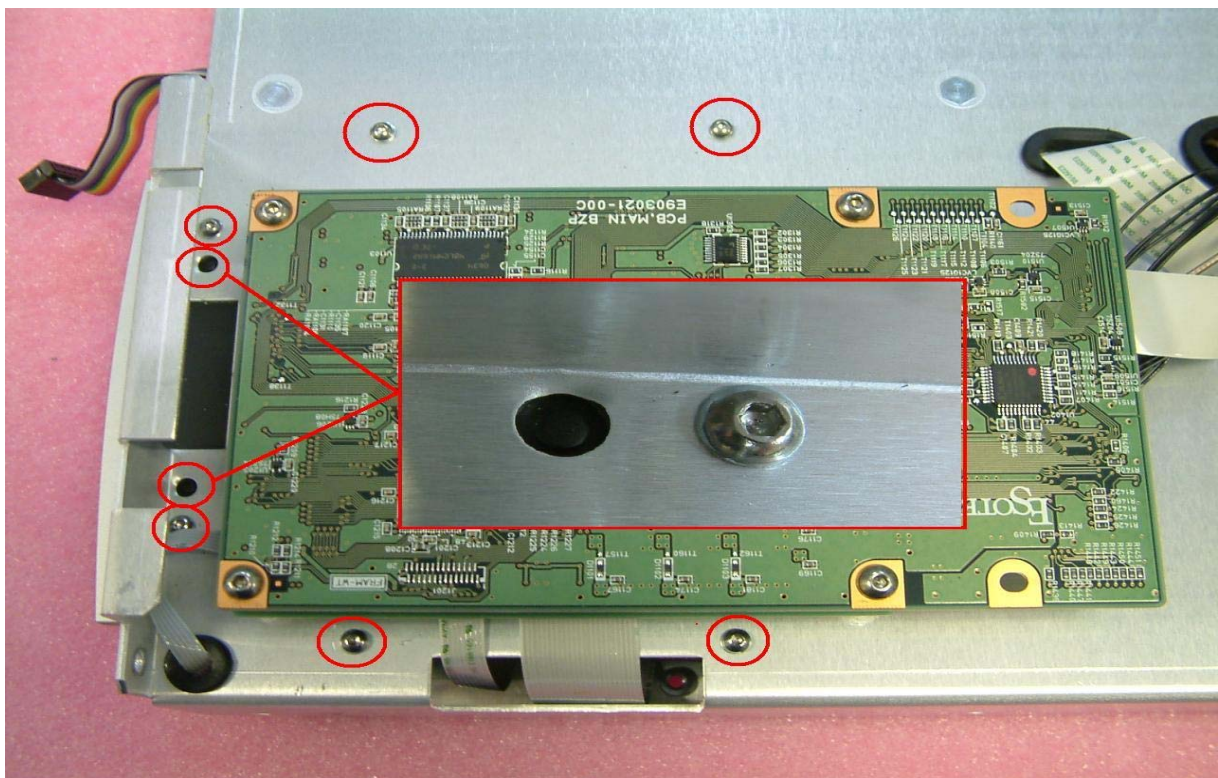
Align the 3 front panel assembly securing studs centrally through the chassis holes and secure loosely with M4 nuts. Adjust so that the CD tray is central in the front panel aperture before tightening.



The gap around the tray should be even as shown below.

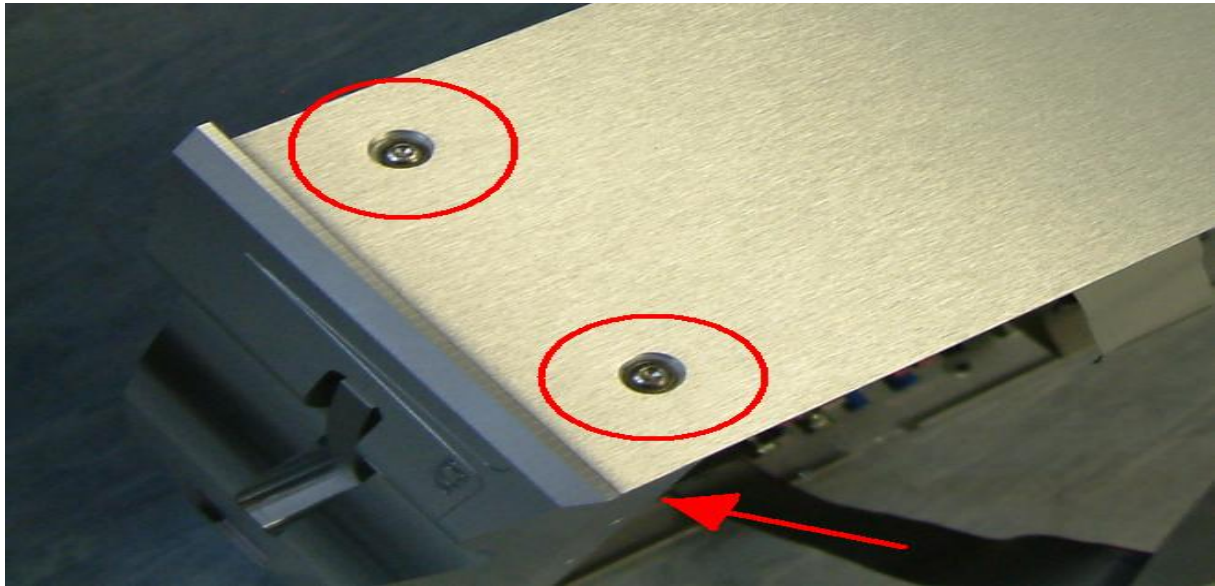


If more left-right adjustment of the tray is needed, loosen the six M3 screws securing the CD mechanism to the chassis (see below), move the mechanism to centralise the tray and tighten the screws. Observe the pips through the holes in the chassis (as shown in the inset) to aid alignment.

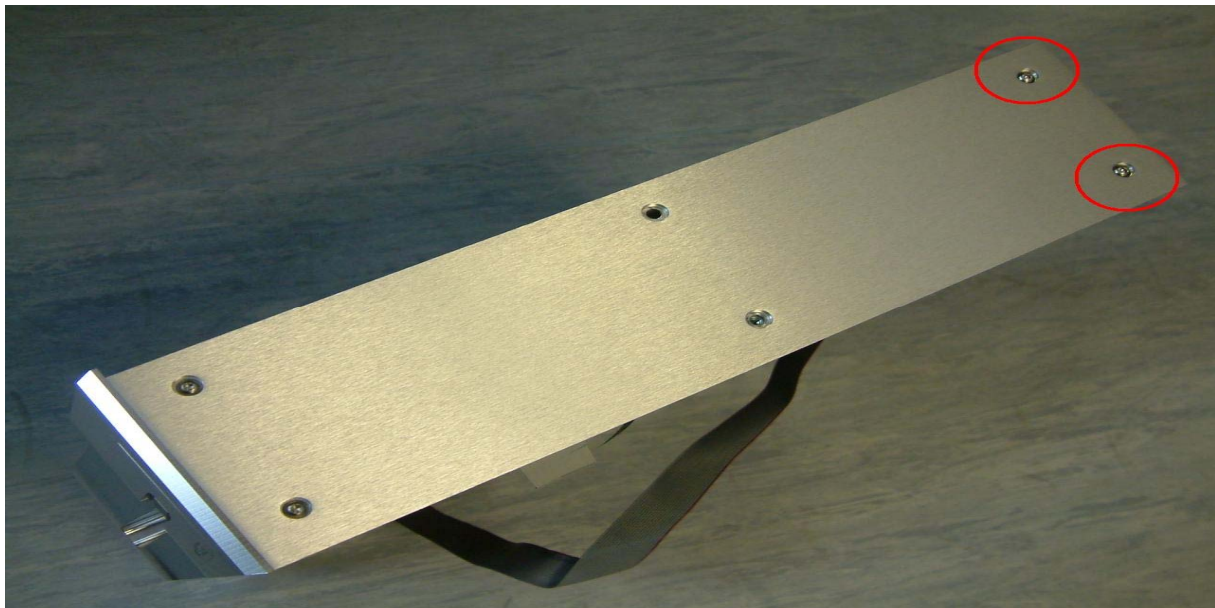


Side cheeks

Align a side cheek to the front panel, keeping the bottom corner of the side cheek flush with the bottom corner of the front panel, secure using the two front screws only.



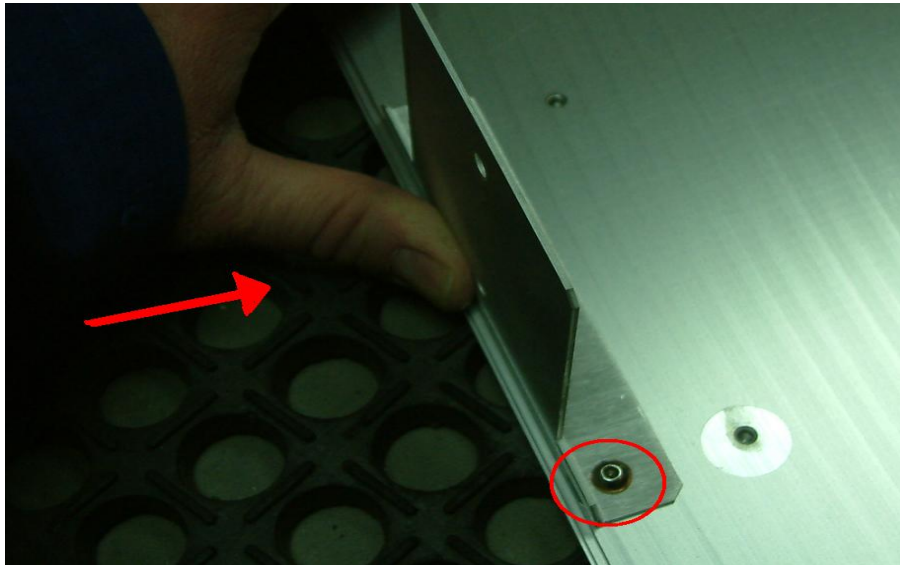
Align the rear chassis holes with the side cheek and secure using two M4 screws.



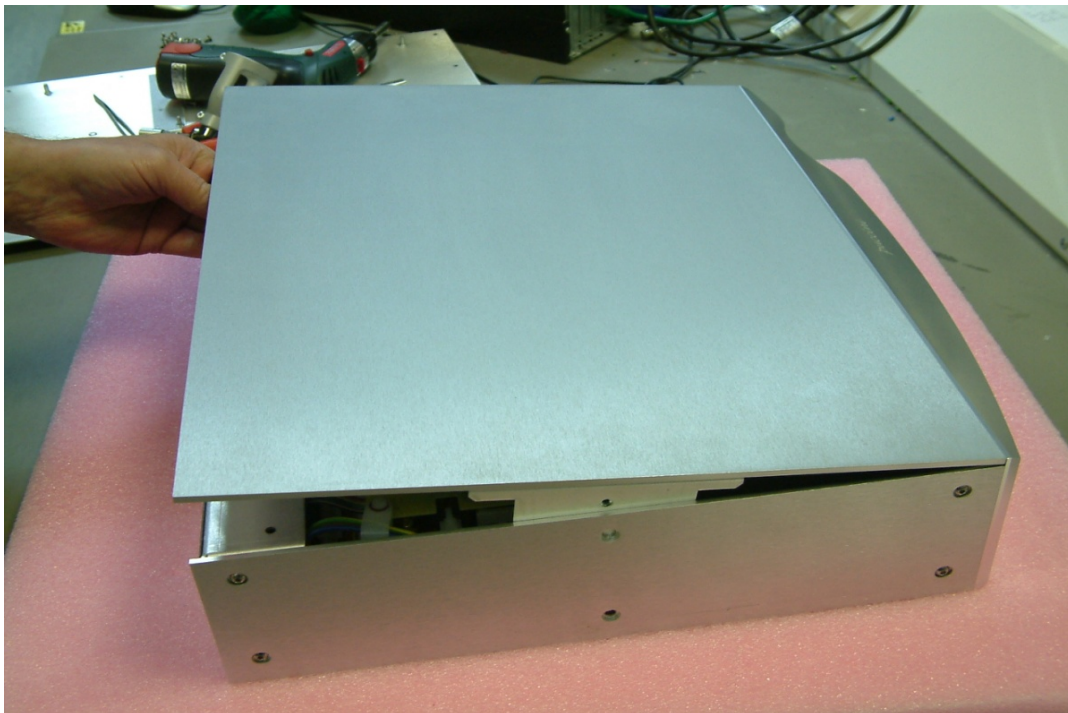
Repeat for the other side cheek.

Top plate

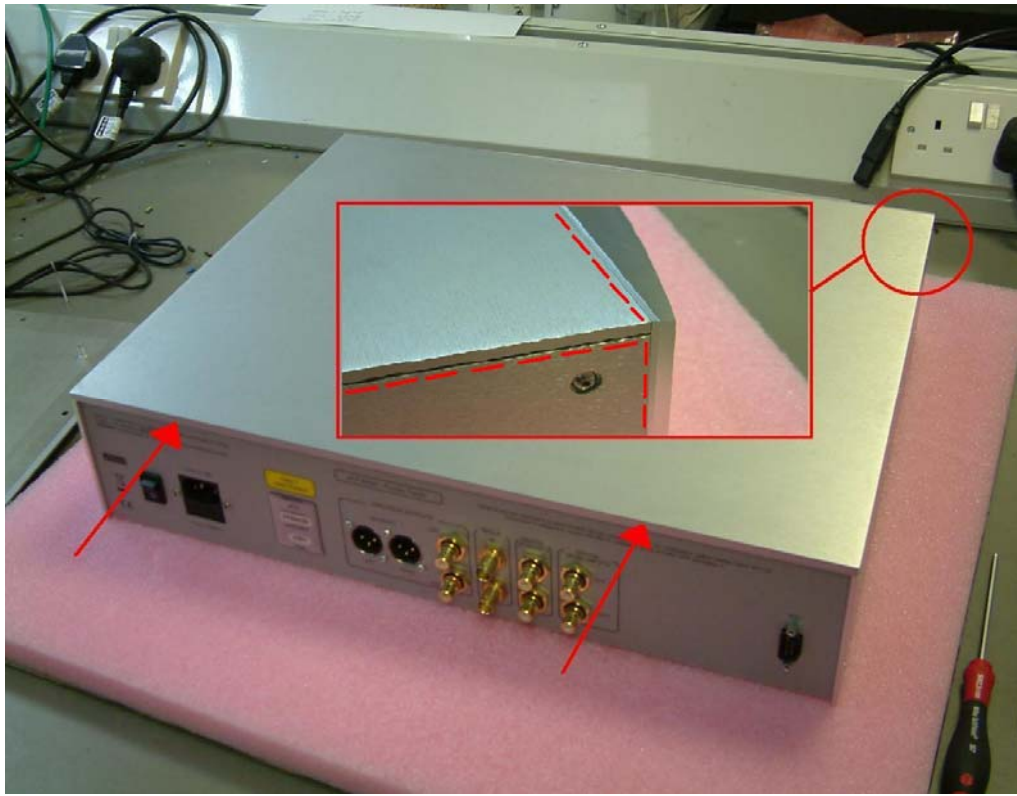
Fit the top plate brackets using M4x6 screws and flat washers. Push the bracket inwards towards the centre of the plate as the screws are tightened.



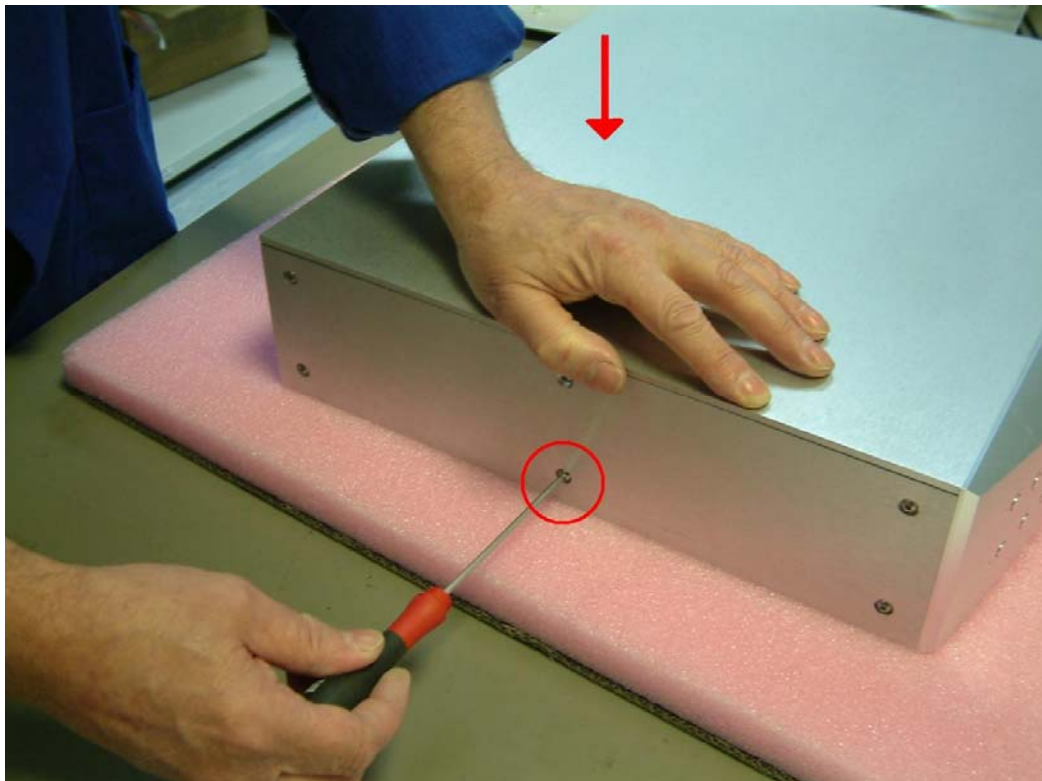
Fit the top plate to the unit, taking care that the top plate brackets do not scratch the outer faces of the side cheeks. Locate the tabs at the front edge of the top plate into the slots in the front panel – this is easier if the panel is inserted at a shallow angle rather than slid in flat.



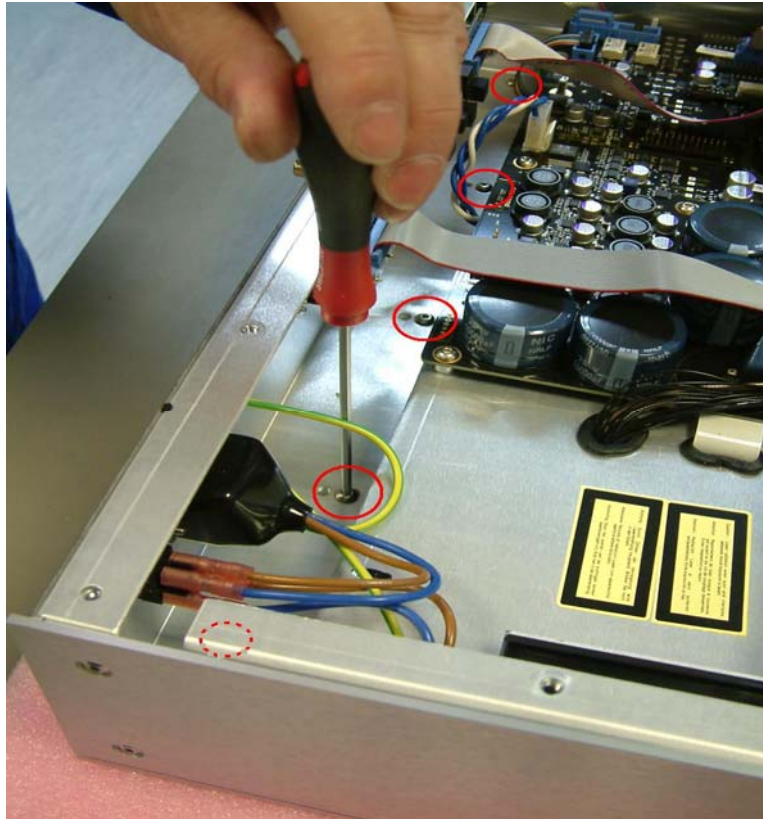
Move the top plate into position by pushing from the rear edge, ensuring that there are no visible gaps where the top plate meets the front panel. Check that the joins between the top plate and side cheeks are tight as shown in the inset below.



Apply hand pressure to keep the joints closed, insert an M4 screw into the lower hole of each side cheek.



Check the unit to ensure all joins are square, then fit M4 screws in the remaining hole in each side cheek. Turn the unit over and fit the five M4x6 screws and washers into the inside face of the chassis to secure the top plate.



Base Plate

Finally, fit the base plate using twelve M4x8 countersunk screws and two M4x12 countersunk screws where shown below.



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 or 7J versions of this board has been used on all *Paganini Transports*.

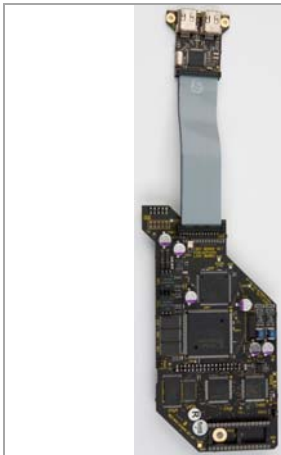
The circuit diagram file is 156540cd7g4.pdf.

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



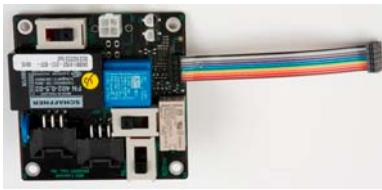
This assembly comprises a main 1394 interface board (LINK) and a small 1394 connector board (PHY), joined by a ribbon cable. It handles the 1394 interface, running its own software, which is downloaded from the Control Board as necessary. The same board set is used in the *Scarlatti* / *Paganini DAC* and *Transport*, 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 Set 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).

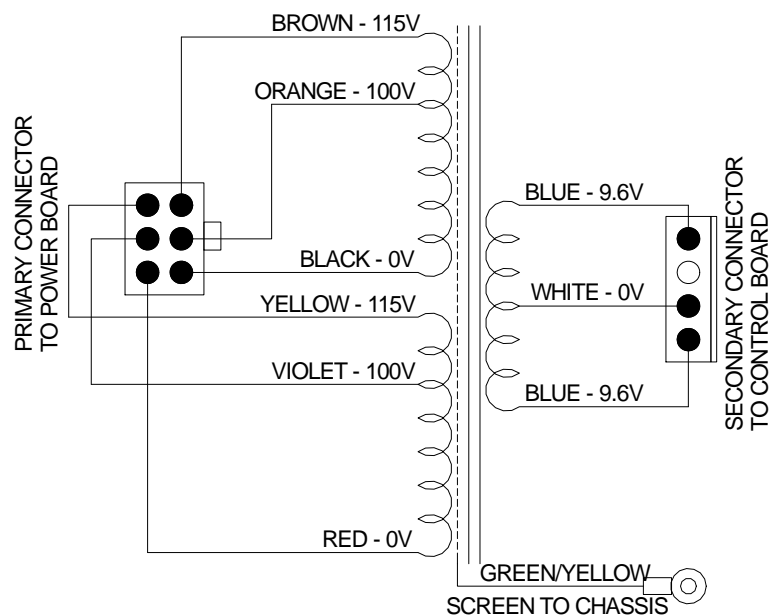
The component layout file is 152223cl5a.pdf (current version).

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.



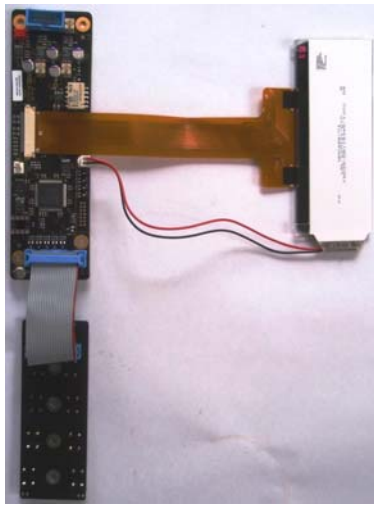
Early versions of this transformer had four primary wires instead of six and offered two ranges: 100-120V and 200-240V. The Power Board used with this early type should be set to 115/120V or 230/240V ONLY (not 100V or 215/220V – otherwise the unit will not power up).

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.

Display Board DCS300750 / Switch Board DCS300755



The Display Board drives the LCD display module MOD0160008 (shown at the right side of the picture) and carries the IR receiver. The Switch Board (shown at the lower left side) carries the switches and LEDs, it connects to the Display Board. Switches and LEDs are fitted to the Switch Board to suit the product. The same boards are used on the *Paganini* series and *Puccini Player*.

To date, the 1A or 1B versions of the Display Board (version 1D will be introduced soon) and the 1A version of the Switch Board have been used on all *Paganini Transports*. The differences between these versions are minor.

CN1 connects to the rotary encoder (DACs only).

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.

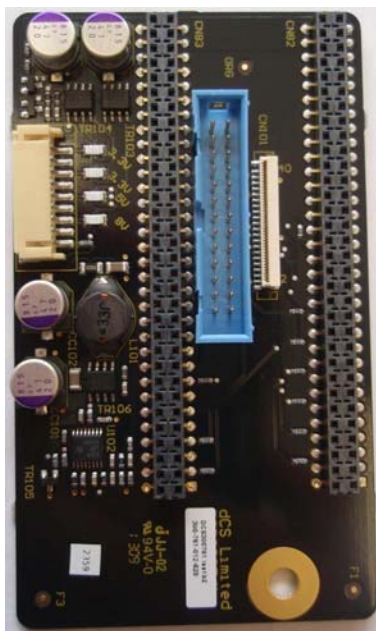
CN8 connects to the Switch Board.

The circuit diagram files are 300750cd1c1.pdf & 3007551a1.pdf.

The component layout files are 300750cl1c.pdf & 3007551a.pdf.

These boards are detailed in the separate **Display Board Service Manual**.

I/O Board DCS300761



This board fits onto the two I/O headers CN82/83 on the Control Board. CN102 connects to the ribbon cable from CN14 on the Connector Panel board.

For Transports and Players, the board includes a +8V DC-DC converter (U102/TR106) and switching transistors (TR101-105) to control the power supplies driving the Esoteric Main Board, connected by CN103. Power to the Esoteric hardware is protected by four 1.5A surface-mount fuses, FS101-104, mounted in a line close to CN103.

FFC connector CN101 carries data to/from the Esoteric Main 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 300761cd1b1.pdf.

The component layout file is 300761cl1b.pdf.

Connector Panel Board DCS300765



This board carries the digital I/O connectors and some digital interface components. The AES and SPDIF interfaces (CN7-12) are isolated with pulse transformers T101-106. All digital connections are brought out on ribbon cable CN14, which connects to CN102 on the I/O Board.

This board is common to the Paganini Transport / DAC / Upsampler and the Puccini Player. Connectors are fitted to the board as required to suit the model.

The circuit diagram file is 300765cd1a1.pdf.

The component layout file is 300765cl1a.pdf.

Unique Subassemblies

Transport Interface Board DCS300500



CN21 on this small board fits onto the Control Board at CN11. It connects clocks and signals to the Esoteric Main Board via CN101 and CN102.

The circuit diagram file is 300500cd1a1.pdf.

The component layout file is 300500cl1a.pdf.

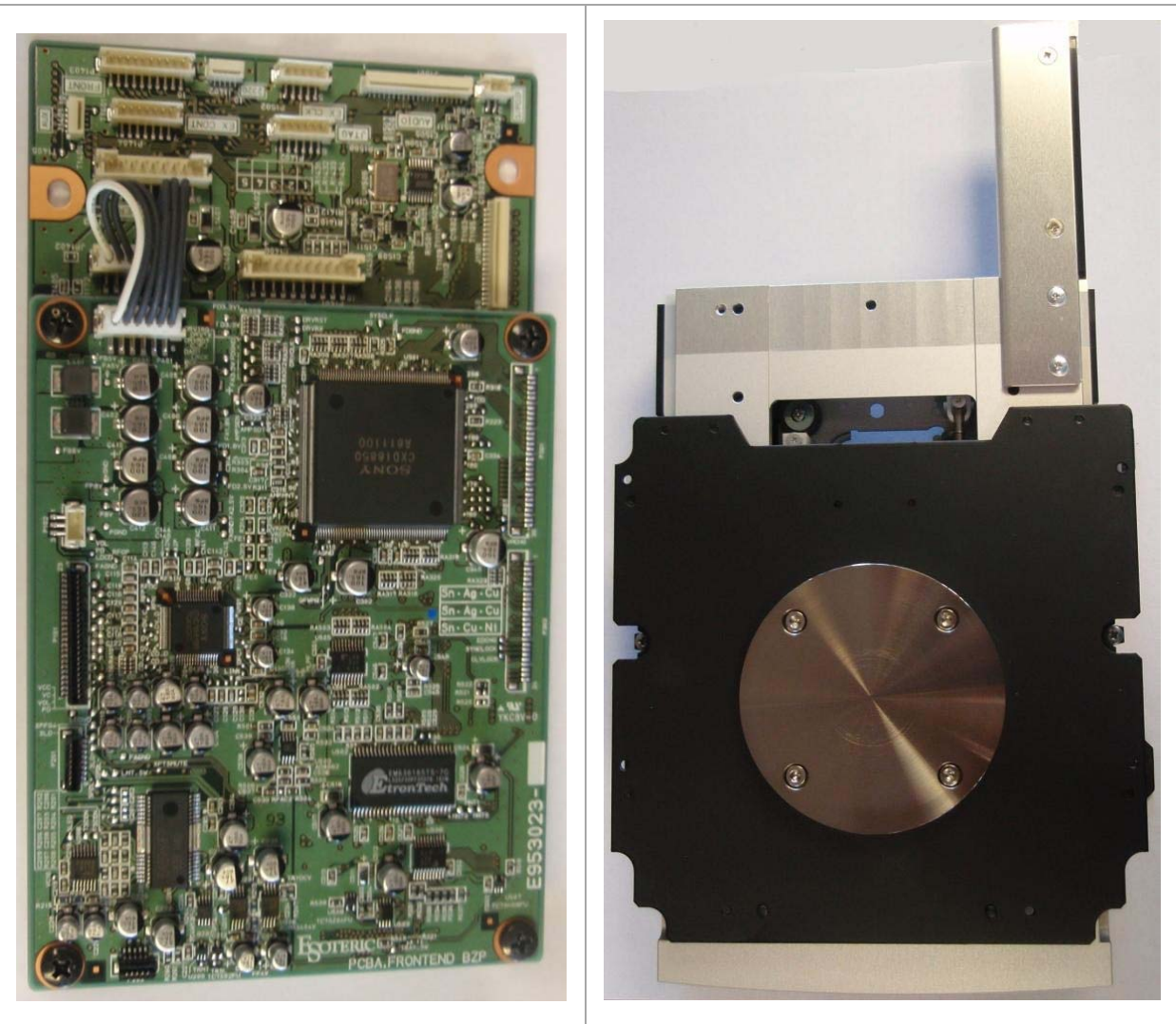
Esoteric Main Board, Front-end Board and UMK5 CD/SACD mechanism

The two boards control the UMK5 CD/SACD mechanism and decode the data read from the disc. The same boards and mechanism are used in the *Puccini Player*.

The Main Board connects the Transport Interface Board via P1502 & P1404, it connects to the I/O Board via J1501 & P1103. 2 connectors join P1402 & P1102 on the Main Board to P401 & P503 on the Front-End Board.

The Front-End Board connects to the CD Mechanism by 3 Flat Flex Cables (FFCs): P101 connects to the OPU, P201 supplies the motors and P202 connects to the limit switches.

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



FAULT-FINDING

Known Faults and Solutions

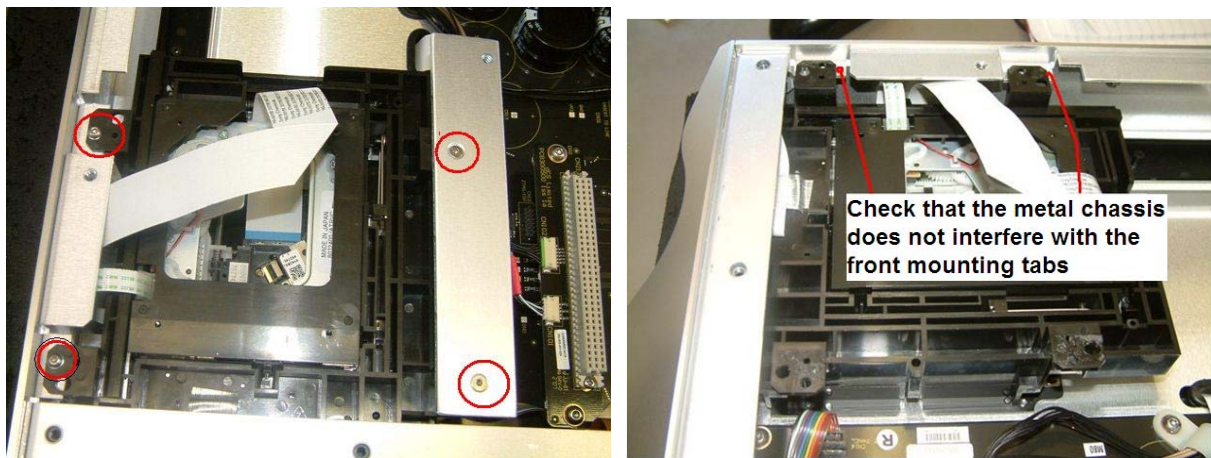
Make sure the latest software is loaded.

Symptom: The CD mechanism does not work or runs at the wrong speed

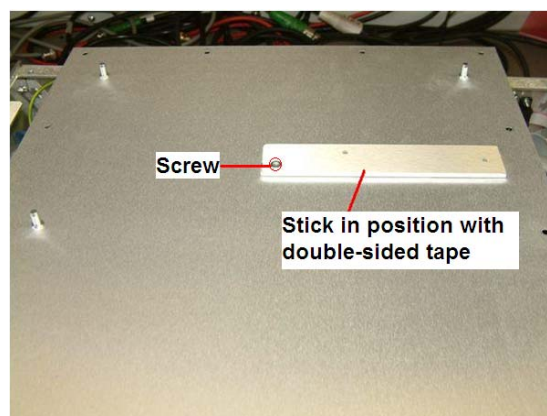
- This fault was traced to a batch of 27MHz crystal oscillators on the Control Board, location X03. The solution is to replace the oscillator, part No.XTL0034270.

Symptom: The CD tray opens on command then immediately closes

- **Older units with Mk1 case only.** This fault is caused by slight flexing of the mechanism due to the mechanism being secured top and bottom. Remove the base plate and check for the 4 screws shown below left – if they are not fitted, the modifications have been done and there is another reason for the fault. Otherwise, remove the 4 screws and the metal bracket. Check that the metal chassis does not interfere with the mechanism's two front mounting tabs



Turn the unit upright and check for correct operation. If the fault is still present, remove the top cover and loosen the 6 screws securing the mechanism from the top. Move the mechanism slightly to release any pressure, then tighten the 6 screws and re-check the tray operation. Fix the metal plate to the underside of the base plate with the screw and double-sided adhesive tape.



Reassemble the unit and test.

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 **30** for instructions for cleaning the lens and replacing the OPU.

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.
- If the fault recurs, check that the OPU cable is correctly located. Check the 2 Esoteric boards for build errors or dry joints.

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 22, 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 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 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	+2.500V
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	0V *
VP6U	+6.8V
VN8X	-5.9V

* Note that VN18U remains 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 41.
- At the back right corner of the Control Board, you will see 3 metal-cased crystal oscillators X01, X02 and 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 crystal positions 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 a PC running Hyperterminal to extract diagnostic information from the Control Board. Please see the **Control Board v7Service Manual** for more information.

Symptom: The unit boots up but the CD mechanism does not work

- The I/O Board supplies power to the CD mechanism via 4 fuses, FS101-104. If a fault or an overload has caused one of these fuses to blow, the CD mechanism will not operate. Check that the same voltage appears on both sides of each fuse, relative to ground. The voltages should be: FS101 +8.0V, FS102 +5.0V, FS103 & FS104 +3.3V. If a fuse has blown, contact *dCS* for advice.
- A faulty 27MHz crystal oscillator may prevent the CD mechanism operating.

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-USB Interface Board 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 OPU



**Laser diodes are easily damaged by electrostatic discharges (ESD).
Ensure ESD precautions are in place before servicing the Optical Pick-Up (OPU).**

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.

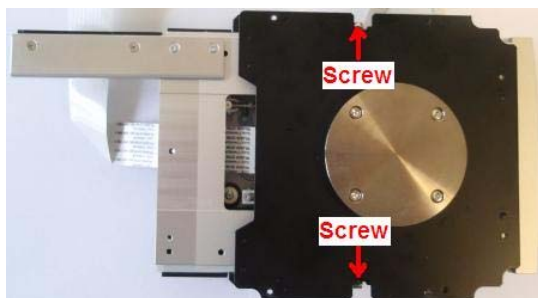
Additional tools required: Torque screwdriver with 0-point Philips bit.

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



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 CD mechanism from the unit.
- Remove the 2 screws securing the top plate, slide the top plate 8mm forwards and lift it off.



- Wipe the top of the focussing lens VERY GENTLY with a cotton bud moistened with a small amount of isopropyl alcohol.

- Replace the mechanism top plate and slide it back to engage the locking lugs. Replace the 2 screws and use the torque screwdriver to tighten them to 0.14Nm.



Over-tightening these screws will cause permanent damage to the plastic frame.

- Replace the mechanism in the unit and re-connect to the Front-End Board.

Test the unit with the sample disc to see if the reading problems have cleared. If not, OPU replacement is recommended.

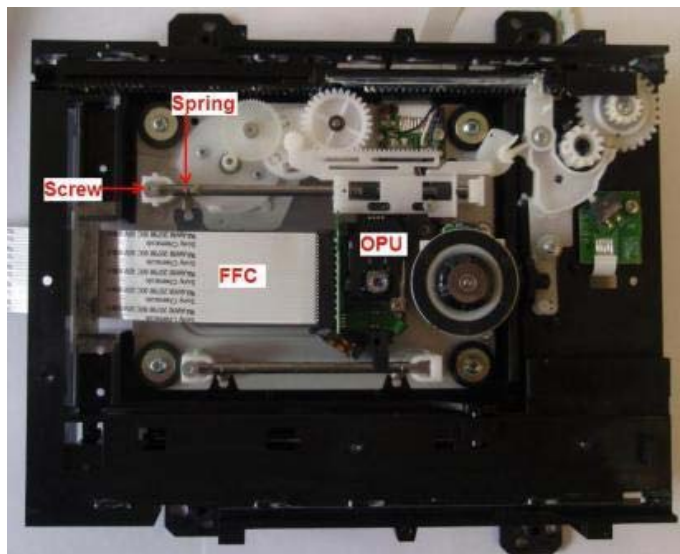
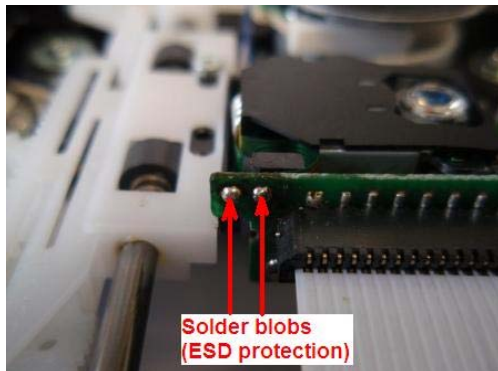
Replacing the OPU

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 mechanism from the unit, remove the top plate as described above and lift off the CD tray.
- 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.

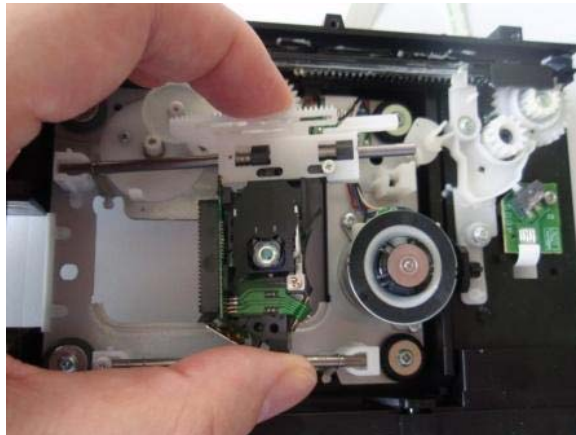


OPUs returned with the solder blobs missing or that show obvious contamination or with no identification cannot be considered for a warranty claim.

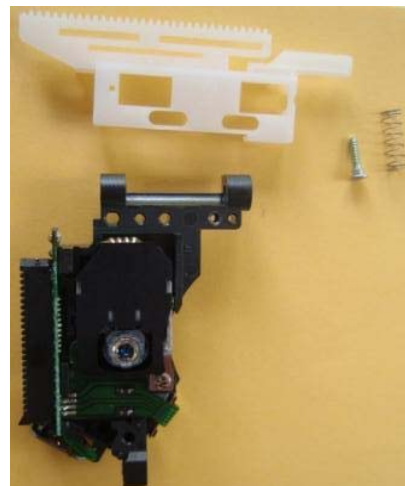
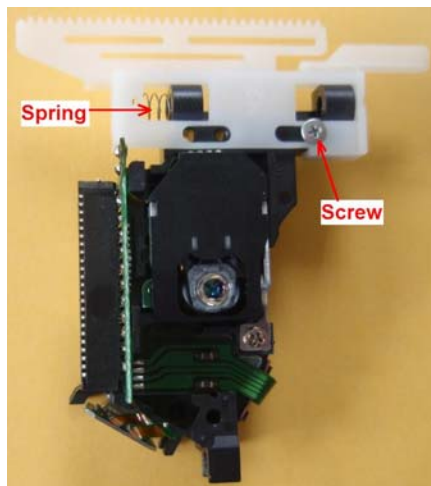


- Disconnect the FFC from the old OPU.
- Remove the screw securing the long guide rod (see the picture above).

- Taking care not over-stretch the spring (or lose it!), lift the right-hand side of the long guide rod, unclip the OPU from the short guide rod and pull the OPU/rack assembly off the long guide rod.



- Use a pair of needle-nosed pliers to compress the spring that tensions the OPU on the white rack and pull the spring out of the back of the OPU (see the pictures below).
- Remove the screw securing the old OPU to the rack and pull the rack off.

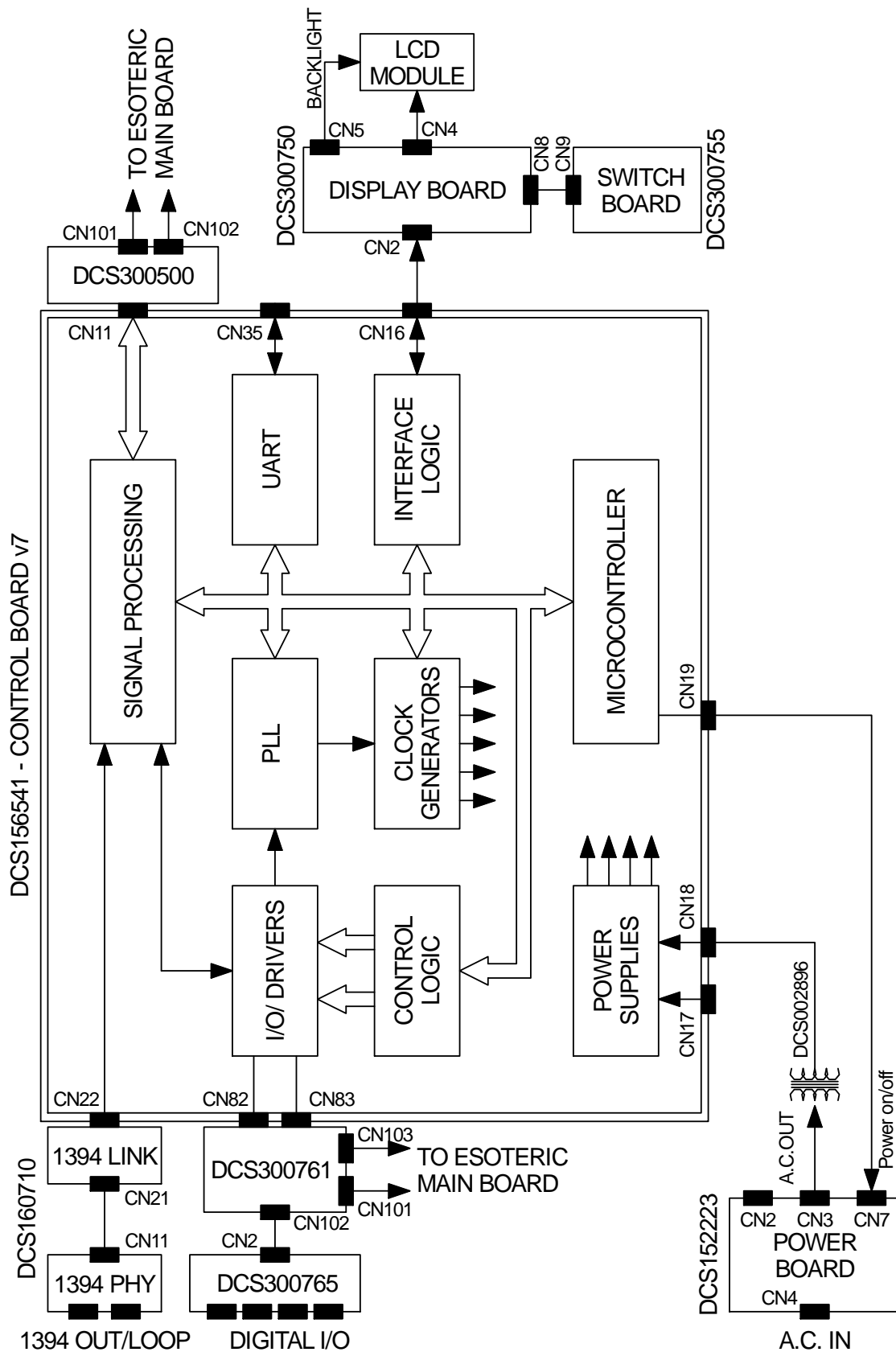


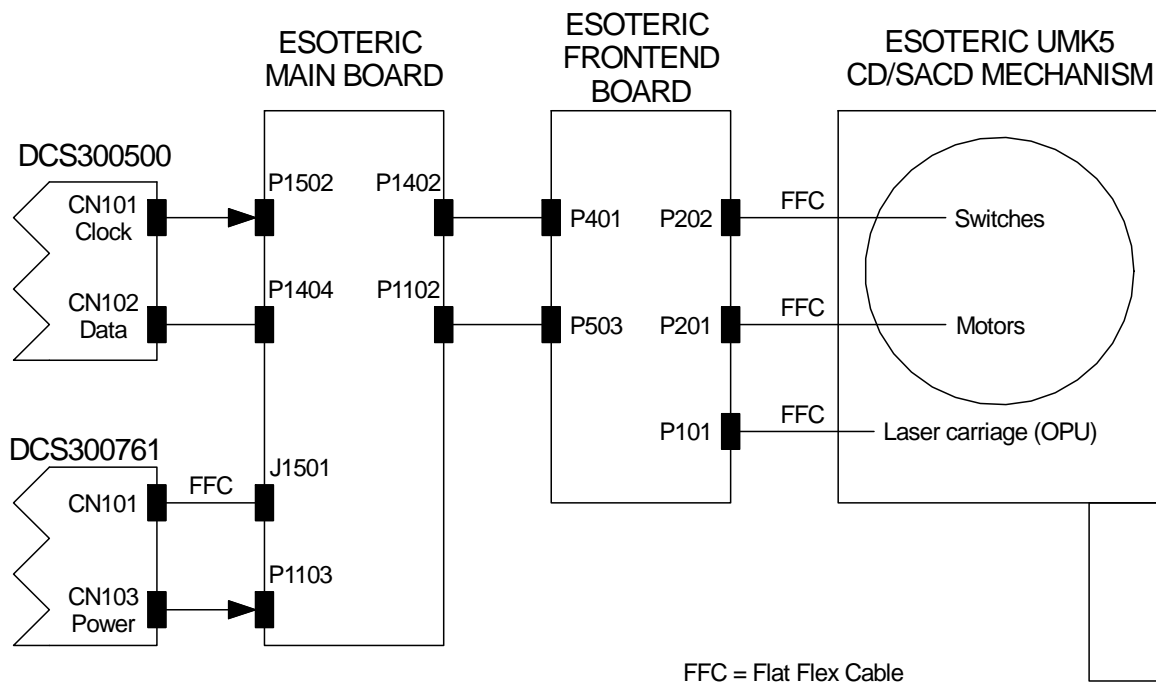
- Fit the rack onto the new OPU and secure with the screw, ensuring the rack is free to slide.
- Use the pliers to compress the spring and push it back between the rack and OPU, so that it aligns with the central hole.
- Lift the right-hand end of the long guide rod again, ease the OPU/rack assembly onto the rod, clip the OPU back onto the short guide rod, gently locate the rack teeth onto the small white gear wheel and push the long guide rod back into its supports.
- Secure the guide rod with the screw. 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.
- Lay the tray on top of the mechanism, move it slightly to and fro until the gears mesh and it settles into position. The back edge of the tray overhangs the mechanism by about 2mm.
- Fit the top plate with the straight edge about 9mm behind the front edge of the tray and slide the top back about 8mm, so that the plastic lugs at the sides engage with the mechanism.
- Secure the top with the two screws, using the torque screwdriver to tighten them up to 0.14Nm.
- Fit the mechanism to the Transport and test the unit.



If you find the Transport boots up but won't read any disc, the most likely causes are that the solder blobs have not been removed or the FFCs have not been correctly fitted.

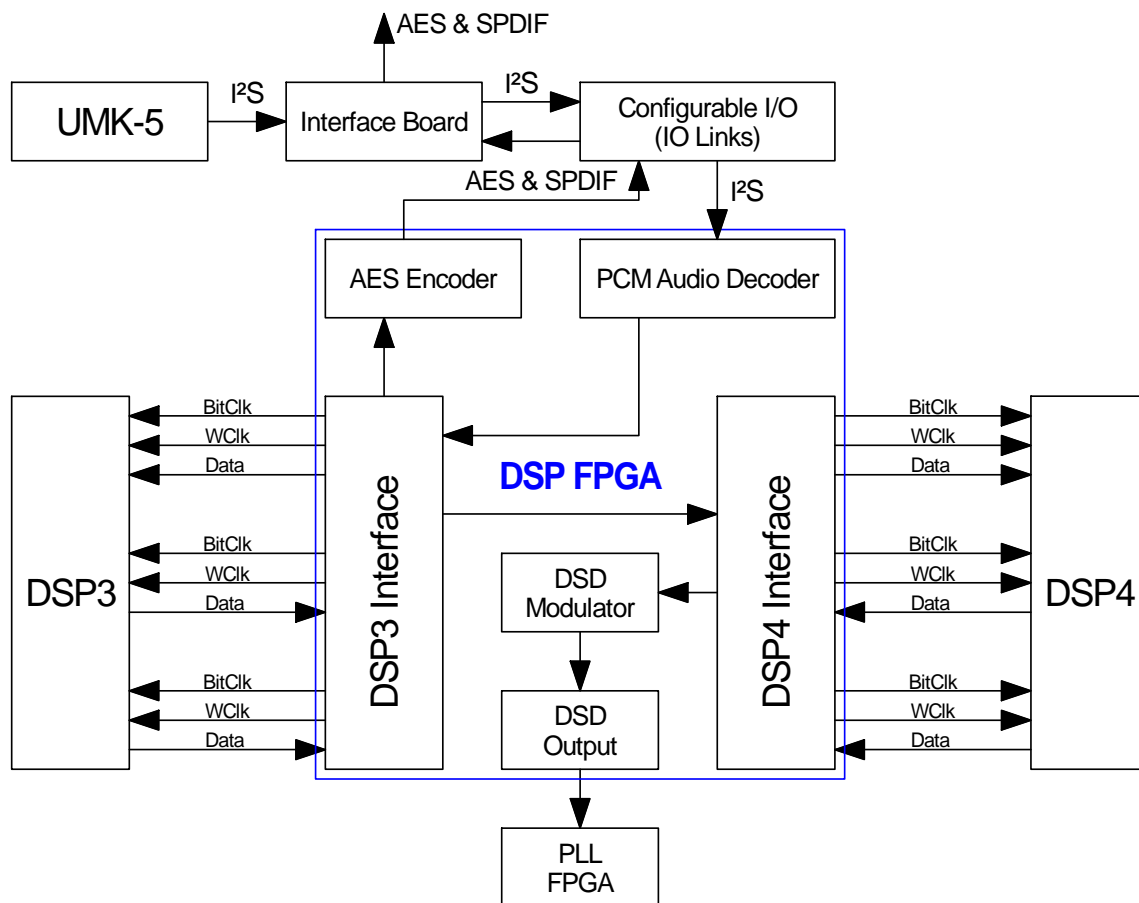
BLOCK DIAGRAM



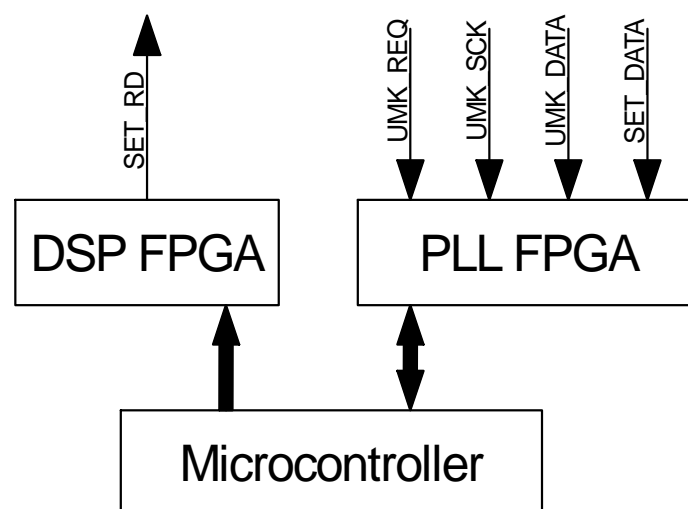


SIGNAL PROCESSING PATH

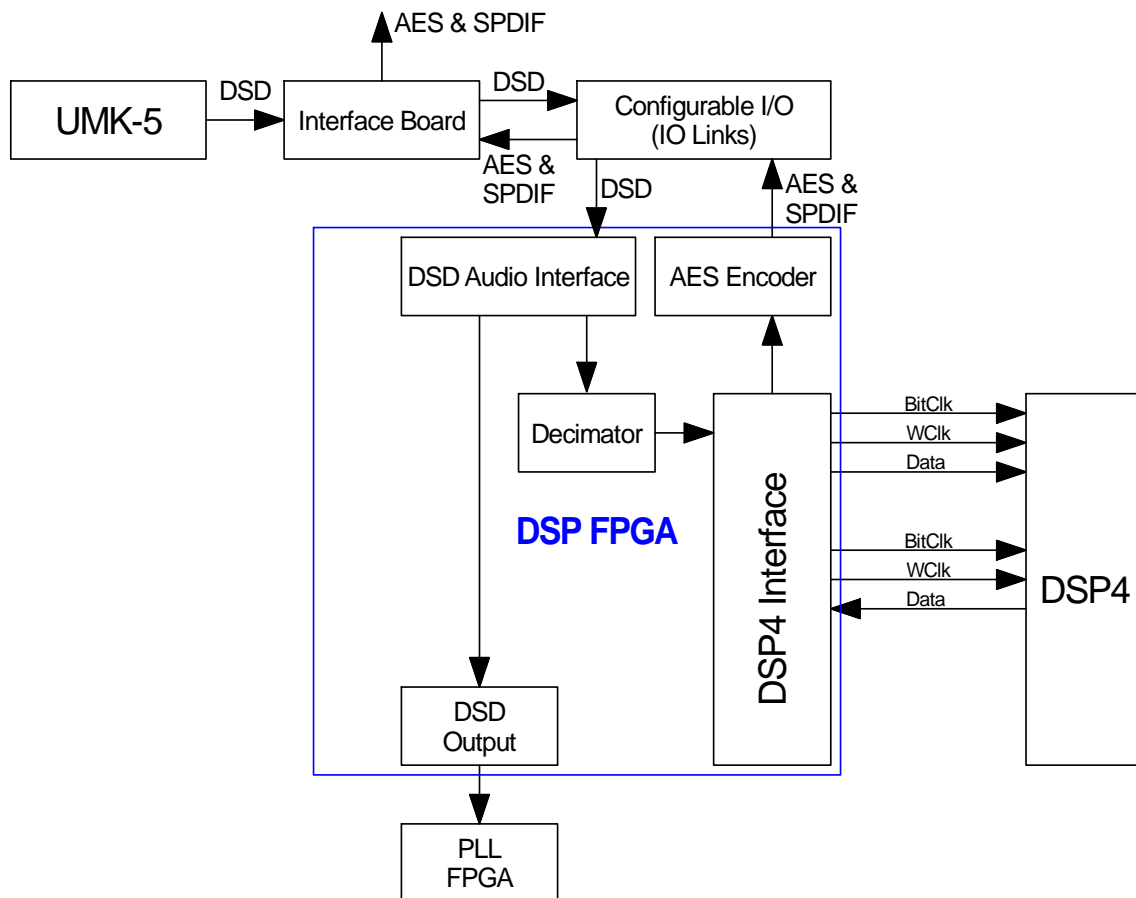
PCM Audio Path



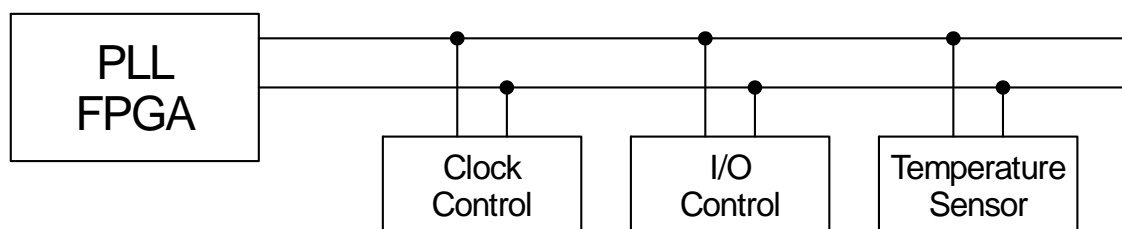
Control Interface



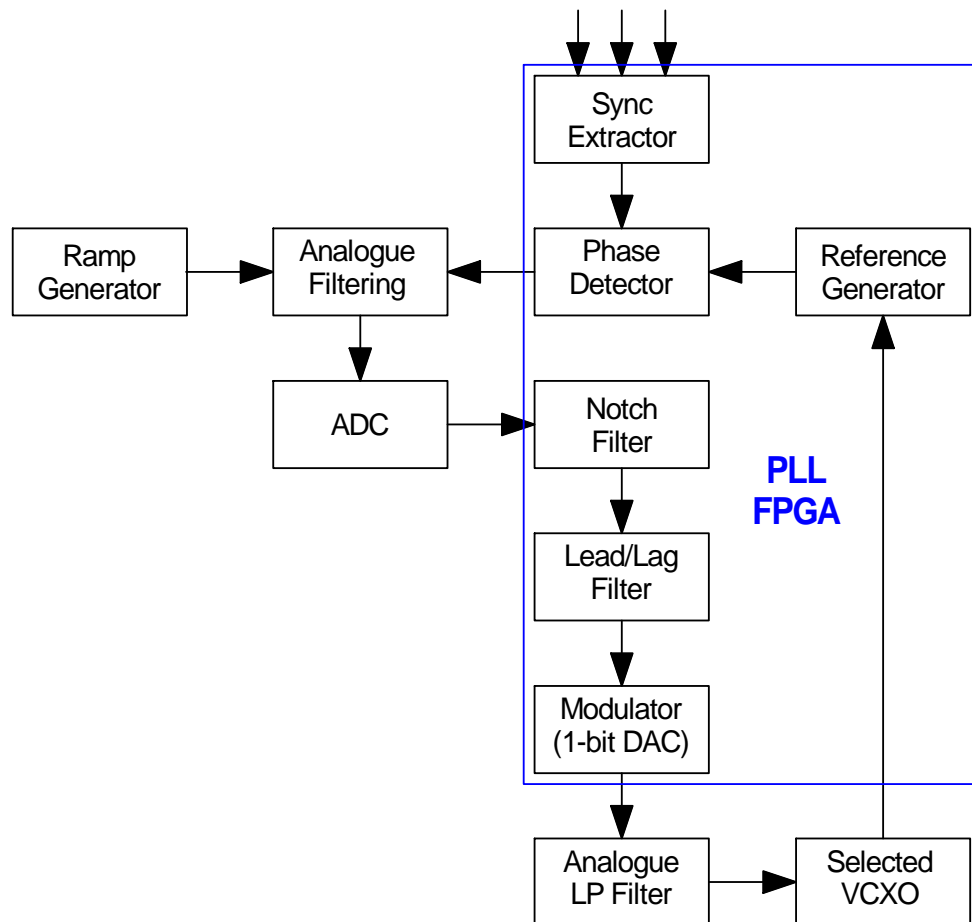
DSD Audio Path



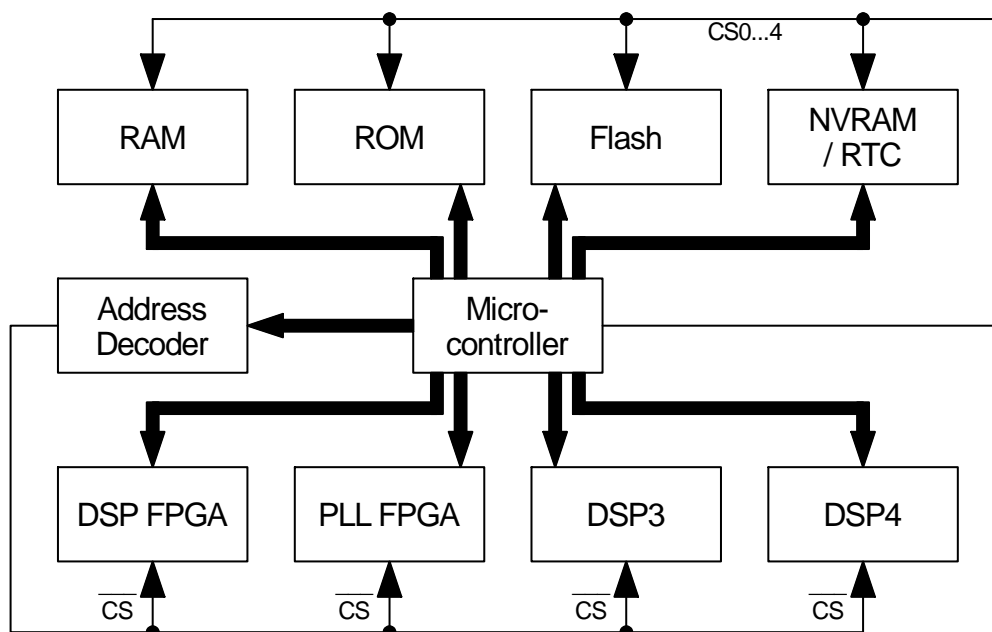
I²C Bus



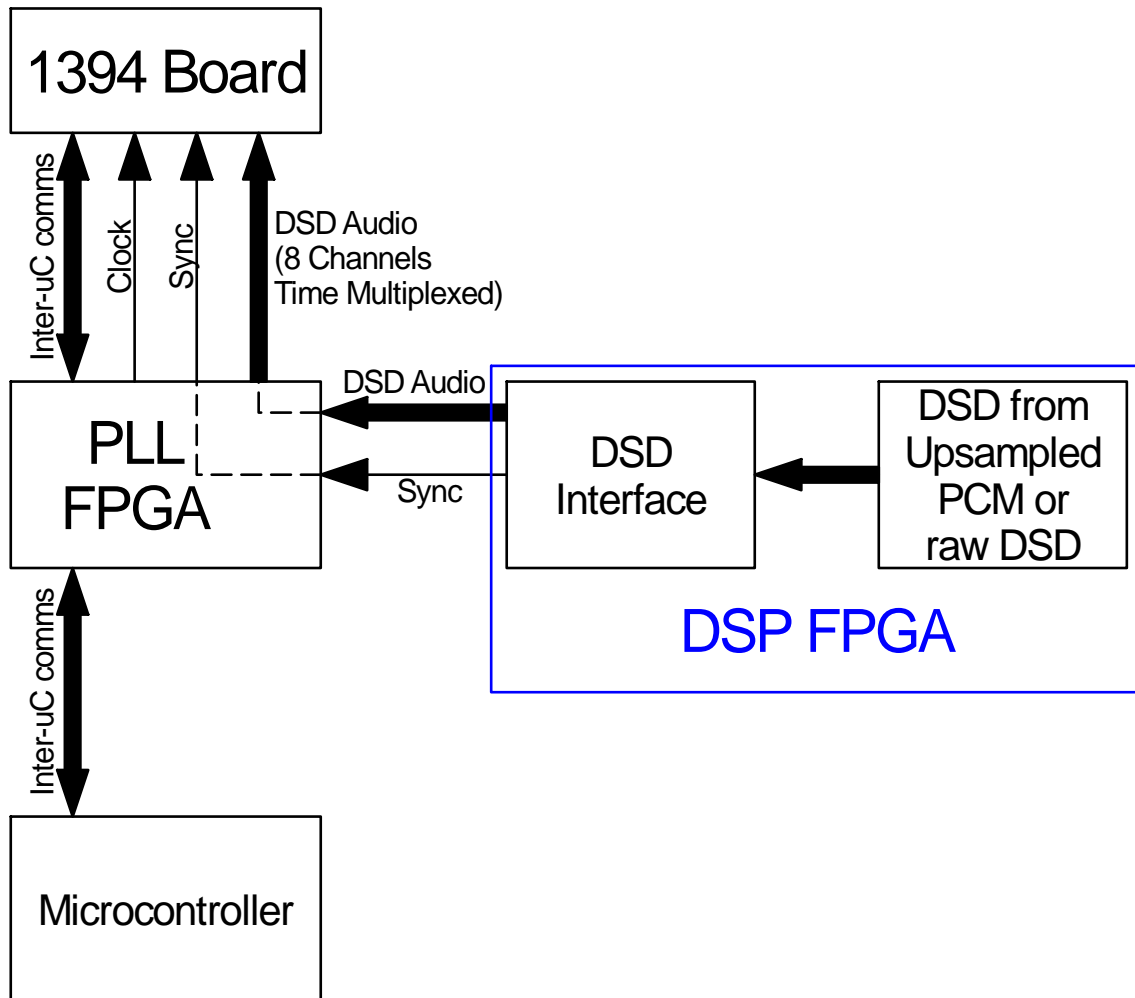
PLL



UA & UD



1394 Interface



CD UPDATE PROCEDURE

dCS Paganini Transport v1.02 Software Update



If you are loading a software version later than 1.02, follow the instructions provided with the disc.

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

The CD supplied with these instructions enables the software in any *dCS Paganini Transport* with version 1.00 or 1.01 software to be updated to version 1.02. *dCS* contact information is given at the end of this document.

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

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 *Paganini 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, or you forgot to play the disc for 10 seconds first, 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 1.02	
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	Paganini Transport	
35:50	Welcome	
36:00		The unit finishes uploading the new software and reads the disc.

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

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

If You Need More Help

In the first instance please contact the *dCS* distributor for your country. Contact details may be found on the *dCS* web site - www.dcsLtd.co.uk. Please provide the serial number of your unit, the software version currently installed and the version of software on the Update CD you are trying to install.

RE-LOADING SOFTWARE FROM ROM

Re-loading the Control software

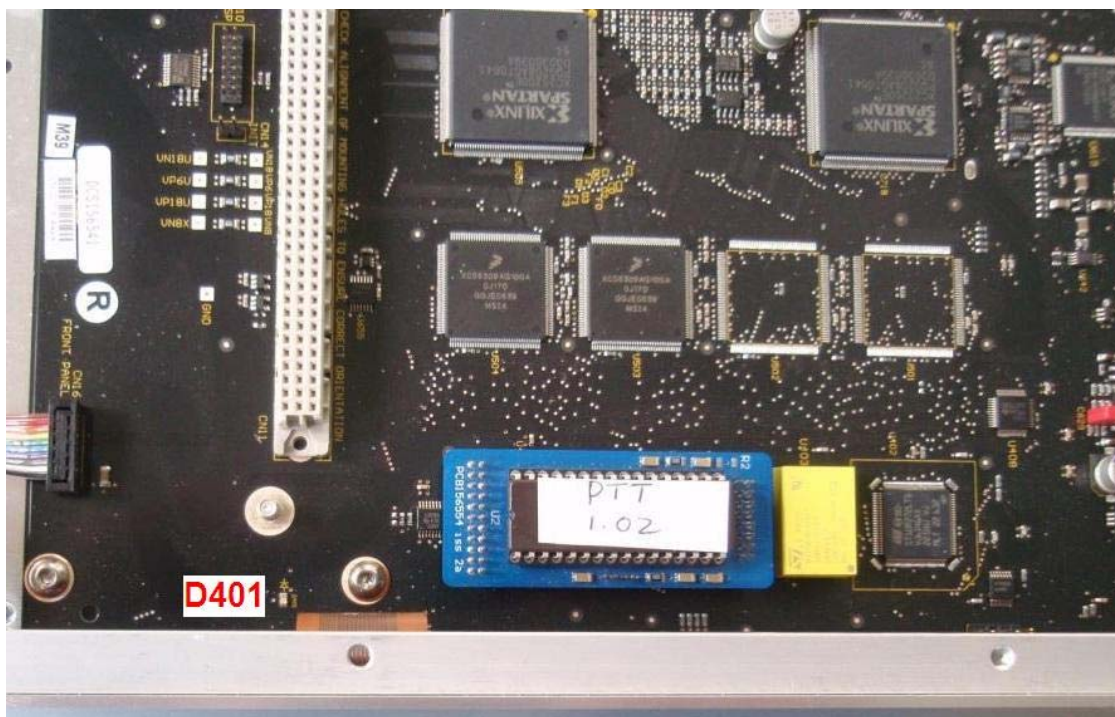
Normally, software can be updated from CD without opening the case, provided the unit boots up and runs correctly.

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 "**PTT**" which is loaded with the *Paganini Transport* 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.
- Fit the **PTT** 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.
- 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.

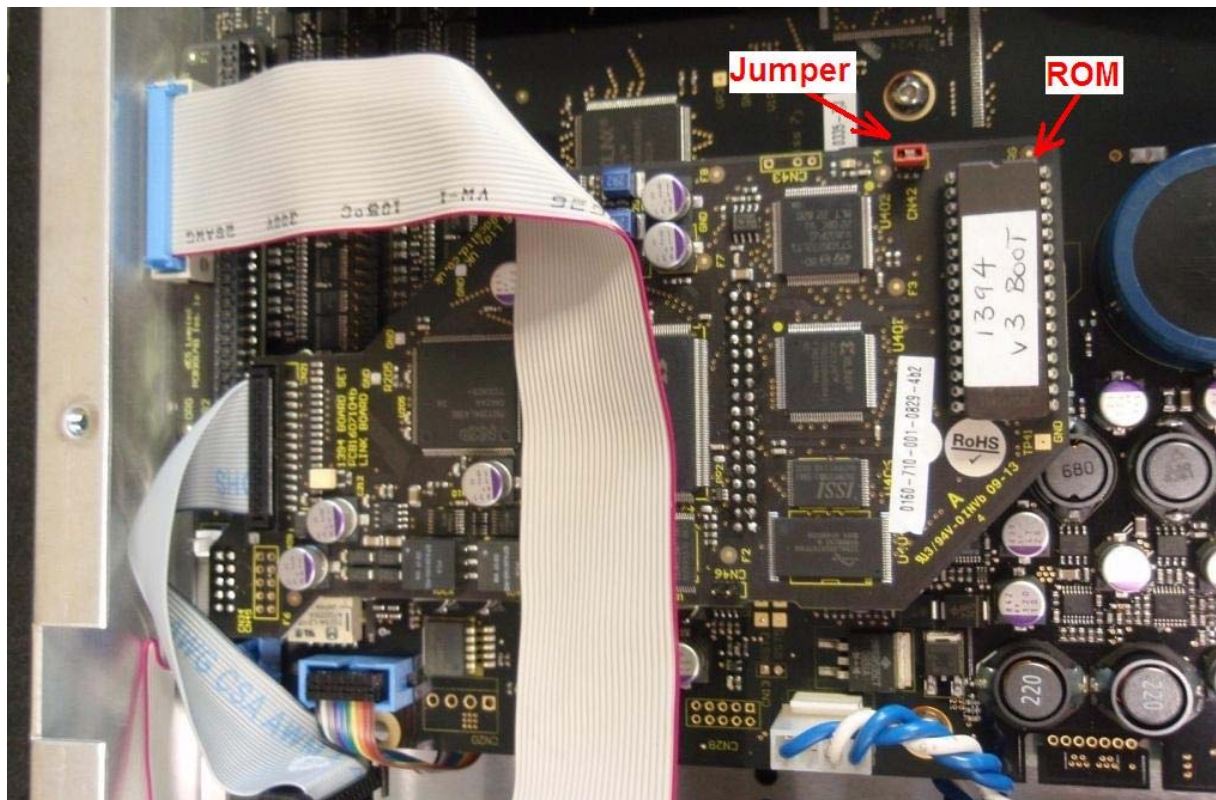
Re-loading the 1394 code

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 Paganini and must not be loaded into Paganini 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.
- Ensure that all 1394 cables are disconnected from the Transport.
- Turn the unit over 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 CN42. 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.
- Replace the base plate.
- 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.