

*Service Manual*

# CD23

Issue 1.0

## FMJ CD23 Compact Disc Player (Text)



ARCAM

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# Service Guide

## Contents

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- **Fault diagnostics**
- **Power supply test points**
- **Hints & tips**

## CD23 (Text) Service Guide

### Fault diagnostics

Fault	Action
No power	Check mains fuse Check power supply rails
No Audio output	Check for digital output, if ok then check power supply voltages Check DAC chip
Intermittent noise on output	Check Dac chip
Fails to respond to commands	Check supply to remote circuit Check remote flex foil cable Check for +4.9volts on RX201 o/p
Fails to read disc	Check mech supply Check clock signal
Laser optic moves to end stop position	Caused by failure of clock signal to the mech Check mech supply Check clock signal
No Display	Check filament voltage 3.1vac Check flex foil cable Check for dry joints on micro and display
Spurious display readout	Check for dry joints on display board

### Power supply test points

Position	Voltage
DGND	0 volts
PL202	+12 volts
PL204	-12 volts
IC200 o/p	+7.3 volts - mech supply
IC203 o/p	+5 volts - DAC supply
IC202 o/p	+5 volts - Digital supply
IC204 o/p	-30 volts
Between R227 & R228	3.1 volts AC – display filament

### Hints & tips

- Voltage conversion 230/115VAC by changing the internal fuse position and fitting the correct rated fuse. 100VAC requires a different transformer.

# **Main Board L935**

## **Contents**

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- **Circuit description**
- **Component overlay**
- **Parts list**
- **Circuit diagrams**

# CD23 (text) Circuit Description

## Power Supplies Transformers

115/230 VAC:

- Main board - part number L859TX
- Toroid - part number L860TX

100 VAC:

- Main board - part number L862TX
- Toroid - part number L883TX

Main board transformer secondary windings:

1. 9V-0V-32V to produce the digital, motor drive and fluorescent display grid supplies  
+11V(U) Unregulated supply for relay drive and +5V(D) supply  
+7V (IC200) Mechanism and motor driver supply  
+5V(D) (IC202) General digital logic supply  
+5V(A) (IC203) Supply to DAC  
-30V (IC204) Display grid voltage.
2. 0-5V to provide an AC supply for the display filament.

Toroid transformer secondary winding:

1. 13.7-0V-13.7 for audio output circuitry (DAC)

## Relay Mute Control

This circuit drives a relay to un-mute the analogue output ~5 seconds after the unit is powered on, and quickly mutes the output when the unit is switched off. The circuit works effectively as an "AND" gate.

If AC is present on the transformer secondary winding and the 5-second timer composed of R222 and C221 has reached the threshold voltage ( $V_{be}$  of TR200 +  $V_{be}$  of TR201 -  $V_{ce}$  of TR202, or ~1.0V), the relay coil is connected to +11V (referenced to 0V<sub>3</sub> as required by the DAC's internal circuitry) via TR204.

When AC is removed, C231 discharges quickly through R225, the base voltage of TR204 rises and the relay coil voltage is removed, muting the output.

TR203 resets the 'timer' by discharging C221 quickly at turn-off.

## Remote Control/PIC Micro

Remote control data is received from the IREye on the display PCB and buffered by TR300 and TR301. The Programmable Interrupt Controller converts the RC-5 format data into the NEC format required by the Sony micro. The PIC also controls the configuration of the digital filter/DAC on the DAC board.

## Motor Driver

The status of the drawer is indicated to the micro by two micro switches 'INSW' and 'OUTSW' on SK205. The micro controls the drawer motor via driver IC303.

## Clock Buffering

The clock and data signals LRCK, ADATA and BCLK from the mechanism connector SK300 are double buffered by IC300 before being delivered to the DAC.

## Power-On/Reset

The power-on reset signal XRST (or RESET) is generated by R409, C410 and IC404. When the power is turned on, C410 is initially uncharged and pin 11 of IC404 is at high voltage, and thus the output is low. After a short time, C410 is charged via R409; IC404 pin 11 is then low, and the output switches high (RESET is de-asserted).

## System Clock

The system clock is generated on the DAC board.

The clock and data signals LRCK, ADATA and BCLK from the mechanism connector SK300 are double buffered by IC300 before being delivered to the DAC. The system clock is delivered to the mech via two-position jumper PL300.

## Microcontroller & Display Board

The system microcontroller IC100 serves the following functions:

- Control of the mechanism & decoder on the CDM14 mechanism
- Control of mute, attenuation and de-emphasis for the DAC
- Direct drive of the fluorescent display
- Remote control decoding
- Keyboard scanning
- DAC muting

The keyboard scanning works by connecting the keys to a resistor ladder on an ADC input to the micro. Pressing a key presents a unique voltage to this input, which the micro is pre-programmed to interpret accordingly.

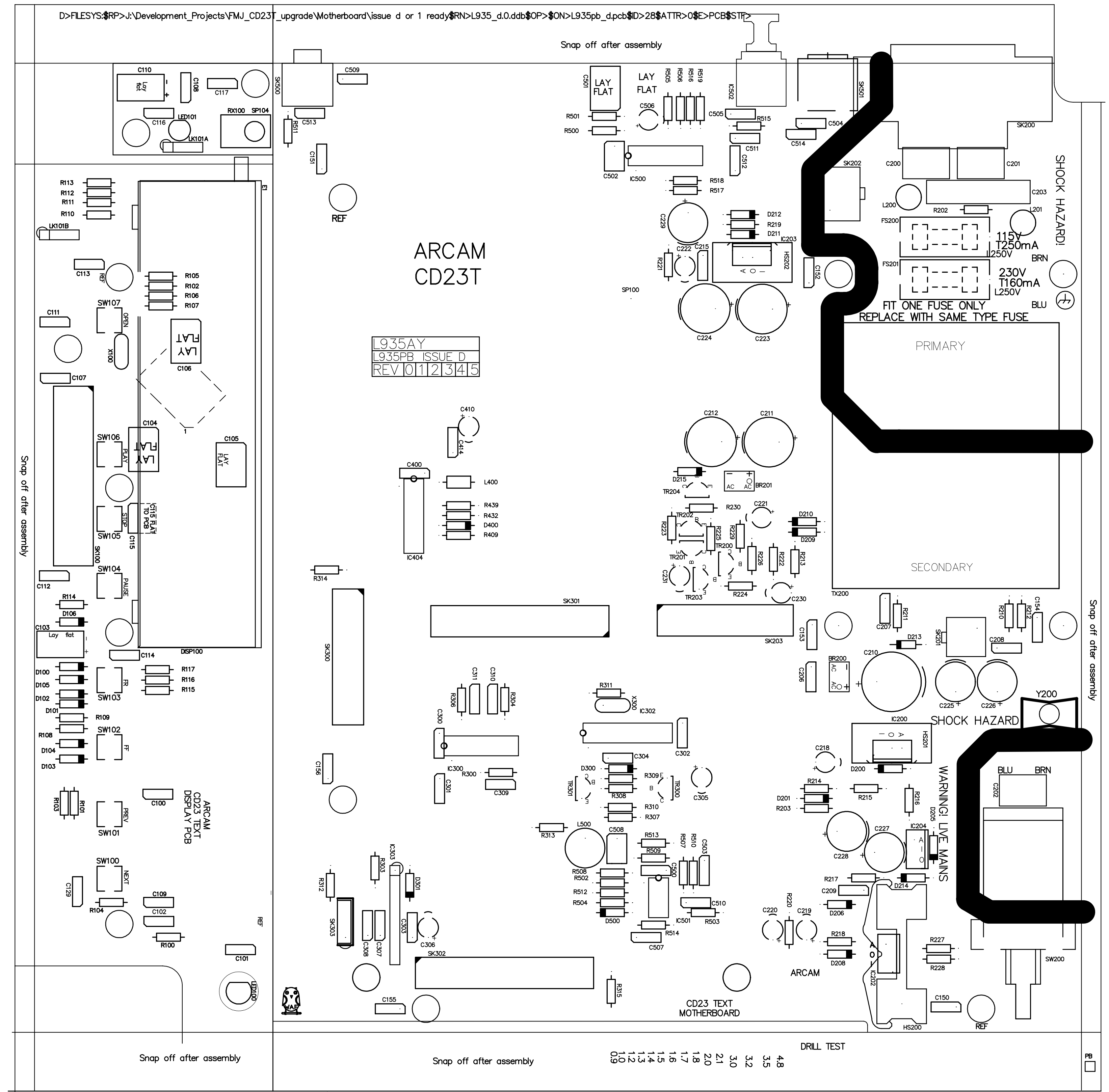
The remote control data contains a 'Customer Code' that identifies this as an Arcam product. The diode network D100 to D106 configures the micro to accept this code.

## Remote Bus Carrier Filter & Demodulator

Remote control commands can be delivered over wire to SK500 for multi-room applications. Incoming signals are attenuated and clipped by resistors and D500. L500 and C508 form a parallel resonant circuit at approximately 37kHz. This demodulates the incoming signal and the output is passed to IC501A where it is 'chopped', low pass filtered and fed to IC501B to provide the RC5 output signal.

## Digital Output

The decoder on the mechanism assembly generates an SPDIF format digital output signal. This is passed to buffer IC500A. IC500B through E are used in parallel to provide a transformer less 75-ohm source impedance to a single phono socket SK501. Optical digital output via IC502 is also tapped off the digital output signal via IC500F.



MECHANICAL DATA	
LAYER STACKUP	
D:\FILESYS\RP>J:\Development\Projects\FMJ_CD23T_upgrade\Motherboard\issue d or 1 ready\RN>L935_d.0.dtb\$OP>\$ON>L935pb_d.pcb\$D>28\$ATTR>0\$E>PCB\$STR>	

MATERIAL	FR4	NOTES:--
COPPER WEIGHT	1oz	1/ Manufacture in accordance with IPC-A-600F Class 1.
HOLE SIZES	FINISHED (SEE NOTE 2)	2/ Always use NC drill file as reference.
ROUTING	SEE NOTE 3	3/ All routing 2.0mm unless otherwise shown on drill drawing.
COPPER LAYERS	TWO	4/ Mark month/year of manufacture on ident layer.
MINIMUM WIDTH	10 MIL	5/ Scoring denoted by ->>> on drill drawing.
MINIMUM GAP	10 MIL	
RESIST	GREEN	
IDENT	WHITE	GENERAL TOLERANCES
VENDOR CODES	SEE NOTE 4	PCB Dims. +/- 0.2mm
FINISH	SILVER	Routing +/- 0.1mm
SCORING	SEE NOTE 5	All holes +/- 0.08mm
		ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED

DRAWING TITLE FMJ CD23T MAIN / DISPLAY BOARD		---	---	---	---
Top Overlay		---	---	---	---
<b>ARCAM</b>	Filename: L935pb_d.pcb	---	---	---	---
	DRAWING NO.	---	---	---	---
A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB	L935PB	---	WAF	14/08/01	UPDATED PROTOTYPE
		---	CL	13/07/01	PROTOTYPE
Contact Engineer: Cliff Lawrence	E.C.O. No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
	Contact Tel: +44 (0) 1223 203294	Printed: 30-Aug-2001	Sheet 2 of 8		

## L935 Main Board Parts List Issue 4.0

Designator	Part	Description
BR200	3BDF01M	Bridge rectifier DF01M 1A 100V
BR201	3BDF01M	Bridge rectifier DF01M 1A 100V
C100	2A210	CERD 1N0 63V 20% RA
C101	2A210	CERD 1N0 63V 20% RA
C102	2A210	CERD 1N0 63V 20% RA
C103	2N710	ELST 100U 25V
C103	2P710ZA	ELST 100U 25V ZA RUBYCON
C104	2A410	CERD 100N 63V 20% RA
C105	2A410	CERD 100N 63V 20% RA
C106	2A410	CERD 100N 63V 20% RA
C107	2A410	CERD 100N 63V 20% RA
C108	2A410	CERD 100N 63V 20% RA
C109	2A410	CERD 100N 63V 20% RA
C110	2N610	ELST 10U 50V
C111	2A210	CERD 1N0 63V 20% RA
C112	2A410	CERD 100N 63V 20% RA
C113	2A210	CERD 1N0 63V 20% RA
C114	2A210	CERD 1N0 63V 20% RA
C115	2A210	CERD 1N0 63V 20% RA
C116	2A210	CERD 1N0 63V 20% RA
C117	2A210	CERD 1N0 63V 20% RA
C129	2A310	CERD 10N 63V 20% RA
C151	2A210	CERD 1N0 63V 20% RA
C152	2A210	CERD 1N0 63V 20% RA
C153	2A210	CERD 1N0 63V 20% RA
C154	2A210	CERD 1N0 63V 20% RA
C155	2A210	CERD 1N0 63V 20% RA
C156	2A210	CERD 1N0 63V 20% RA
C200	2K233	SUPPR CAP 3N3 250V
C201	2K233	SUPPR CAP 3N3 250V
C202	2K233	SUPPR CAP 3N3 250V
C203	2D422	220NF CLASS X2 CAP 275VRMS
C206	2A410	CERD 100N 63V 20% RA
C207	2A410	CERD 100N 63V 20% RA
C208	2A410	CERD 100N 63V 20% RA
C209	2A410	CERD 100N 63V 20% RA
C210	2N833	ELST 3M3 25V
C211	2N810	ELST 1M0 25V
C212	2N810	ELST 1M0 25V
C215	2K410	PEST 100N 63V 10%
C218	2N710	ELST 100U 25V
C219	2N710	ELST 100U 25V
C220	2N710	ELST 100U 25V
C221	2N710	ELST 100U 25V
C222	2N710	ELST 100U 25V
C223	2N810	ELST 1M0 25V
C224	2N810	ELST 1M0 25V
C225	2N710B	ELST 100U 100V
C226	2N710B	ELST 100U 100V
C227	2N710B	ELST 100U 100V
C228	2N810A	ELST 1M0 10V
C229	2N810A	ELST 1M0 10V
C230	2N710	ELST 100U 25V
C231	2N610	ELST 10U 50V
C300	2A410	CERD 100N 63V 20% RA



## L935 Main Board Parts List Issue 4.0

Designator	Part	Description
C301	2A410	CERD 100N 63V 20% RA
C302	2A410	CERD 100N 63V 20% RA
C303	2A410	CERD 100N 63V 20% RA
C304	2A110	CERD 100P 50V -20% +80% RA
C305	2N710	ELST 100U 25V
C306	2N710	ELST 100U 25V
C307	2A310	CERD 10N 63V 20% RA
C308	2A410	CERD 100N 63V 20% RA
C400	2A410	CERD 100N 63V 20% RA
C410	2N710	ELST 100U 25V
C414	2A410	CERD 100N 63V 20% RA
C500	2A410	CERD 100N 63V 20% RA
C501	2A310	CERD 10N 63V 20% RA
C502	2K447	PEST 470N 63V 10%
C503	2A210	CERD 1N0 63V 20% RA
C504	2A310	CERD 10N 63V 20% RA
C505	2A410	CERD 100N 63V 20% RA
C506	2P622	ELST 22U 20V OSCON
C507	2A410	CERD 100N 63V 20% RA
C508	2D168	PPRO 680P 5% 63V RA
C509	2A410	CERD 100N 63V 20% RA
C510	2A110	CERD 100P 50V -20% +80% RA
C511	2A410	CERD 100N 63V 20% RA
C512	2A147	CERD 470P 50V -20% +80% RA
C513	2A110	CERD 100P 50V -20% +80% RA
C514	2A410	CERD 100N 63V 20% RA
CA1	L920CA	CD...T MAINS JUMPER CABLE
D100	3A4148	SSDIODE 1N4148 75V
D101	3A4148	SSDIODE 1N4148 75V
D102	3A4148	SSDIODE 1N4148 75V
D103	3A4148	SSDIODE 1N4148 75V
D104	3A4148	SSDIODE 1N4148 75V
D105	3A4148	SSDIODE 1N4148 75V
D106	3A4148	SSDIODE 1N4148 75V
D200	3A4148	SSDIODE 1N4148 75V
D201	3A4148	SSDIODE 1N4148 75V
D205	3A4148	SSDIODE 1N4148 75V
D206	3A4148	SSDIODE 1N4148 75V
D208	3A4148	SSDIODE 1N4148 75V
D209	3A4148	SSDIODE 1N4148 75V
D210	3A4148	SSDIODE 1N4148 75V
D211	3A4148	SSDIODE 1N4148 75V
D212	3A4148	SSDIODE 1N4148 75V
D213	3B4003	RECTIFIER 1N4003F 1A 200V
D214	3C05104	Diode 5V1 400mW
D215	3A4148	SSDIODE 1N4148 75V
D300	3A4148	SSDIODE 1N4148 75V
D301	3C04704	ZENER 4V7 400MW
D400	3A4148	SSDIODE 1N4148 75V
D500	3C04704	ZENER 4V7 400MW
DISP100	B1015	DISP CD SONY 14-ST-20GK
E1	E930MC	CD23TEXT VFD SUPPORT
EL200	8M101	EARTH LEAD
FS200	F022	INS COVER PCB FUSEHOLDER
FS200	8S004	FUSEHOLDER 20mm PCB

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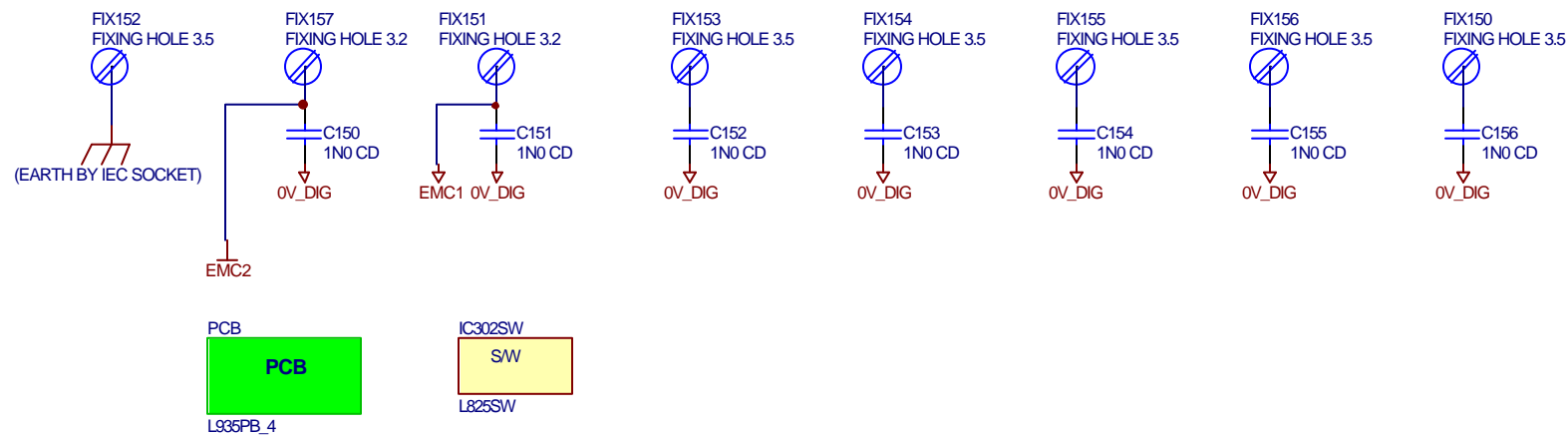
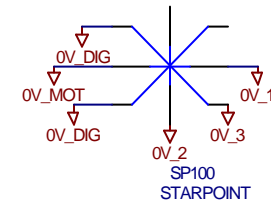
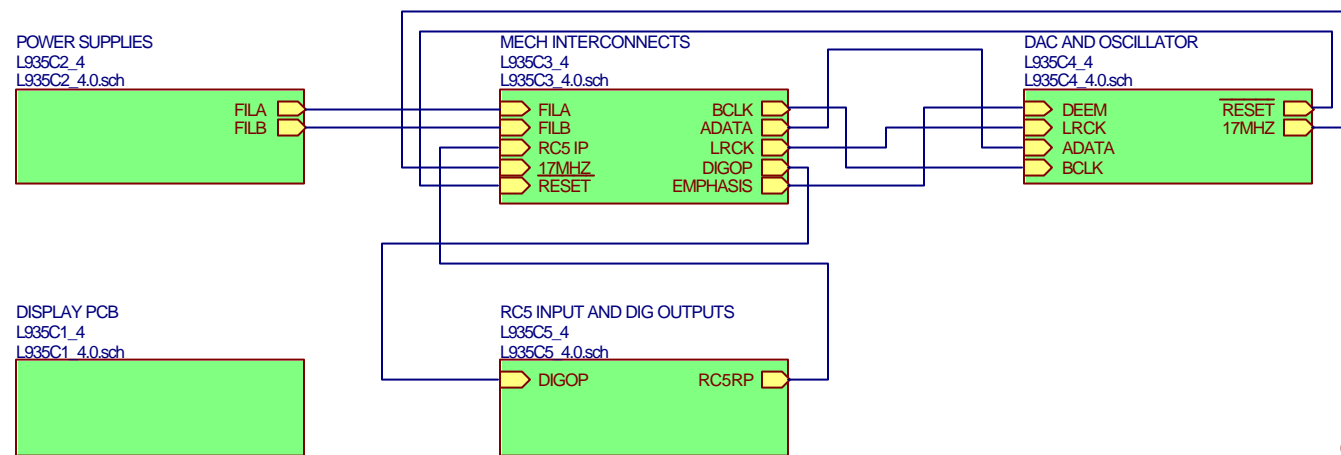
Designator	Part	Description
FS201	C11166	FUSE 20mm 160mA T S504160mA
FS201	F022	INS COVER PCB FUSEHOLDER
FS201	8S004	FUSEHOLDER 20mm PCB
HS200	F006	HEATSINK CLIP TO220 13/8.6 DC/W
HS200	F008	HEATSINK TO220 8.6 DEGC/W
HS201	F007	HEATSINK TO220 CLIP 30
HS202	F007	HEATSINK TO220 CLIP 30
IC100	5G82832	IC CD CXP82832-031Q MICRO
IC200	5D1086A	IC VREG LM1086CT-ADJ
IC202	5D317T	IC VREG POS LM317T
IC203	5D317T	IC VREG POS LM317T
IC204	5D337	IC VREG POS LM337T
IC300	5J7404	IC HCMOS 74HCU04
IC302	5H16C54X	IC CMOS MICRO PIC16C54XT/P
IC302	8S018	IC SOCKET 18 PIN 0.3"
IC302	5H16C54X	IC CMOS MICRO PIC16C54XT/P
IC303	5Q1641	IC MOTOR DRIVER LB1641
IC404	5J7404	IC HCMOS 74HCU04
IC500	5J7404	IC HCMOS 74HCU04
IC501	5M393A	IC COMPARITOR DUAL LM393A
IC502	5TG550T	SPDIF OPTICAL TRANSMITTER
IC302SW	L825SW	SOFTWARE
IC302SW	L825SW	SOFTWARE
L200	7D968A	6U8H INDUCTOR
L201	7D968A	6U8H INDUCTOR
L400	7F003	FERRITE BEAD SINGLE AXIAL TAPED 2K BOX
L500	7D327	27mH INDUCTOR
LED100	3D001	LED GREEN 5MM
LED101	3D003	LED ULTRARED 5MM
LK101A	L814CA	JUMPER 4-WAY LEAD
MC200	E922MC	MAGNETIC SHIELD PLATE (ATTACH TO TX WITH E923MC)
MC201	E923MC	ADHESIVE PAD (ATTACH TO E922MC & TX)
PCB	L935PB_3	PRINTED CIRCUIT BOARD
PCB	L935PB_2	PRINTED CIRCUIT BOARD
R100	1H122	RES MF W4 220R 1%
R101	1H310	RES MF W4 1% 10K
R102	1H310	RES MF W4 1% 10K
R103	1H268	RES MF W4 1% 6K8
R104	1H268	RES MF W4 1% 6K8
R105	1H268	RES MF W4 1% 6K8
R106	1H268	RES MF W4 1% 6K8
R107	1H268	RES MF W4 1% 6K8
R108	1H233	RES MF W4 1% 3K3
R109	1H222	RES MF W4 1% 2K2
R110	1H215	RES MF W4 1% 1K5
R111	1H210	RES MF W4 1% 1K0
R112	1H168	RES MF W4 1% 680R
R113	1H010	RES MF W4 1% 10R
R114	1H310	RES MF W4 1% 10K
R115	1H310	RES MF W4 1% 10K
R116	1H310	RES MF W4 1% 10K
R117	1H310	RES MF W4 1% 10K
R202	1K515	RES W25 5% VR25 1M5
R203	1H133	RES MF W4 1% 330R
R210	1G810	RES MF FU W3 1R0 5% NFR25

## L935 Main Board Parts List Issue 4.0

Designator	Part	Description
R211	1G010	RES MF FU W3 10R 5% NFR25
R212	1G810	RES MF FU W3 1R0 5% NFR25
R213	1G010	RES MF FU W3 10R 5% NFR25
R214	1H216	RES MF W4 1% 1K6
R215	1H322	RES MF W4 1% 22K
R216	1H210	RES MF W4 1% 1K0
R217	1H333	RES MF W4 1% 33K
R218	1H127	RES MF W4 1% 270R
R219	1H127	RES MF W4 1% 270R
R220	1H182	RES MF W4 1% 820R
R221	1H182	RES MF W4 1% 820R
R222	1H447	RES MF W4 1% 470K
R223	1H310	RES MF W4 1% 10K
R224	1H310	RES MF W4 1% 10K
R225	1H222	RES MF W4 1% 2K2
R226	1H310	RES MF W4 1% 10K
R227	1H110	RES MF W4 1% 100R
R228	1H110	RES MF W4 1% 100R
R229	1H215	RES MF W4 1% 1K5
R230	1H310	RES MF W4 1% 10K
R300	1H056	RES MF W4 1% 56R
R303	1H268	RES MF W4 1% 6K8
R304	1H056	RES MF W4 1% 56R
R306	1H056	RES MF W4 1% 56R
R307	1H310	RES MF W4 1% 10K
R308	1H310	RES MF W4 1% 10K
R309	1H310	RES MF W4 1% 10K
R310	1H310	RES MF W4 1% 10K
R311	1H410	RES MF W4 1% 100K
R312	1H268	RES MF W4 1% 6K8
R313	1H410	RES MF W4 1% 100K
R314	1H310	RES MF W4 1% 10K
R315	1H310	RES MF W4 1% 10K
R409	1H310	RES MF W4 1% 10K
R432	1H310	RES MF W4 1% 10K
R439	1H510	RES MF W4 1% 1M0
R500	1H010	RES MF W4 1% 10R
R501	1H010	RES MF W4 1% 10R
R502	1H218	RES MF W4 1% 1K8
R503	1H218	RES MF W4 1% 1K8
R504	1H210	RES MF W4 1% 1K0
R505	1H112	RES MF W4 1% 120R
R506	1H212	RES MF W4 1% 1K2
R507	1H310	RES MF W4 1% 10K
R508	1H310	RES MF W4 1% 10K
R509	1H310	RES MF W4 1% 10K
R510	1H310	RES MF W4 1% 10K
R511	1H147	RES MF W4 1% 470R
R512	1H410	RES MF W4 1% 100K
R513	1H410	RES MF W4 1% 100K
R514	1H215	RES MF W4 1% 1K5
R515	1H310	RES MF W4 1% 10K
R516	1H212	RES MF W4 1% 1K2
R517	1H212	RES MF W4 1% 1K2
R518	1H212	RES MF W4 1% 1K2

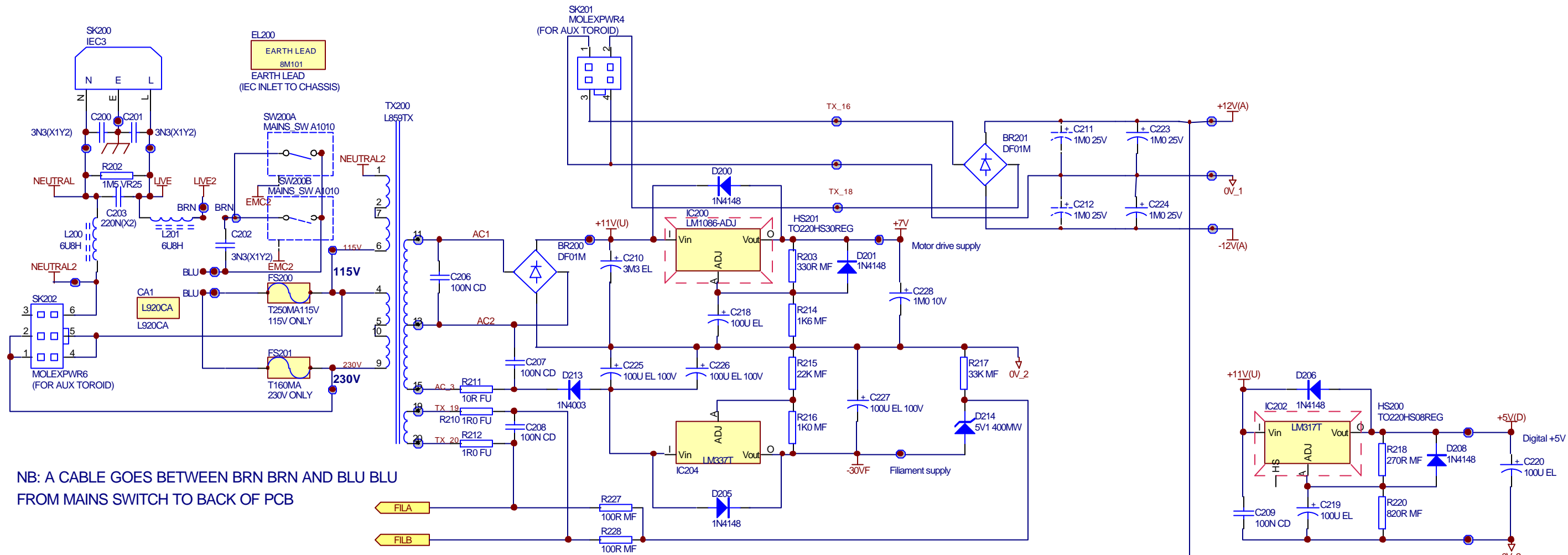
## L935 Main Board Parts List Issue 4.0

<b>Designator</b>	<b>Part</b>	<b>Description</b>
R519	1H110	RES MF W4 1% 100R
RX100	B2107	REMOTE RX PIC-26043TM2
SK100	8K8132	32-WAY FFC CONN HORIZ
SK200	8A001	IEC MAINS CONN PCB INS PX
SK200	HP007	COPPER RIVET TCP/D48 BS
SK201	8K2304	MOLEX MINI FIT 4 WAY
SK202	8K2306	MOLEX MINI FIT HCS 6 WAY
SK203	8K8023	23-WAY FFC CONN VERT
SK300	8K8023	23-WAY FFC CONN VERT
SK301	8K8032	32-WAY FFC CONN VERT
SK302	8K8032	32-WAY FFC CONN VERT
SK303	8K2005	5-WAY AMP CT CONN
SK500	8D228	MIN JACK SINGLE 3.5mm
SK501	8D220	PHONO SKT SINGLE EMC
SP103	F215	DS STICKY PAD 70 X 25mm
SP104	E822AP	IR RX SUPPORT PAD
SW100	A1510	TACT SWITCH 2-PIN LOW PROF NO GND PIN
SW101	A1510	TACT SWITCH 2-PIN LOW PROF NO GND PIN
SW102	A1510	TACT SWITCH 2-PIN LOW PROF NO GND PIN
SW103	A1510	TACT SWITCH 2-PIN LOW PROF NO GND PIN
SW104	A1510	TACT SWITCH 2-PIN LOW PROF NO GND PIN
SW105	A1510	TACT SWITCH 2-PIN LOW PROF NO GND PIN
SW106	A1510	TACT SWITCH 2-PIN LOW PROF NO GND PIN
SW107	A1510	TACT SWITCH 2-PIN LOW PROF NO GND PIN
SW200	A1010	SWITCH PUSH MAINS DPST TV-8
TR200	4A549	TRANS LF SS N BC549B
TR201	4A549	TRANS LF SS N BC549B
TR202	4A549	TRANS LF SS N BC549B
TR203	4A549	TRANS LF SS N BC549B
TR204	4A557	TRANS LF SS P BC557B
TR300	4A549	TRANS LF SS N BC549B
TR301	4A549	TRANS LF SS N BC549B
TX200	L859TX	FMJ COOL MULTI-VOLTAGE TX
TX200	L859TX	FMJ COOL MULTI-VOLTAGE TX
X100	7W008	CER RESON 8.00MHz
X300	7W005	CER RESON 4.00MHz
Y200	F185	TX WIRE RESTRAINT
Y200	F185	TX WIRE RESTRAINT
Y201	HF4V09B	SCREW
Y202	HF4V09B	SCREW
Y203	HF4V09B	SCREW
Y204	HF4V09B	SCREW



USE EXCLUDE NF WHEN GENERATING ROS.

DRAWING TITLE							
<b>CD23T - TOP LEVEL SCHEMATIC</b>							
<b>23425</b> A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB	Filename: L935C6_4.0.prj						
	Notes:	02_E011	WAF	22/1/02	PCB REMOTE SNAP OFF CHANGE	4.0	
		01_1171	CL	04/10/01	ADMINISTRATIVE ISSUE CHANGE, PCB TO ISS3 FOR AIWA REQ	3.0	
	ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE		ISSUE	
Contact Engineer: Travis Pierce	Contact Tel: (01223) 203 200	Printed: 23-Jan-2002	Sheet 6 of 6	DRAWING NO. <b>L935CT</b>			



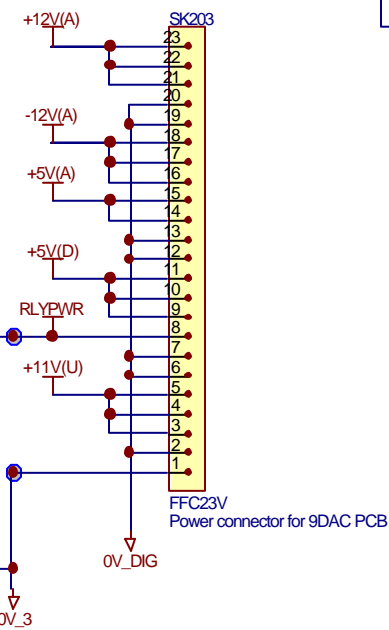
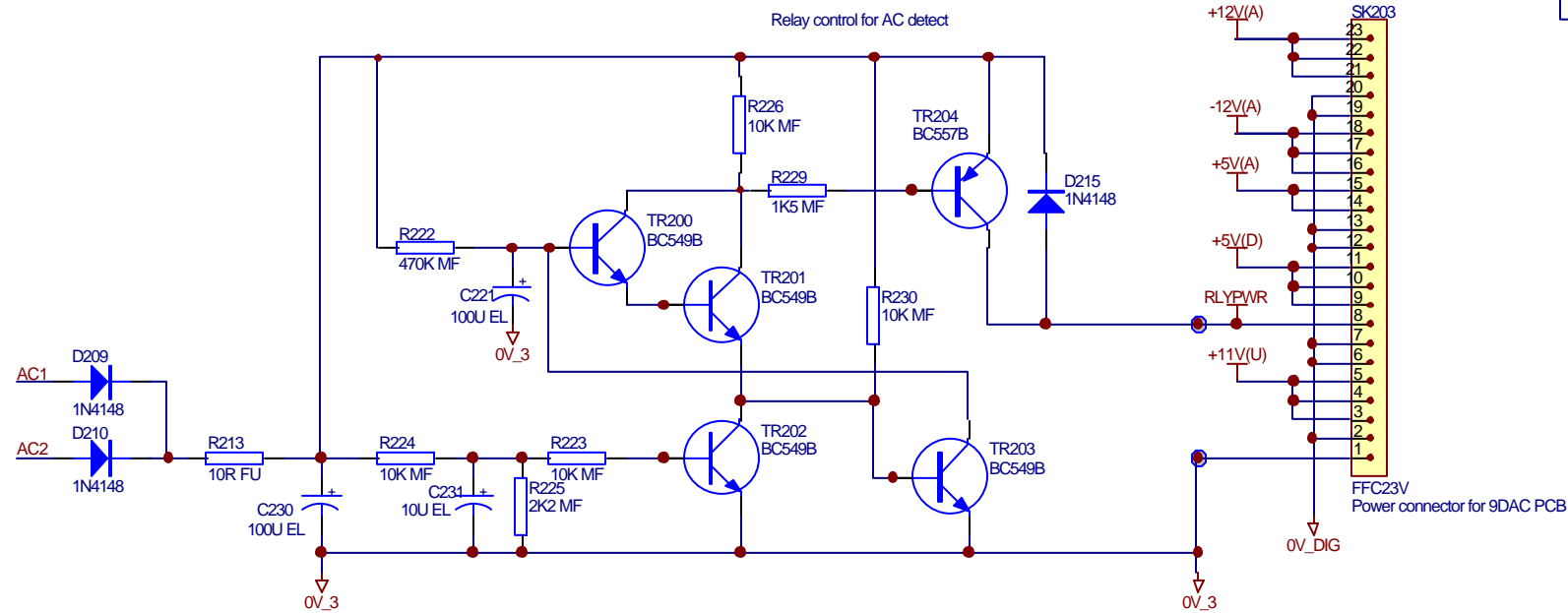
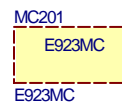
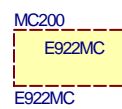
NB: A CABLE GOES BETWEEN BRN BRN AND BLU BLU FROM MAINS SWITCH TO BACK OF PCB



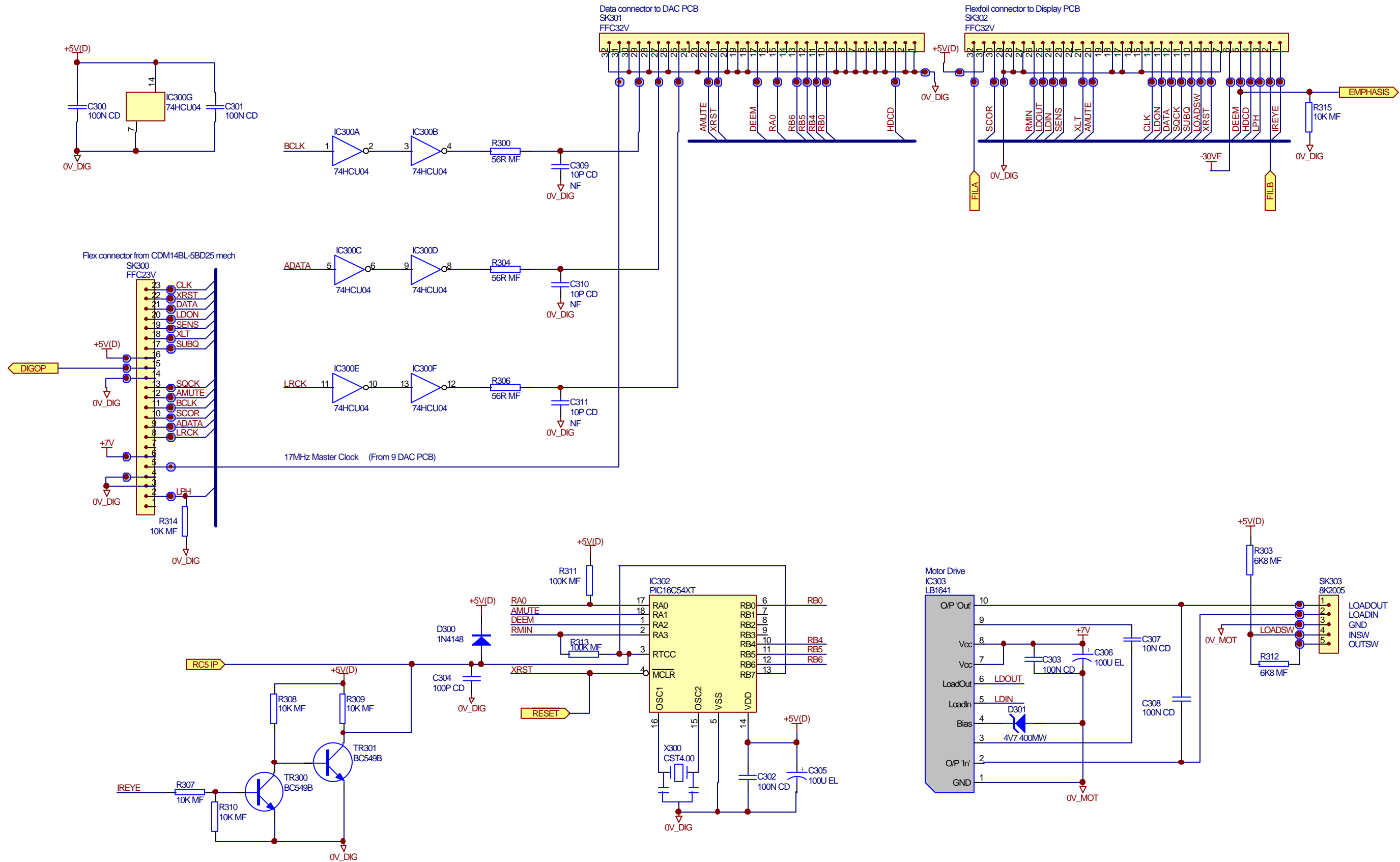
TX FIXING SCREWS

- Y201 SCREW HF4V09B
- Y202 SCREW HF4V09B
- Y203 SCREW HF4V09B
- Y204 SCREW HF4V09B

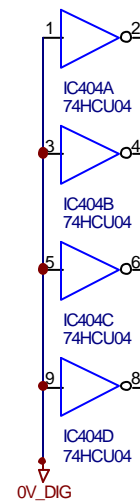
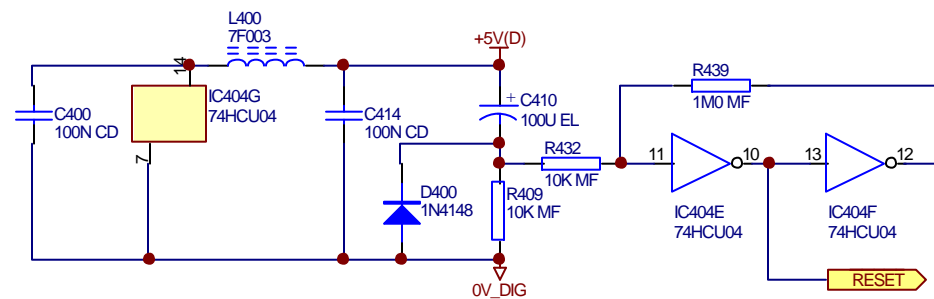
AFFIX TO TX BETWEEN ANALOGUE CIRCUITRY & TX



DRAWING TITLE						
<b>CD23T - POWER SUPPLIES</b>						
Filename: L935C2_4.0.sch						
Notes:		02_E011	WAF	22/1/02	PCB REMOTE SNAP OFF CHANGE	4.0
		01_1171	CL	04/10/01	ADMINISTRATIVE ISSUE CHANGE, PCB TO ISS3 FOR AIWA REQ	3.0
		ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
Contact Engineer: Travis Pierce	Contact Tel: (01223) 203 200	Printed: 23-Jan-2002	Sheet 2 of 6	DRAWING NO. L935CT		

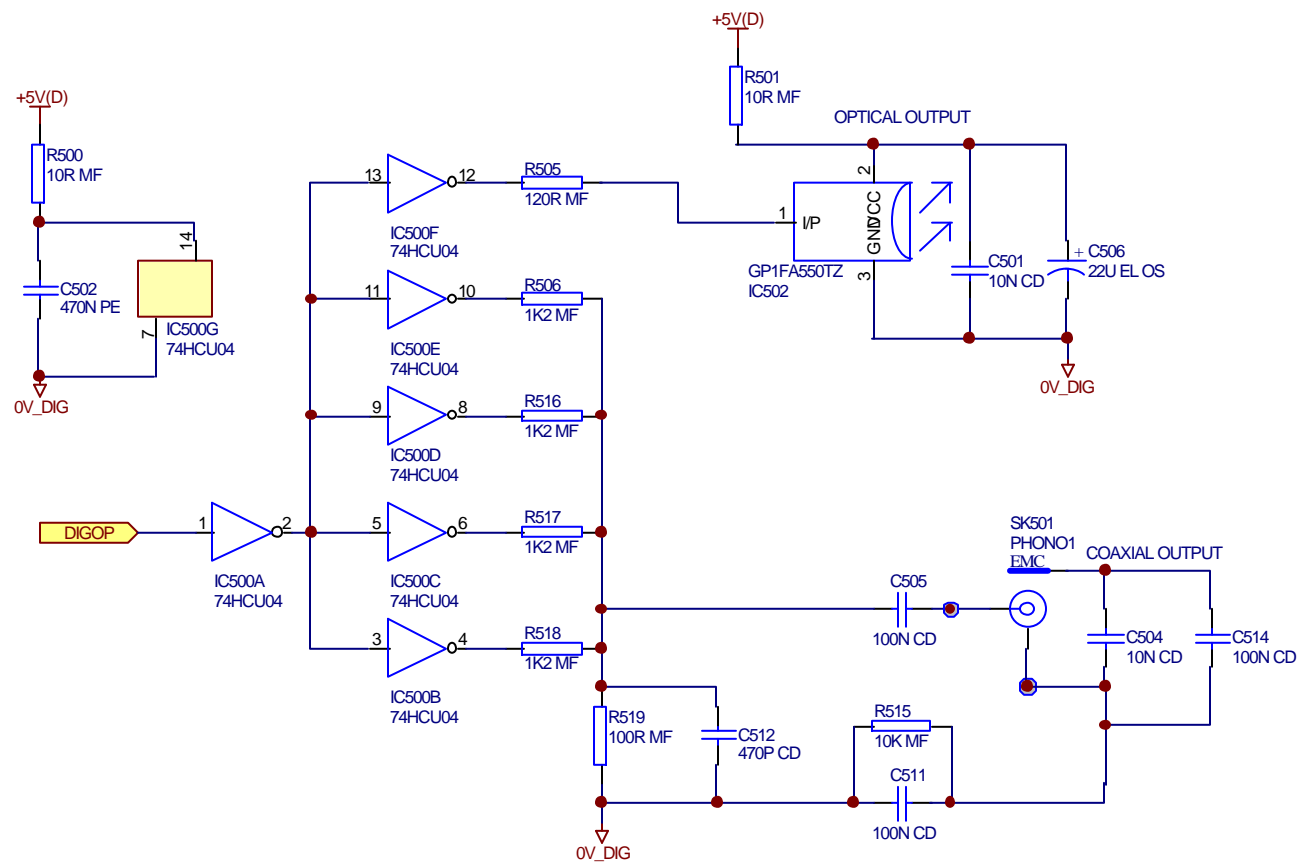
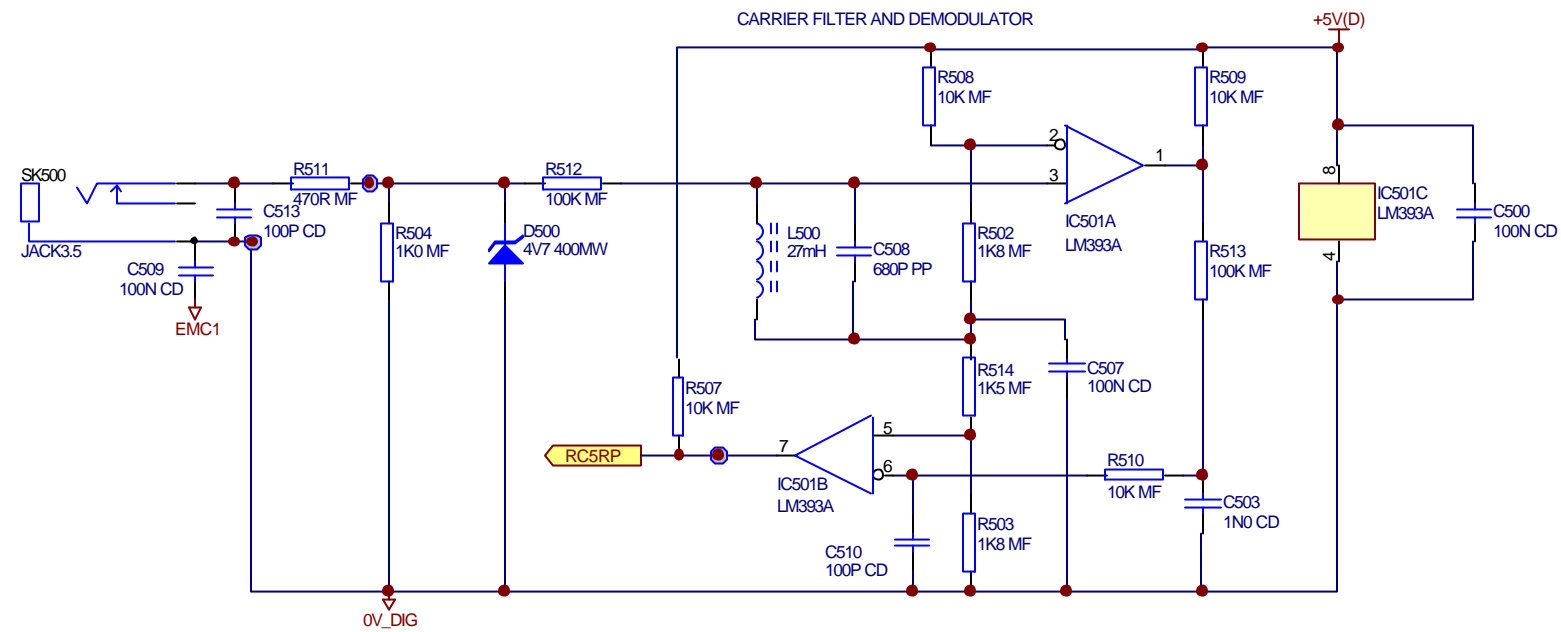


DRAWING TITLE						
<b>CD23T - MECH, MOTOR &amp; MICRO</b>						
<b>23425</b> A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB	Filename: L935C3_4.0.sch					
	Notes:		02_E011	WAF	22/1/02	PCB REMOTE SNAP OFF CHANGE
			01_1171	CL	04/10/01	ADMINISTRATIVE ISSUE CHANGE, PCB TO ISS3 FOR AIWA REQ
	ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE		ISSUE
Contact Engineer: Travis Pierce	Contact Tel: (01223) 203 200	Printed: 23-Jan-2002	Sheet 3 of 6	DRAWING NO. L935CT		

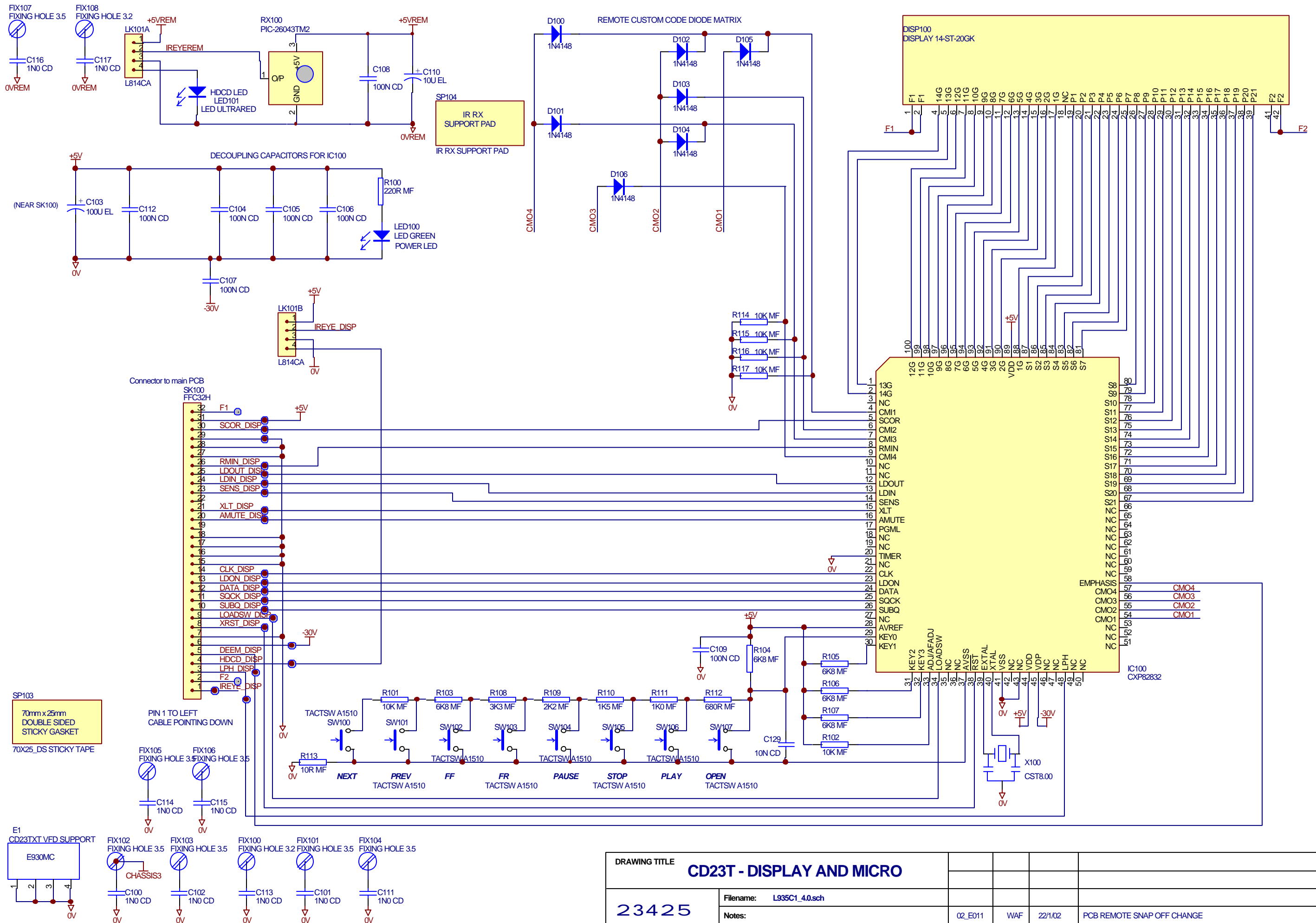


DRAWING TITLE							
<b>CD23T - RESET CIRCUIT</b>							
<b>23425</b> A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB	Filename: L935C4_4.0.sch						
	Notes:	02_E011	WAF	22/1/02	PCB REMOTE SNAP OFF CHANGE	4.0	
		01_1171	CL	04/10/01	ADMINISTRATIVE ISSUE CHANGE, PCB TO ISS3 FOR AWA REQ	3.0	
		ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE	
Contact Engineer: Travis Pierce	Contact Tel: (01223) 203 200	Printed: 23-Jan-2002	Sheet 4 of 6	DRAWING NO. L935CT			





DRAWING TITLE									
<b>CD23T - RC5 INPUT &amp; DIGITAL OUT</b>									
<b>23425</b> A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB	Filename:	L935C5_4.0.sch							
	Notes:								
	ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE				
	02_E011	WAF	22/1/02	PCB REMOTE SNAP OFF CHANGE	4.0				
01_1171	CL	04/10/01	ADMINISTRATIVE ISSUE CHANGE, PCB TO ISS3 FOR AIWA REQ	3.0					
Contact Engineer:	Travis Pierce	Contact Tel:	(01223) 203 200	Printed:	23-Jan-2002	Sheet	5 of 6	DRAWING NO.	L935CT



DRAWING TITLE				
<b>CD23T - DISPLAY AND MICRO</b>				
Filename: L935C1_4.0.sch				
Notes:				
02_E011	WAF	22/1/02	PCB REMOTE SNAP OFF CHANGE	4.0
01_1171	CL	04/1001	ADMINISTRATIVE ISSUE CHANGE, PCB TO ISS3 FOR AWA REQ	3.0
ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
Contact Engineer: Travis Pierce		Contact Tel: (01223) 203 200	Printed: 23-Jan-2002	Sheet 1 of 6
			DRAWING NO. L935CT	

23425  
 A & R Cambridge Ltd.  
 Pembroke Avenue  
 Waterbeach  
 Cambridge CB5 9PB

# **DAC Board L912**

## **Contents**

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- **Circuit description**
- **Component overlay**
- **Parts list**
- **Circuit diagrams**

## DAC Circuit description

### Refer to L912 circuit diagrams

The DAC PCB converts Sony format digital audio data at 44.1KHz sampling rate to unbalanced audio outputs. There is a Pacific Microsonics PMD-200 HDCD filter which is programmed by a dedicated on board PIC micro (IC406) to accept a variety of data formats.

### Digital Filter/HDCD decoder

The FPGA receives two control lines from the main board PIC, RB0 and RB6.

**RB5** MS1, Serial data mode select 1. Used just after switch-on.

**RB4** MS2, Serial data mode select 2. Used just after switch-on.

The PMD 200 (IC 400) receives Sony format serial digital audio data (after re latching) mute and de-emphasis control signals from the main board. The output from this is 8x over-sampled filtered audio data with a 24 bit word length. The HDCD filter output is in serial form BCKO, WCKO, DOL and DOR.

### Data Re-latching

The PMD 200 (IC 400) requires that the input data is timed with respect to the system clock, however the data edges are not well defined when clocking at the system clock frequency so a re-latching circuit, IC300, IC 401, IC402 and IC403, re-clocks SER\_CLK, SER\_DIN and SER\_CH to double the bit clock frequency. The phase of the latching clock is nudged if it's rising edge gets too close to the bit clock transitions.

### Reset Signal

The XRST reset signal from the mother board is buffered by IC 300D & E to produce the GO signal. C127 at the input of the buffer delays GO from falling when the unit is switched off so that the mute relay has chance to close before any clicks occur.

The GO signal enables the clock output, initiates PMD 200 and FPGA programming and enables power and bias to the DAC ASIC.

### Power Supplies

TR7 and TR5 regulate the supply to +/-13V with about 0.2V drop-out margin.

### Voltage Reference

A voltage reference, IC 62, is used to derive the +/-13V rails as mentioned above and also a clean 5V supply to the DAC from IC 5. The reference is filtered and can be divided by two if TR 19 is switched on to provide the 6dB gain shift required by the HDCD filter(IC 400). This reference is used to drive the DAC reference point and the bias sources for the DAC.

### Mute Relay

The mute relay is controlled from the PIC micro on the motherboard via RA0 after switch-on. In Standby mode, XRST is low which interrupts the relay via TR 25. RA0 is low when the CD player comes out of standby mode and goes high after a short settling delay. TR 18 is also used to interrupt the relay while the FPGA is not fully programmed.

The power rail, RLYPWR, is un-regulated and has a small reservoir capacitor (on the mother board) so that the relay is released very soon after the mains is disconnected from the CD player before the other power supply rails collapse.

### FPGA noise shaper

The FPGA (IC61) is programmed by the PROM (IC31), which holds the configuration code, to perform the function of reading in the 8x over-sampled audio data from the HDCD filter and output the noise-shaped and encoded data to drive the ring DACs. This happens after the PRGMN line and the GO signal goes high.

### Ring DAC

The ring DAC (IC 63) re-latches the data from the FPGA to a clean latching signal gated by U21 to the system clock. The data is then driven through buffers into resistor rings, which effectively form the 48 current sources, into a virtual earth point. Bias currents are also injected to compensate for the way the ring data is encoded. The earth point is held at half the voltage reference voltage 2.5V or 1.25V depending on the HDCD gain shift state. This level is generated by a matched resistor divider on the chip.

### Voltage References

The current switches in the DAC need two reference voltage levels per channel to switch each of the resistors between, 0V and +2.5/5V. The second reference can be switched between +2.5 and +5V depending on the gain required by the HDCD filter. The reference points must be kept at a very quiet DC level since any noise on these points is directly represented at the audio outputs. To keep these points quiet, op-amp servos, IC 8, IC 9, IC 24 and IC 25 drive them through discreet buffers. A second connection is made to the point on the chip which the op-amp uses as a sense line.

### DC Bias

Because of the way the ring DAC works, not all the 48 current sources are switched on at any one time in each ring. On each channel, one ring has an average of 14 sources on and the other, the compliment, has an average of 34. DC bias needs to be injected into the virtual earths to null the current offsets. This is done by applying a DC voltage through on-chip matched resistors. The applied voltages must be either side of the virtual earth voltage which is half the reference voltage. The DC levels must also be proportional to the reference voltage. The bias voltages are sourced by IC 4 and IC 23.

### Voltage Servo

A voltage servo, IC 22, ensures the audio output DC offset is nulled by varying one of the DC bias levels slightly via R16 and R115.

To ensure the servo has stabilized by the time the mute relays are opened, the time constant of the servo is drastically reduced while the mute relay is active by JFETs TR 27 and TR 28.

### Analogue Stages

The DAC has two pairs of complimentary outputs. Each output is in the form of a virtual earth point which are then passed through a current feedback I/V stage (IC2 and IC6). The gain setting feedback resistor for the I/V stage is on the DAC chip matched to the resistors in the DAC ring.

The complementary signals are then passed through a differential 4 pole passive LP filter with a Bessel characteristic which removes a large amount of digital (ultrasonic) noise while causing minimum disruption to the audio band. They are then combined with a low distortion differential buffer amplifier to produce a single ended output (IC 3 and IC 7).

## Specifications

<b>Type of DAC</b>	:	DCS-designed ring DAC ASIC with a 4 rings of 48 current sources.
<b>DAC source</b>	:	Encoded current source drive from FPGA. 14 of 48 current sources active on average on two rings & 34 of 48 on the other two.
<b>0dB Output Level</b>	:	2.3V rms (4.6V for HDCD mode) +/- 0.2V rms @ 1KHz.
<b>Frequency response</b>	:	10Hz to 20KHz +0,-0.2dB.
<b>THD</b>	:	0.01% typical, 0.018% max @ 1KHz 0dB output. 0.05% typical, 0.06% max @ 1KHz 0dB output in HDCD mode
<b>Signal to Noise</b>	:	Better than 93dB CCIR uwtd ref 1KHz 0dB, Better than 97dB A weighted ref 1KHz 0dB. (Hoping to improve, please consult SJB before publishing).
<b>Crosstalk L/R</b>	:	Better than -98dB at 1KHz 0dB
<b>Output offset</b>	:	<20mV d.c.
<b>Output Impedance</b>	:	47 Ohms o/p to drive load 600 Ohms minimum.



## L912 DAC Board Parts List Issue 2.0

Designator	Part	Description
C1	2D247N	PPRO 4N7 63V 5% RA
C2	2N710	ELST 100U 25V
C3	2P710AC	ELEC 100U 25V CERAFINE
C4	2N710	ELST 100U 25V
C5	2K410	PEST 100N 63V 10%
C6	2P710AS	ELEC 100U 25V SILMIC
C7	2P710AS	ELEC 100U 25V SILMIC
C9	2D133	PPRO 330P 5% 63V RA
C10	2D133	PPRO 330P 5% 63V RA
C11	2D147N	PPRO 470P 63V 5% RA
C12	2N710	ELST 100U 25V
C13	2C047	MLC 47P 100V NPO 5% SM
C14	2C047	MLC 47P 100V NPO 5% SM
C15	2C410	MLC 100N 50V X7R 10% SM
C16	2D210	PPRO 1N0 5% 63V RA
C17	2C410	MLC 100N 50V X7R 10% SM
C18	2D210	PPRO 1N0 5% 63V RA
C19	2K410	PEST 100N 63V 10%
C20	2K410	PEST 100N 63V 10%
C21	2N710	ELST 100U 25V
C22	2C410	MLC 100N 50V X7R 10% SM
C23	2C410	MLC 100N 50V X7R 10% SM
C24	2K410	PEST 100N 63V 10%
C25	2D147N	PPRO 470P 63V 5% RA
C26	2D147N	PPRO 470P 63V 5% RA
C27	2U610	ELST NON POLAR 10UF 35V
C28	2P622AS	ELEC 22U 25V SILMIC
C29	2K410	PEST 100N 63V 10%
C30	2U610	ELST NON POLAR 10UF 35V
C31	2C410	MLC 100N 50V X7R 10% SM
C32	2C410	MLC 100N 50V X7R 10% SM
C33	2K410	PEST 100N 63V 10%
C34	2K410	PEST 100N 63V 10%
C35	2K410	PEST 100N 63V 10%
C36	2N747	ELST 470U 25V RA
C37	2N747	ELST 470U 25V RA
C38	2U610	ELST NON POLAR 10UF 35V
C39	2C410	MLC 100N 50V X7R 10% SM
C40	2C410	MLC 100N 50V X7R 10% SM
C41	2C410	MLC 100N 50V X7R 10% SM
C42	2K410	PEST 100N 63V 10%
C43	2C410	MLC 100N 50V X7R 10% SM
C44	2K410	PEST 100N 63V 10%
C45	2C310	MLC 10N 50V X7R 10% SM
C46	2D268	PPRO 6N8 5% 63V RA
C47	2K410	PEST 100N 63V 10%
C48	2K410	PEST 100N 63V 10%
C49	2C310	MLC 10N 50V X7R 10% SM
C50	2D247N	PPRO 4N7 63V 5% RA
C51	2D268	PPRO 6N8 5% 63V RA
C52	2D233	PPRO 3N3 5% 63V RA
C53	2D247N	PPRO 4N7 63V 5% RA
C54	2J310	MLC 10N 50V X7R 10% 0805
C55	2D233	PPRO 3N3 5% 63V RA
C56	2N710	ELST 100U 25V
C57	2D233	PPRO 3N3 5% 63V RA
C58	2K410	PEST 100N 63V 10%
C59	2D233	PPRO 3N3 5% 63V RA
C60	2K410	PEST 100N 63V 10%
C61	2D133	PPRO 330P 5% 63V RA
C62	2D133	PPRO 330P 5% 63V RA
C65	2D268	PPRO 6N8 5% 63V RA

## L912 DAC Board Parts List Issue 2.0

Designator	Part	Description
C66	2C210	MLC 1N0 50V X7R 10% SM
C67	2C110	MLC 100P 50V NPO 5% SM
C68	2C110	MLC 100P 50V NPO 5% SM
C69	2C110	MLC 100P 50V NPO 5% SM
C70	2C110	MLC 100P 50V NPO 5% SM
C71	2C082	MLC 82P 50V NPO 5% SM
C74	2J310	MLC 10N 50V X7R 10% 0805
C75	2C310	MLC 10N 50V X7R 10% SM
C76	2J310	MLC 10N 50V X7R 10% 0805
C77	2J310	MLC 10N 50V X7R 10% 0805
C78	2J310	MLC 10N 50V X7R 10% 0805
C79	2J310	MLC 10N 50V X7R 10% 0805
C80	2J310	MLC 10N 50V X7R 10% 0805
C81	2J310	MLC 10N 50V X7R 10% 0805
C82	2J310	MLC 10N 50V X7R 10% 0805
C83	2J310	MLC 10N 50V X7R 10% 0805
C84	2J310	MLC 10N 50V X7R 10% 0805
C85	2D247N	PPRO 4N7 63V 5% RA
C86	2J310	MLC 10N 50V X7R 10% 0805
C87	2J310	MLC 10N 50V X7R 10% 0805
C88	2C410	MLC 100N 50V X7R 10% SM
C89	2P710ZA	ELST 100U 25V ZA RUBYCON
C90	2J310	MLC 10N 50V X7R 10% 0805
C91	2C310	MLC 10N 50V X7R 10% SM
C92	2C310	MLC 10N 50V X7R 10% SM
C93	2D268	PPRO 6N8 5% 63V RA
C94	2J310	MLC 10N 50V X7R 10% 0805
C95	2K410	PEST 100N 63V 10%
C97	2U610	ELST NON POLAR 10UF 35V
C98	2U610	ELST NON POLAR 10UF 35V
C99	2J310	MLC 10N 50V X7R 10% 0805
C100	2K410	PEST 100N 63V 10%
C101	2J310	MLC 10N 50V X7R 10% 0805
C102	2J310	MLC 10N 50V X7R 10% 0805
C103	2J310	MLC 10N 50V X7R 10% 0805
C104	2C410	MLC 100N 50V X7R 10% SM
C105	2J310	MLC 10N 50V X7R 10% 0805
C106	2J310	MLC 10N 50V X7R 10% 0805
C107	2N710	ELST 100U 25V
C108	2D268	PPRO 6N8 5% 63V RA
C109	2C410	MLC 100N 50V X7R 10% SM
C110	2C310	MLC 10N 50V X7R 10% SM
C111	2K410	PEST 100N 63V 10%
C112	2J310	MLC 10N 50V X7R 10% 0805
C113	2J310	MLC 10N 50V X7R 10% 0805
C114	2K410	PEST 100N 63V 10%
C115	2K410	PEST 100N 63V 10%
C116	2K410	PEST 100N 63V 10%
C117	2K410	PEST 100N 63V 10%
C118	2C410	MLC 100N 50V X7R 10% SM
C119	2C410	MLC 100N 50V X7R 10% SM
C120	2C047	MLC 47P 100V NPO 5% SM
C121	2C047	MLC 47P 100V NPO 5% SM
C122	2D210	PPRO 1N0 5% 63V RA
C123	2D210	PPRO 1N0 5% 63V RA
C124	2N610	ELST 10U 50V
C125	2N610	ELST 10U 50V
C126	2K410	PEST 100N 63V 10%
C127	2J410	MLC 100N 50V X7R 10% 0805
C128	2J410	MLC 100N 50V X7R 10% 0805
C129	2J410	MLC 100N 50V X7R 10% 0805
C130	2J410	MLC 100N 50V X7R 10% 0805



## L912 DAC Board Parts List Issue 2.0

Designator	Part	Description
C131	2J410	MLC 100N 50V X7R 10% 0805
C132	2J210	MLC 1N 50V X7R 10% 0805
C133	2J210	MLC 1N 50V X7R 10% 0805
C134	2J210	MLC 1N 50V X7R 10% 0805
C135	2N710	ELST 100U 25V
C136	2J210	MLC 1N 50V X7R 10% 0805
C137	2J210	MLC 1N 50V X7R 10% 0805
C138	2J310	MLC 10N 50V X7R 10% 0805
C141	2L110	MLC 100P 100V NPO 5% 0805
C159	2C310	MLC 10N 50V X7R 10% SM
C163	2N722	ELST 220U 16V
C164	2C210	MLC 1N0 50V X7R 10% SM
C165	2N610	ELST 10U 50V
C170	2C310	MLC 10N 50V X7R 10% SM
C171	2C310	MLC 10N 50V X7R 10% SM
C300	2C410	MLC 100N 50V X7R 10% SM
C301	2C410	MLC 100N 50V X7R 10% SM
C302	2C410	MLC 100N 50V X7R 10% SM
C303	2C410	MLC 100N 50V X7R 10% SM
C304	2C410	MLC 100N 50V X7R 10% SM
C305	2C410	MLC 100N 50V X7R 10% SM
C306	2C410	MLC 100N 50V X7R 10% SM
C307	2C410	MLC 100N 50V X7R 10% SM
C308	2C410	MLC 100N 50V X7R 10% SM
C309	2C410	MLC 100N 50V X7R 10% SM
C310	2C410	MLC 100N 50V X7R 10% SM
C311	2C410	MLC 100N 50V X7R 10% SM
C312	2N610	ELST 10U 50V
C313	2P622	ELST 22U 20V OSCON
C314	2C410	MLC 100N 50V X7R 10% SM
C316	2C047	MLC 47P 100V NPO 5% SM
C317	2C047	MLC 47P 100V NPO 5% SM
C318	2C110	MLC 100P 50V NPO 5% SM
C320	2C082	MLC 82P 50V NPO 5% SM
C321	2C047	MLC 47P 100V NPO 5% SM
C400	2C110	MLC 100P 50V NPO 5% SM
C407	2C410	MLC 100N 50V X7R 10% SM
C409	2C410	MLC 100N 50V X7R 10% SM
C410	2C410	MLC 100N 50V X7R 10% SM
C411	2C410	MLC 100N 50V X7R 10% SM
C412	2C410	MLC 100N 50V X7R 10% SM
C413	2C410	MLC 100N 50V X7R 10% SM
C414	2C410	MLC 100N 50V X7R 10% SM
C420	2C310	MLC 10N 50V X7R 10% SM
C421	2C310	MLC 10N 50V X7R 10% SM
C422	2N710	ELST 100U 25V
C500	2J210	MLC 1N 50V X7R 10% 0805
C501	2J210	MLC 1N 50V X7R 10% 0805
C600	2J210	MLC 1N 50V X7R 10% 0805
C601	2J210	MLC 1N 50V X7R 10% 0805
C700	2N610	ELST 10U 50V
D3	3AS16W	DIODE SS SM BAS16W
D4	3AV99W	DIODE SS SM BAV99W
D5	3AV99W	DIODE SS SM BAV99W
D6	3AS16W	DIODE SS SM BAS16W
D7	3AS16W	DIODE SS SM BAS16W
D8	3AS16W	DIODE SS SM BAS16W
D10	3AS16W	DIODE SS SM BAS16W
D11	3AS16W	DIODE SS SM BAS16W
D300	3AV99W	DIODE SS SM BAV99W
FLT1	7G002	EMI FILTER SM NFM61R30T472
FLT300	7G002	EMI FILTER SM NFM61R30T472

## L912 DAC Board Parts List Issue 2.0

Designator	Part	Description
HS1	F002	HEATSINK TO220 13 DEGC/W
HS1	HA3A12A	M/C PAN SUPA M3x12 STBK
HS1	HJ3A00F	M3 NYLOC NUT
IC2	5B6182	IC CURRENT FEEDBACK DUAL LM6182 SM
IC3	5B2134	IC OPAMP DUAL SM OPA2134PA
IC4	5B275S	IC AUDIO DUAL SM OP275
IC5	5B027S	IC OPAMP SM OP27
IC6	5B6182	IC CURRENT FEEDBACK DUAL LM6182 SM
IC7	5B2134	IC OPAMP DUAL SM OPA2134PA
IC8	5B797	IC OPAMP SM AD797AR
IC9	5B797	IC OPAMP SM AD797AR
IC10	5D10863S	IC VREG LM1086CS-3.3
IC21	5KA100	IC AHC SN74AHC1G00
IC22	5B072D	IC AUDIO SM DUAL TL072
IC23	5B275S	IC AUDIO DUAL SM OP275
IC24	5B797	IC OPAMP SM AD797AR
IC25	5B797	IC OPAMP SM AD797AR
IC31	5G27512	IC CMOS EPROM 27C512 120NS
IC31	8S028	IC SOCKET 28 PIN
IC35	5D7905	IC VREG NEG 7905
IC36	5D317T	IC VREG POS LM317T
IC61	5R2C002	IC CMOS FPGA ATT2C002
IC62	5D500	IC VREF POS ZRB500F01 SOT32 1%
IC63	5XDSY1	IC DCS 24/96 RING DAC
IC300	5K7404	IC HCMOS SM 74HCU04
IC301	5D78L05	IC VREG POS 78L05
IC302	5K74125V	IC HCMOS SM 74VHC125
IC303	5K74125V	IC HCMOS SM 74VHC125
IC304	5KA100	IC AHC SN74AHC1G00
IC305	5KA1U04	IC AHC SN74AHC1GU04
IC400	5G200	IC CD DIGITAL FILTER HDCD PMD-200
IC401	5K7474V	IC VHCMOS SM 74VHC74MX
IC402	5K7474V	IC VHCMOS SM 74VHC74MX
IC403	5K7474V	IC VHCMOS SM 74VHC74MX
IC406	5H16C54X	IC CMOS MICRO PIC16C54XT/P
IC406	8S018	IC SOCKET 18 PIN 0.3"
L1	7C033	33UH IND 2A RA 34-62086
L2	1A000	RES SM W4 2% 0R0
L3	1A000	RES SM W4 2% 0R0
L4	7C033	33UH IND 2A RA 34-62086
L5	7D247	4m7H INDUCTOR
L6	7C033	33UH IND 2A RA 34-62086
L7	7D247	4m7H INDUCTOR
L8	7D247	4m7H INDUCTOR
L9	7D247	4m7H INDUCTOR
L10	7D215	1m5H INDUCTOR
L11	7B010	10UH IND SM NL322522T-100J
L12	1A000	RES SM W4 2% 0R0
L13	1A000	RES SM W4 2% 0R0
L14	7D215	1m5H INDUCTOR
L15	7D215	1m5H INDUCTOR
L16	7D215	1m5H INDUCTOR
L17	7F004	FERRITE BD 1206 BL31A700S
L18	7F004	FERRITE BD 1206 BL31A700S
L19	7F004	FERRITE BD 1206 BL31A700S
L20	7F004	FERRITE BD 1206 BL31A700S
L21	7F004	FERRITE BD 1206 BL31A700S
L22	7F004	FERRITE BD 1206 BL31A700S
L23	7F004	FERRITE BD 1206 BL31A700S
L24	7F004	FERRITE BD 1206 BL31A700S
L25	7F004	FERRITE BD 1206 BL31A700S
L26	7F004	FERRITE BD 1206 BL31A700S

## L912 DAC Board Parts List Issue 2.0

Designator	Part	Description
L300	7B033	33UH IND SM 1812 180mA
L301	7F004	FERRITE BD 1206 BL31A700S
L302	7F004	FERRITE BD 1206 BL31A700S
L303	7F004	FERRITE BD 1206 BL31A700S
L304	7F004	FERRITE BD 1206 BL31A700S
L305	7B010	10UH IND SM NL322522T-100J
L306	7B822	2UH2 IND SM NL322522T-2R2J
L307	7B810	1UH0 IND SM NL322522T-1R0J
L400	7F004	FERRITE BD 1206 BL31A700S
L401	7F004	FERRITE BD 1206 BL31A700S
L402	7F004	FERRITE BD 1206 BL31A700S
L403	7F004	FERRITE BD 1206 BL31A700S
PB	L912PB	X PRINTED CIRCUIT BOARD
R1	1L310	RES SM 0805 0.1% 10K
R2	1L2221	RES SM 0805 0.1% 22K1
R3	1A000	RES SM W4 2% 0R0
R3	1A110	RES SM W4 1% 100R 1206
R4	1A310	RES SM W4 1% 10K 1206
R5	1L310	RES SM 0805 0.1% 10K
R6	1L310	RES SM 0805 0.1% 10K
R7	1A110	RES SM W4 1% 100R 1206
R8	1A247	RES SM W4 2% 4K7
R9	1A410	RES SM W4 2% 100K
R10	1A115	RES SM W4 1% 150R
R11	1A110	RES SM W4 1% 100R 1206
R12	1A310	RES SM W4 1% 10K 1206
R13	1A310	RES SM W4 1% 10K 1206
R14	1A210	RES SM W4 2% 1K0
R15	1A010	RES SM W4 2% 10R
R16	1A422	RES SM W4 1% 220K
R17	1A247	RES SM W4 2% 4K7
R18	1A147	RES SM W4 1% 470R 1206
R19	1A210	RES SM W4 2% 1K0
R20	1A210	RES SM W4 2% 1K0
R21	1A210	RES SM W4 2% 1K0
R22	1A247	RES SM W4 2% 4K7
R23	1A222	RES SM W4 2% 2K2
R24	1A147	RES SM W4 1% 470R 1206
R25	1A115	RES SM W4 1% 150R
R26	1A210	RES SM W4 2% 1K0
R27	1L310	RES SM 0805 0.1% 10K
R28	1A000	RES SM W4 2% 0R0
R28	4JF113	TRANS JFET SM MMBFJ113
R29	1A147	RES SM W4 1% 470R 1206
R30	1A210	RES SM W4 2% 1K0
R31	1G110	RES MF FU W3 100R 5% NFR25
R32	1A310	RES SM W4 1% 10K 1206
R33	1G110	RES MF FU W3 100R 5% NFR25
R34	1A215	RES SM W4 1% 1K5 1206
R35	1A147	RES SM W4 1% 470R 1206
R36	1A210	RES SM W4 2% 1K0
R37	1A310	RES SM W4 1% 10K 1206
R38	1A215	RES SM W4 1% 1K5 1206
R39	1A311	RES SM W4 1% 11K
R40	1A010	RES SM W4 2% 10R
R41	1A010	RES SM W4 2% 10R
R42	1A210	RES SM W4 2% 1K0
R43	1A215	RES SM W4 1% 1K5 1206
R44	1A268	RES SM W4 1% 6K8 1206
R45	1A215	RES SM W4 1% 1K5 1206
R46	1A047	RES SM W4 1% 47R 1206
R47	1A315	RES SM W4 2% 15K

## L912 DAC Board Parts List Issue 2.0

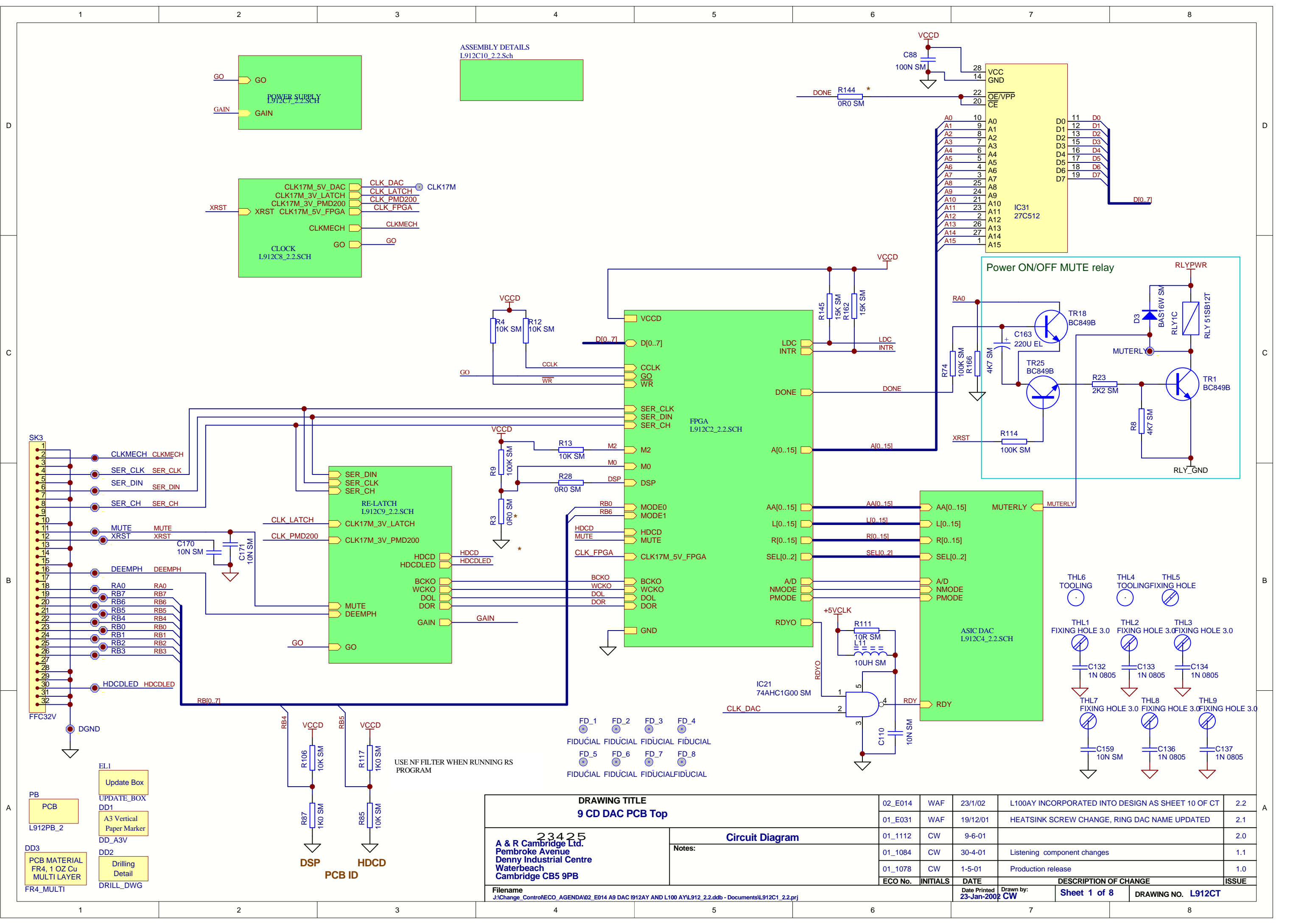
Designator	Part	Description
R48	1A315	RES SM W4 2% 15K
R49	1A315	RES SM W4 2% 15K
R50	1A047	RES SM W4 1% 47R 1206
R51	1A000	RES SM W4 2% 0R0
R52	1A147	RES SM W4 1% 470R 1206
R53	1A315	RES SM W4 2% 15K
R56	1A210	RES SM W4 2% 1K0
R57	1A210	RES SM W4 2% 1K0
R58	1A247	RES SM W4 2% 4K7
R59	1A215	RES SM W4 1% 1K5 1206
R60	1A122	RES SM W4 1% 220R 1206
R61	1A210	RES SM W4 2% 1K0
R62	1A210	RES SM W4 2% 1K0
R63	1A210	RES SM W4 2% 1K0
R64	1A210	RES SM W4 2% 1K0
R65	1A215	RES SM W4 1% 1K5 1206
R66	1A310	RES SM W4 1% 10K 1206
R67	1A210	RES SM W4 2% 1K0
R68	1A000	RES SM W4 2% 0R0
R69	1M110	RES SM 0805 100R
R70	1A010	RES SM W4 2% 10R
R74	1A410	RES SM W4 2% 100K
R75	1A210	RES SM W4 2% 1K0
R76	1A000	RES SM W4 2% 0R0
R77	1A315	RES SM W4 2% 15K
R87	1A210	RES SM W4 2% 1K0
R92	1A147	RES SM W4 1% 470R 1206
R97	1A522	RES SM W4 1% 2M2
R101	1A147	RES SM W4 1% 470R 1206
R102	1A310	RES SM W4 1% 10K 1206
R104	1A522	RES SM W4 1% 2M2
R107	1A115	RES SM W4 1% 150R
R108	1L310	RES SM 0805 0.1% 10K
R109	1A310	RES SM W4 1% 10K 1206
R111	1A010	RES SM W4 2% 10R
R114	1A410	RES SM W4 2% 100K
R115	1A422	RES SM W4 1% 220K
R117	1A210	RES SM W4 2% 1K0
R118	1A147	RES SM W4 1% 470R 1206
R119	1A115	RES SM W4 1% 150R
R120	1A310	RES SM W4 1% 10K 1206
R123	1A147	RES SM W4 1% 470R 1206
R124	1L310	RES SM 0805 0.1% 10K
R125	1L310	RES SM 0805 0.1% 10K
R128	1L2221	RES SM 0805 0.1% 22K1
R129	1L310	RES SM 0805 0.1% 10K
R132	1A410	RES SM W4 2% 100K
R133	1A215	RES SM W4 1% 1K5 1206
R134	1A210	RES SM W4 2% 1K0
R135	1A210	RES SM W4 2% 1K0
R136	1A215	RES SM W4 1% 1K5 1206
R141	1A110	RES SM W4 1% 100R 1206
R144	1A000	RES SM W4 2% 0R0
R145	1A315	RES SM W4 2% 15K
R146	1A210	RES SM W4 2% 1K0
R155	1A210	RES SM W4 2% 1K0
R162	1A315	RES SM W4 2% 15K
R166	1A247	RES SM W4 2% 4K7
R168	1A122	RES SM W4 1% 220R 1206
R169	1A227	RES SM W4 1% 2K7 1206
R170	1A227	RES SM W4 1% 2K7 1206
R171	1A522	RES SM W4 1% 2M2

## L912 DAC Board Parts List Issue 2.0

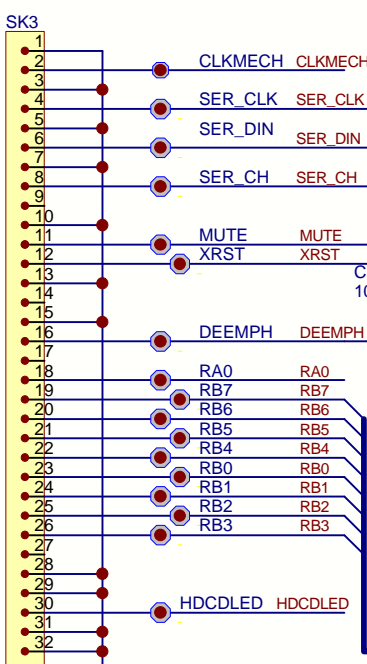
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R172	1A522	RES SM W4 1% 2M2
R300	1A047	RES SM W4 1% 47R 1206
R301	1A510	RES SM W4 1% 1M0
R302	1A310	RES SM W4 1% 10K 1206
R303	1A310	RES SM W4 1% 10K 1206
R304	1A247	RES SM W4 2% 4K7
R305	1A110	RES SM W4 1% 100R 1206
R306	1A110	RES SM W4 1% 100R 1206
R307	1A110	RES SM W4 1% 100R 1206
R309	1A110	RES SM W4 1% 100R 1206
R314	1A547	RES SM W4 2% 4M7
R315	1A110	RES SM W4 1% 100R 1206
R400	1A210	RES SM W4 2% 1K0
R401	1A000	RES SM W4 2% 0R0
R405	1A310	RES SM W4 1% 10K 1206
R406	1A310	RES SM W4 1% 10K 1206
R407	1A310	RES SM W4 1% 10K 1206
R408	1A310	RES SM W4 1% 10K 1206
R409	1A310	RES SM W4 1% 10K 1206
R412	1A310	RES SM W4 1% 10K 1206
R415	1A310	RES SM W4 1% 10K 1206
R416	1A310	RES SM W4 1% 10K 1206
R417	1A310	RES SM W4 1% 10K 1206
R418	1A310	RES SM W4 1% 10K 1206
R419	1A310	RES SM W4 1% 10K 1206
R420	1A310	RES SM W4 1% 10K 1206
R421	1A310	RES SM W4 1% 10K 1206
R422	1A310	RES SM W4 1% 10K 1206
R425	1A310	RES SM W4 1% 10K 1206
R700	1M310	RES SM 0805 10K
R701	1M322	RES SM 0805 22K
R800	1A110	RES SM W4 1% 100R 1206
R802	1A133	RES SM W4 1% 330R 1206
R802	1A133	RES SM W4 1% 330R 1206
R803	1A133	RES SM W4 1% 330R 1206
R804	1A110	RES SM W4 1% 100R 1206
RLY1	A205	RELAY 960 OHM 51SB12T
SH1	E821MC	PHONO EMC SHIELD
SK1	8K8023	23-WAY FFC CONN VERT
SK2	8D225	PHONO SKT 4-WAY EMC GOLD
SK3	8K8032	32-WAY FFC CONN VERT
SW400	A1601	DIL 8WAY SW SM
TR1	4A849B	TRANS LF SS N SM BC849B
TR2	4A849B	TRANS LF SS N SM BC849B
TR3	4A859B	TRANS LF SS P SM BC859B
TR4	4A859B	TRANS LF SS P SM BC859B
TR5	4B5248	TRANS AUDIO DRIVER N 2SC5248
TR6	4A849B	TRANS LF SS N SM BC849B
TR7	4B1964	TRANS AUDIO DRIVER P 2SA1964
TR8	4A847	TRANS LF SS N SM BC847B
TR9	4A847	TRANS LF SS N SM BC847B
TR10	4A857B	TRANS LF SS P SM BC857B
TR11	4A857B	TRANS LF SS P SM BC857B
TR12	4A847	TRANS LF SS N SM BC847B
TR13	4A859B	TRANS LF SS P SM BC859B
TR14	4A849B	TRANS LF SS N SM BC849B
TR15	4A857B	TRANS LF SS P SM BC857B
TR16	4A847	TRANS LF SS N SM BC847B
TR17	4A849B	TRANS LF SS N SM BC849B
TR18	4A849B	TRANS LF SS N SM BC849B
TR19	4A849B	TRANS LF SS N SM BC849B
TR20	4A857B	TRANS LF SS P SM BC857B

## L912 DAC Board Parts List Issue 2.0

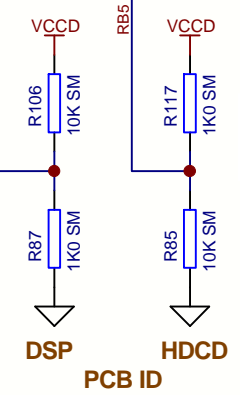
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TR21	4A847	TRANS LF SS N SM BC847B
TR22	4A857B	TRANS LF SS P SM BC857B
TR23	4A857B	TRANS LF SS P SM BC857B
TR24	4A847	TRANS LF SS N SM BC847B
TR25	4A849B	TRANS LF SS N SM BC849B
TR26	4A847	TRANS LF SS N SM BC847B
TR27	4JF113	TRANS JFET SM MMBFJ113
TR29	4A859B	TRANS LF SS P SM BC859B
TR30	4A849B	TRANS LF SS N SM BC849B
TR31	4D10KN	DIGITAL TRANS NPN SM 10KX2
TR32	4A856B	TRANS LF SS P SM BC856B
TR300	4D17H	TRANS NPN SM BFS17H
TR700	4AFMMT497	TRANS LF SS N SM FMMT497
TR701	4AFMMT497	TRANS LF SS N SM FMMT497
X300	7X012	CRYSTAL 16.9344MHz PARALLEL
X400	7W005	CER RESON 4.00MHz



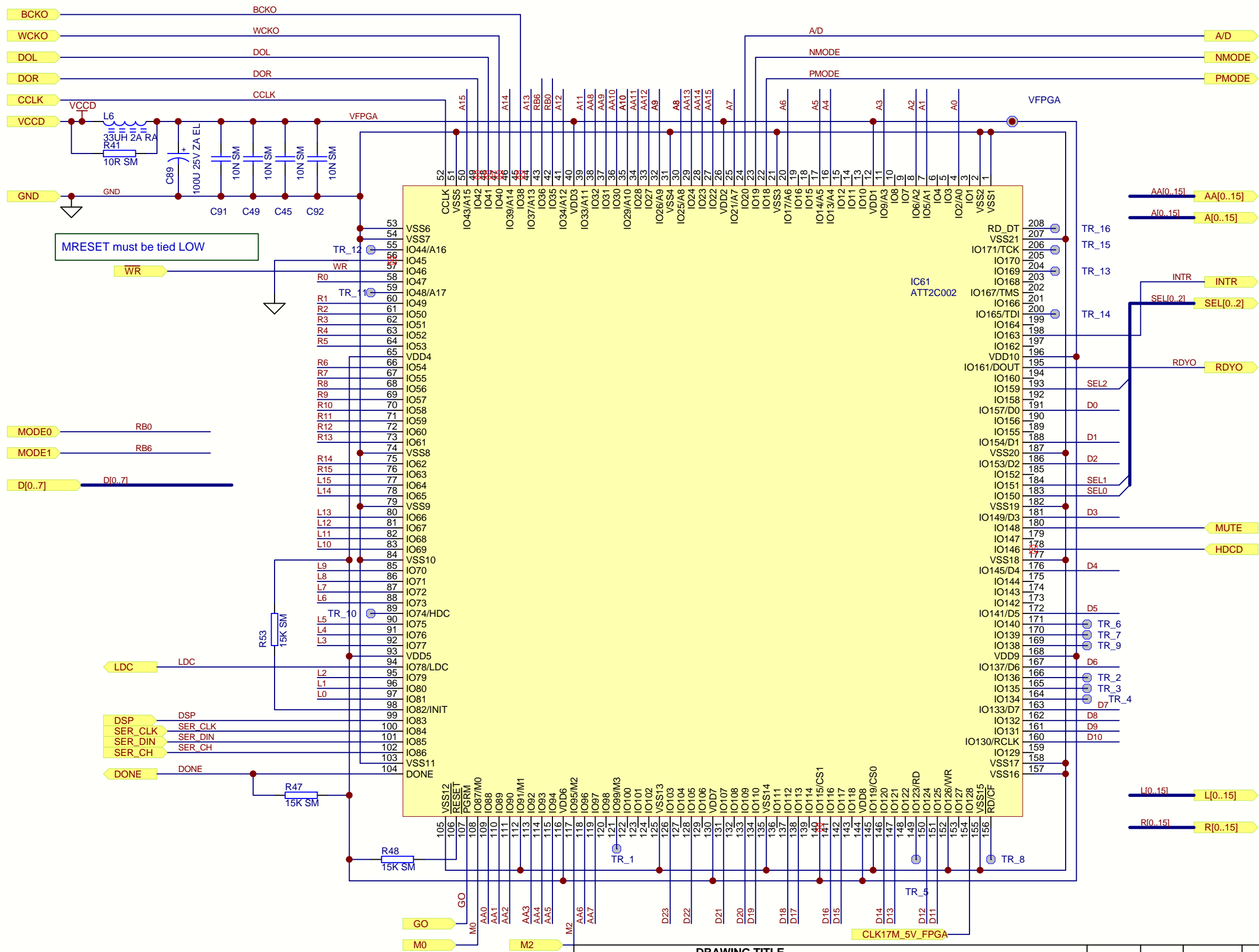
ASSEMBLY DETAILS  
L912C10\_2.2.Sch



- EL1 Update Box
- PB PCB
- DD3 PCB MATERIAL FR4, 1 OZ Cu MULTI LAYER FR4\_MULTI
- DD1 UPDATE\_BOX
- DD2 DD\_A3V
- DD3 DRILLING Detail



DRAWING TITLE		02_E014	WAF	23/1/02	L100AY INCORPORATED INTO DESIGN AS SHEET 10 OF CT	2.2
9 CD DAC PCB Top		01_E031	WAF	19/12/01	HEATSINK SCREW CHANGE, RING DAC NAME UPDATED	2.1
23425 <b>A &amp; R Cambridge Ltd.</b> Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB		01_1112	CW	9-6-01		2.0
		01_1084	CW	30-4-01	Listening component changes	1.1
		01_1078	CW	1-5-01	Production release	1.0
		ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
Filename J:\Change_Control\ECO_AGENDA\02_E014 A9 DAC I912AY AND L100 AYL912_2.2.ddb - Documents\L912C1_2.2.prj		Date Printed	23-Jan-2002	Drawn by:	CW	Sheet 1 of 8
				DRAWING NO. L912CT		



**DRAWING TITLE**  
**9 CD DAC DRIVER**

23425  
**A & R Cambridge Ltd.**  
 Pembroke Avenue  
 Denny Industrial Centre  
 Waterbeach  
 Cambridge CB5 9PB

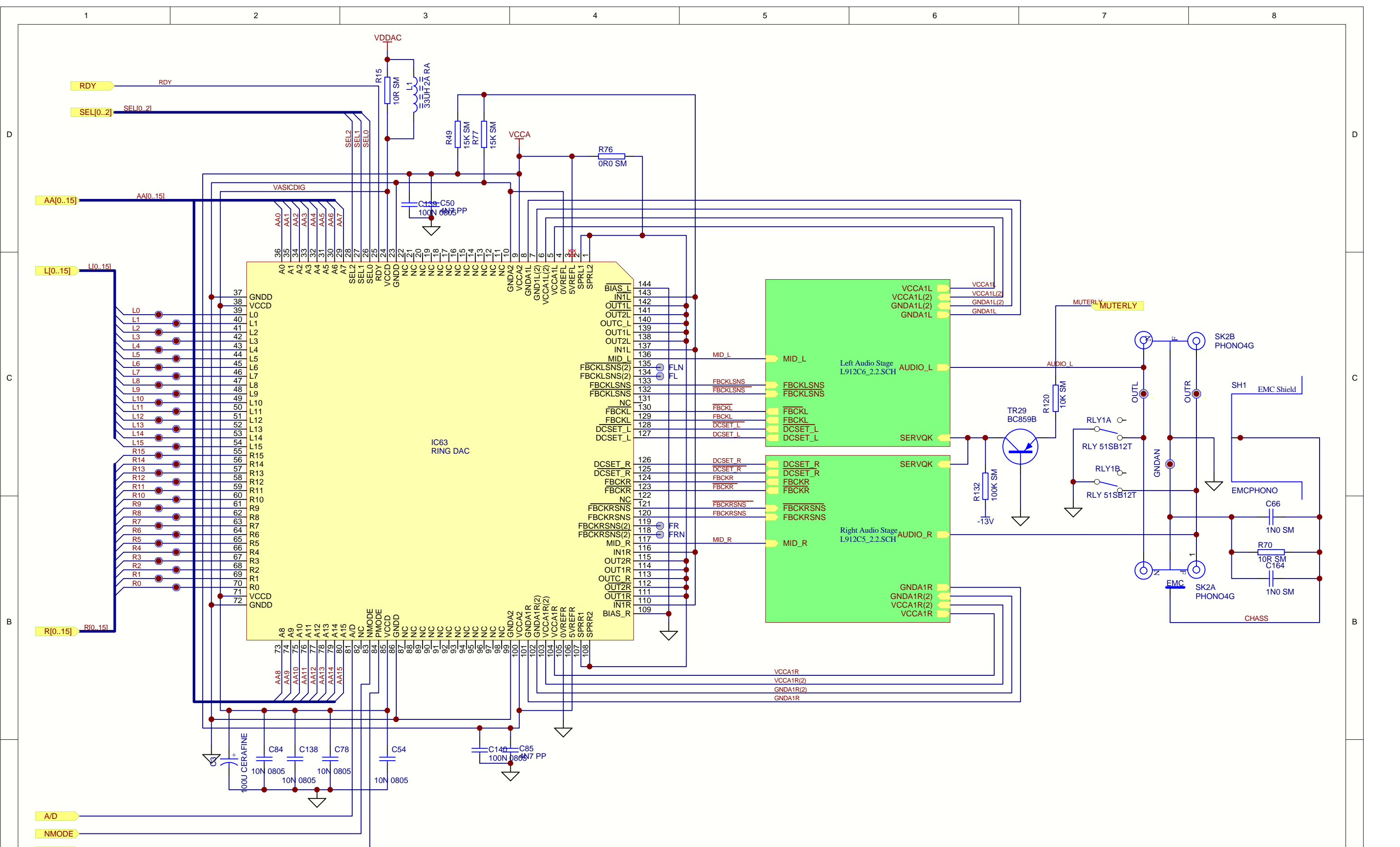
**Circuit Diagram**

Notes:

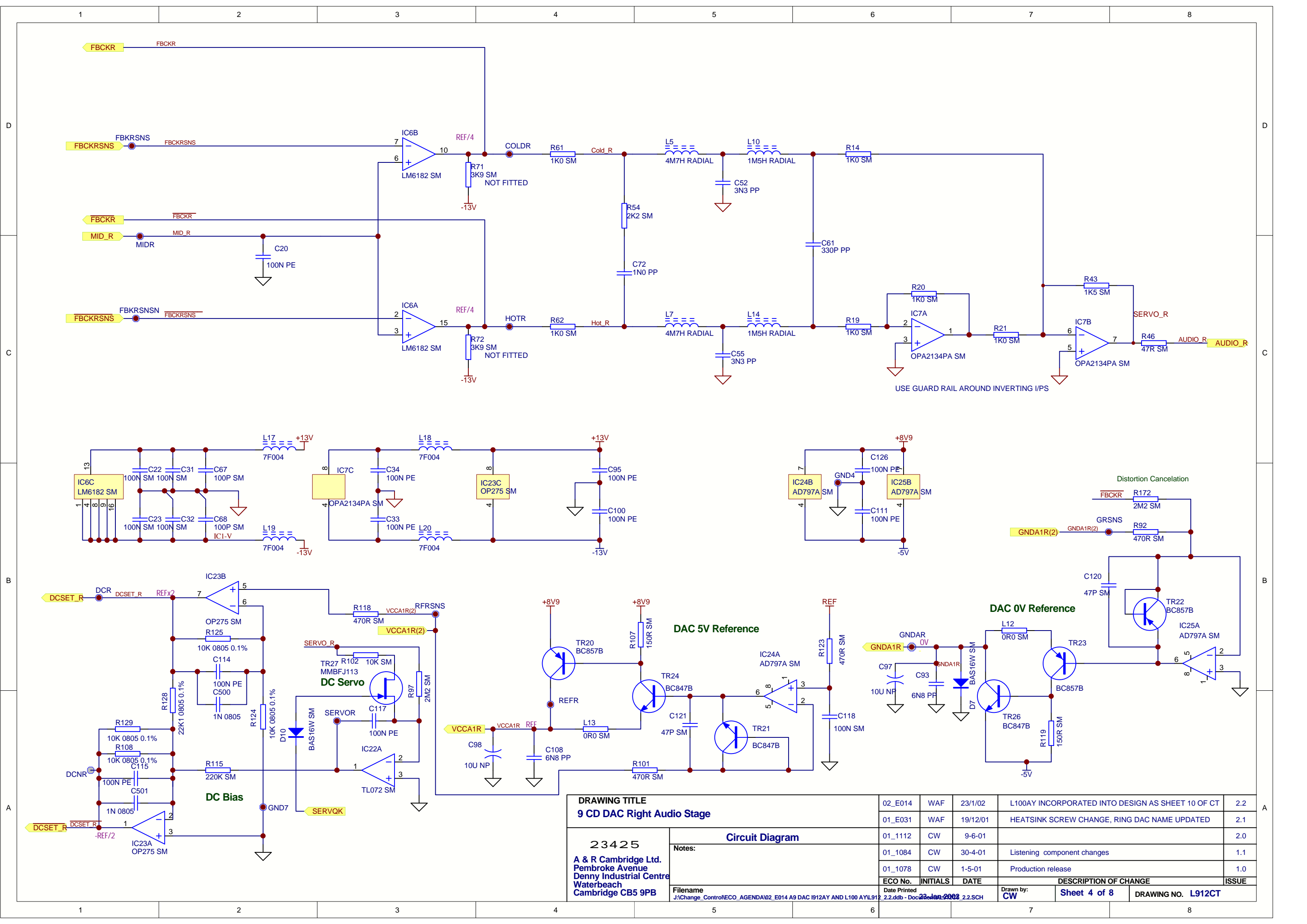
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01_1112	CW	9-6-01		2.0
01_1084	CW	30-4-01	Listening component changes	1.1
01_1078	CW	1-5-01	Production release	1.0
ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE

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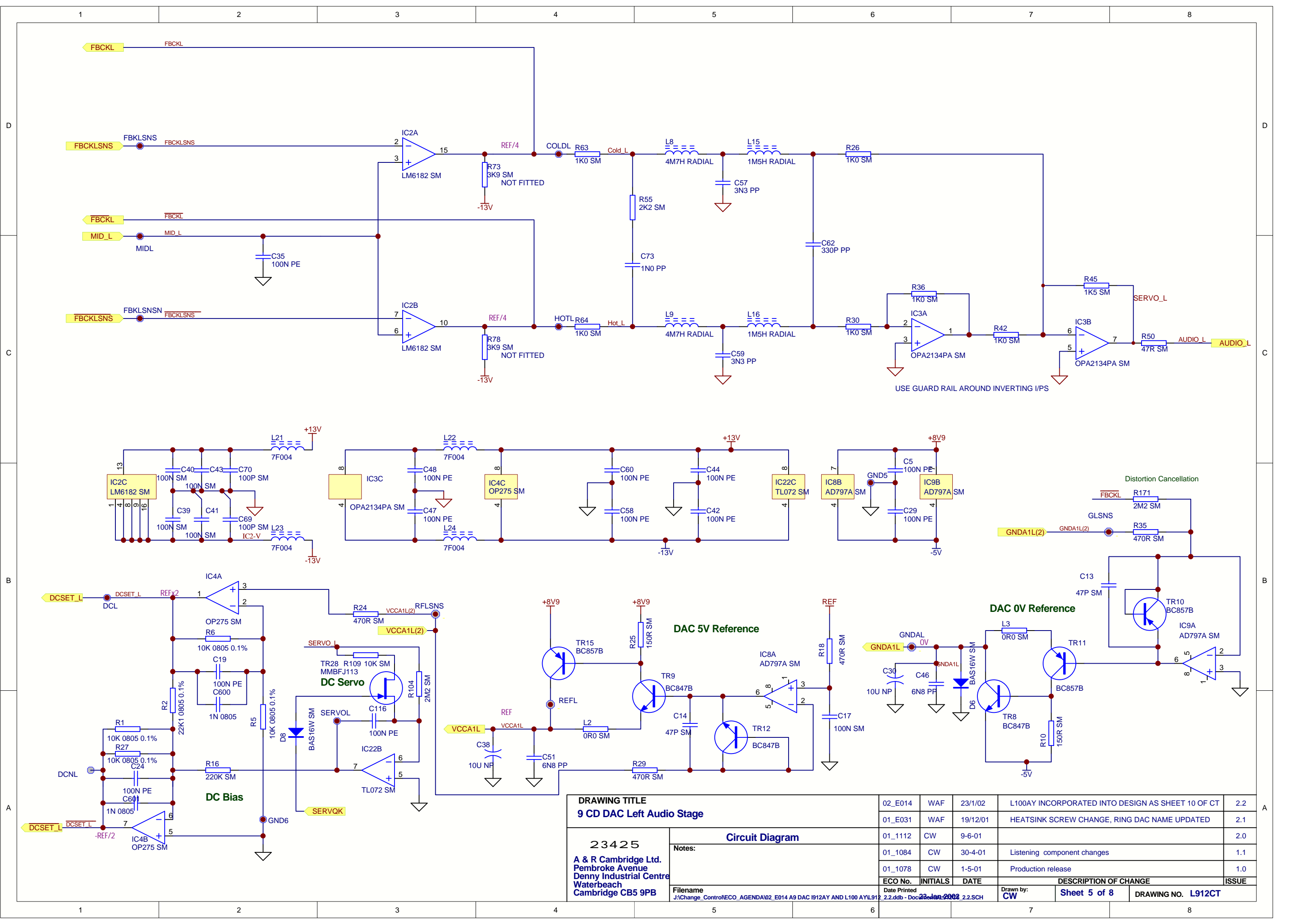




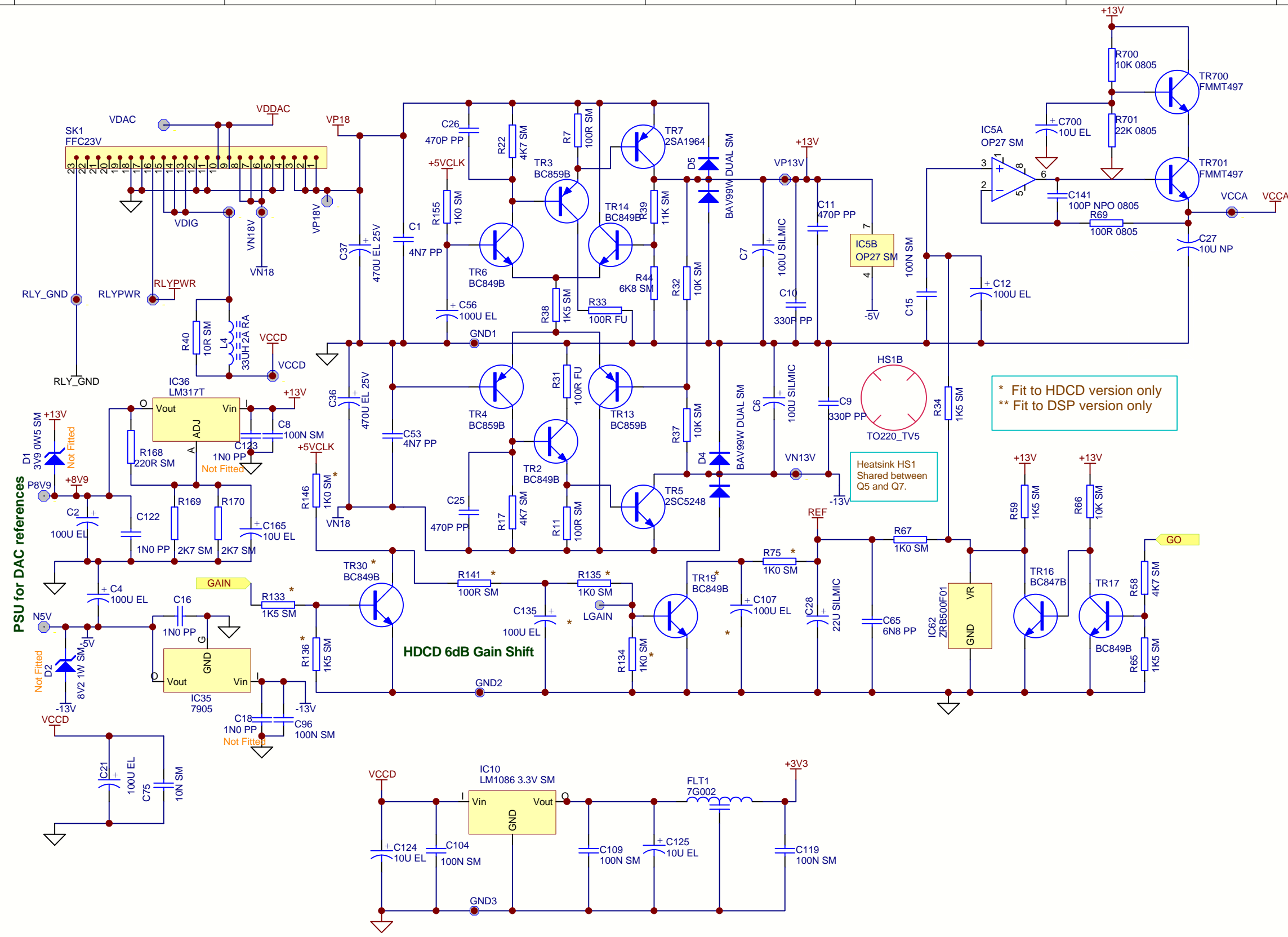
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9 CD DAC ASIC					01_E031	WAF	19/12/01	HEATSINK SCREW CHANGE, RING DAC NAME UPDATED	2.1				
23425 <b>A &amp; R Cambridge Ltd.</b> Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB					<b>Circuit Diagram</b>				01_1112	CW	9-6-01	2.0	
					Notes:				01_1084	CW	30-4-01	Listening component changes	1.1
									01_1078	CW	1-5-01	Production release	1.0
									ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
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DRAWING TITLE		02_E014	WAF	23/1/02	L100AY INCORPORATED INTO DESIGN AS SHEET 10 OF CT	2.2					
9 CD DAC Right Audio Stage		01_E031	WAF	19/12/01	HEATSINK SCREW CHANGE, RING DAC NAME UPDATED	2.1					
23425		01_1112	CW	9-6-01		2.0					
<b>A &amp; R Cambridge Ltd.</b> Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB		Notes:		01_1084	CW	30-4-01	Listening component changes	1.1			
		File name		01_1078	CW	1-5-01	Production release	1.0			
		Date Printed		ECO No.		INITIALS		DATE		DESCRIPTION OF CHANGE	
J:\Change_Control\ECO_AGENDA\02_E014 A9 DAC B912AY AND L100 AYL912		2.2.ddb - Doc 23 Jan 2002		2.2.SCH		23 Jan 2002		CW		Sheet 4 of 8	DRAWING NO. L912CT



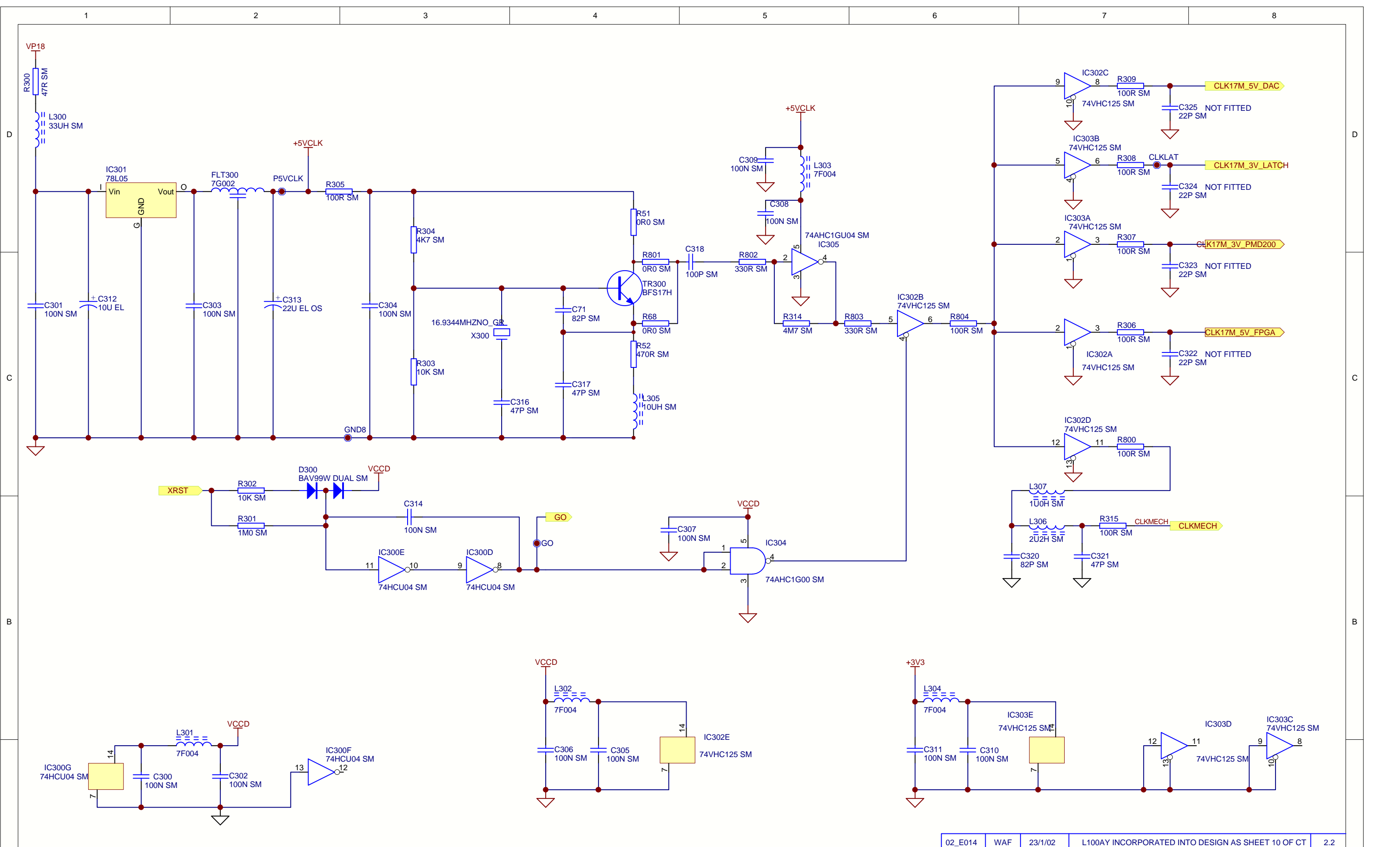
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9 CD DAC Left Audio Stage		01_E031	WAF	19/12/01	HEATSINK SCREW CHANGE, RING DAC NAME UPDATED	2.1
23425		01_1112	CW	9-6-01		2.0
A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB		01_1084	CW	30-4-01	Listening component changes	1.1
Notes:		01_1078	CW	1-5-01	Production release	1.0
File name		ECO No.		INITIALS	DATE	DESCRIPTION OF CHANGE
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		Date		22 Jan 2002	22 SCH	Sheet 5 of 8
		Date		22 Jan 2002	22 SCH	DRAWING NO. L912CT



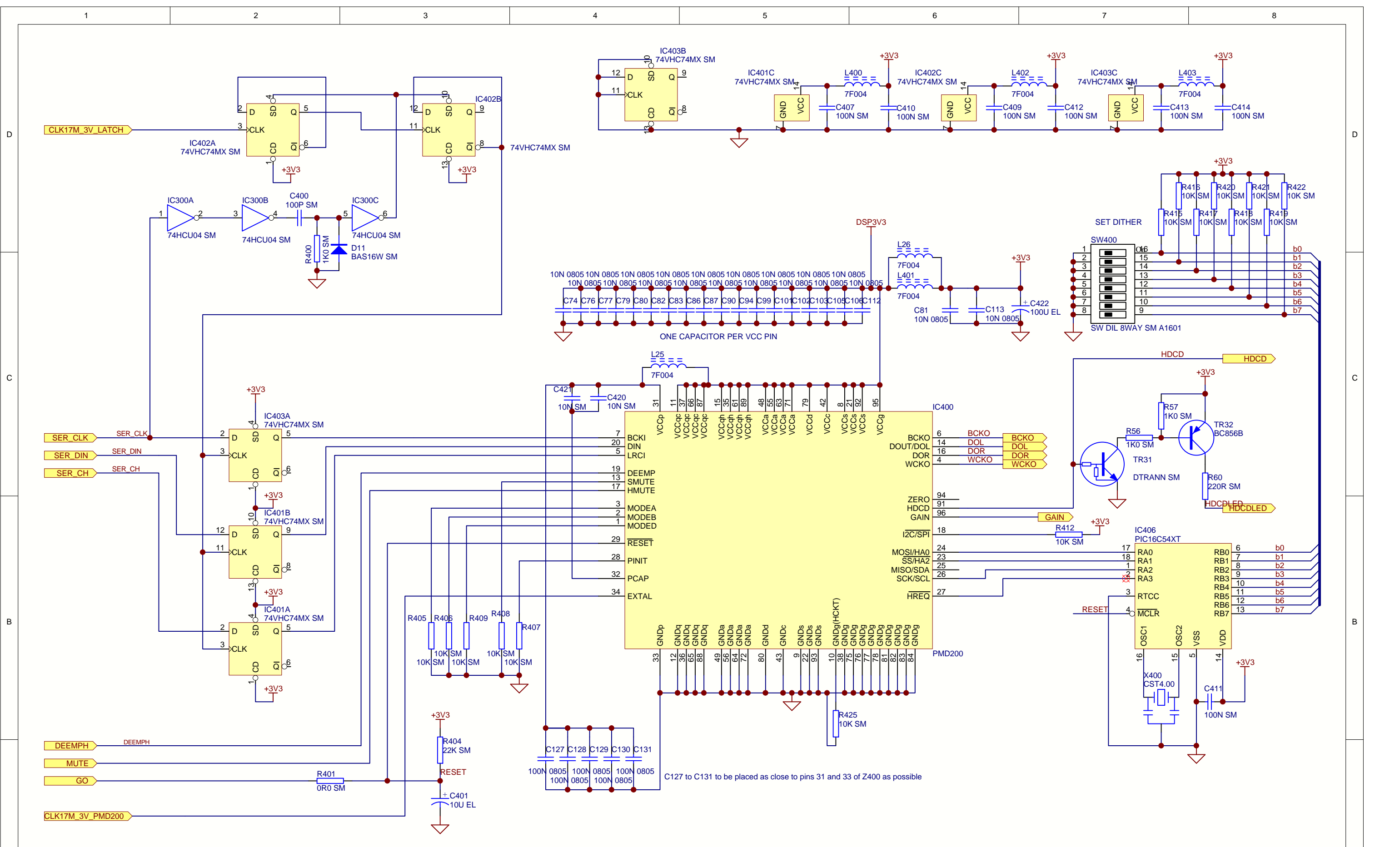
\* Fit to HDCD version only  
 \*\* Fit to DSP version only

Heatsink HS1  
 Shared between  
 Q5 and Q7.

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9 CD DAC PSU		01_E031	WAF	19/12/01	HEATSINK SCREW CHANGE, RING DAC NAME UPDATED	2.1
23425 A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB		01_1112	CW	9-6-01		2.0
Notes:		01_1084	CW	30-4-01	Listening component changes	1.1
		01_1078	CW	1-5-01	Production release	1.0
Filename	J:\Change_Control\ECO_AGENDA\02_E014 A9 DAC I912AY AND L100 AYL912 2.2.ddb - Documents\L912CT 2.2.SCH	ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
Date Printed	23-Jan-2002	Drawn by:	CW		Sheet 6 of 8	DRAWING NO. L912CT



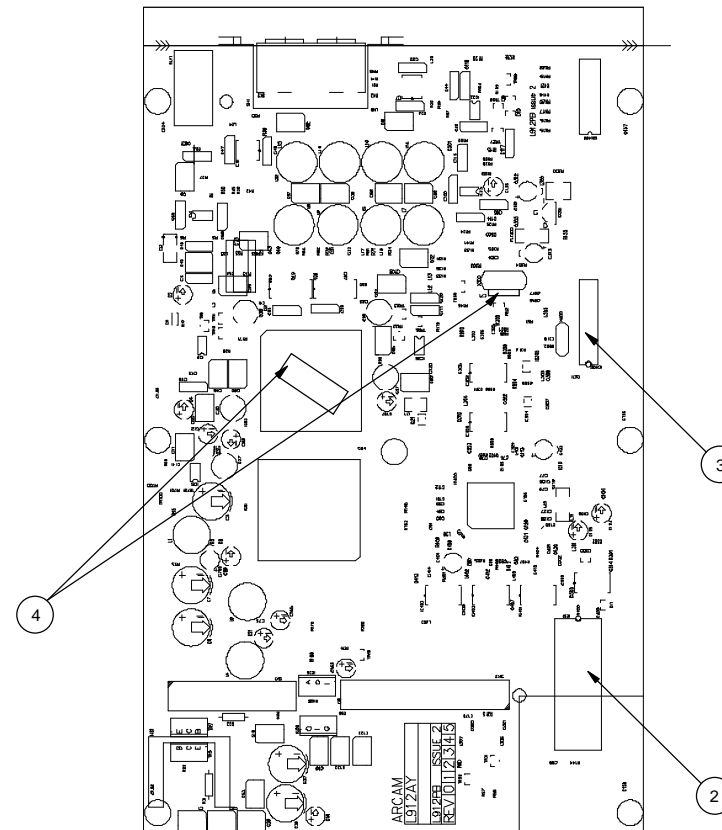
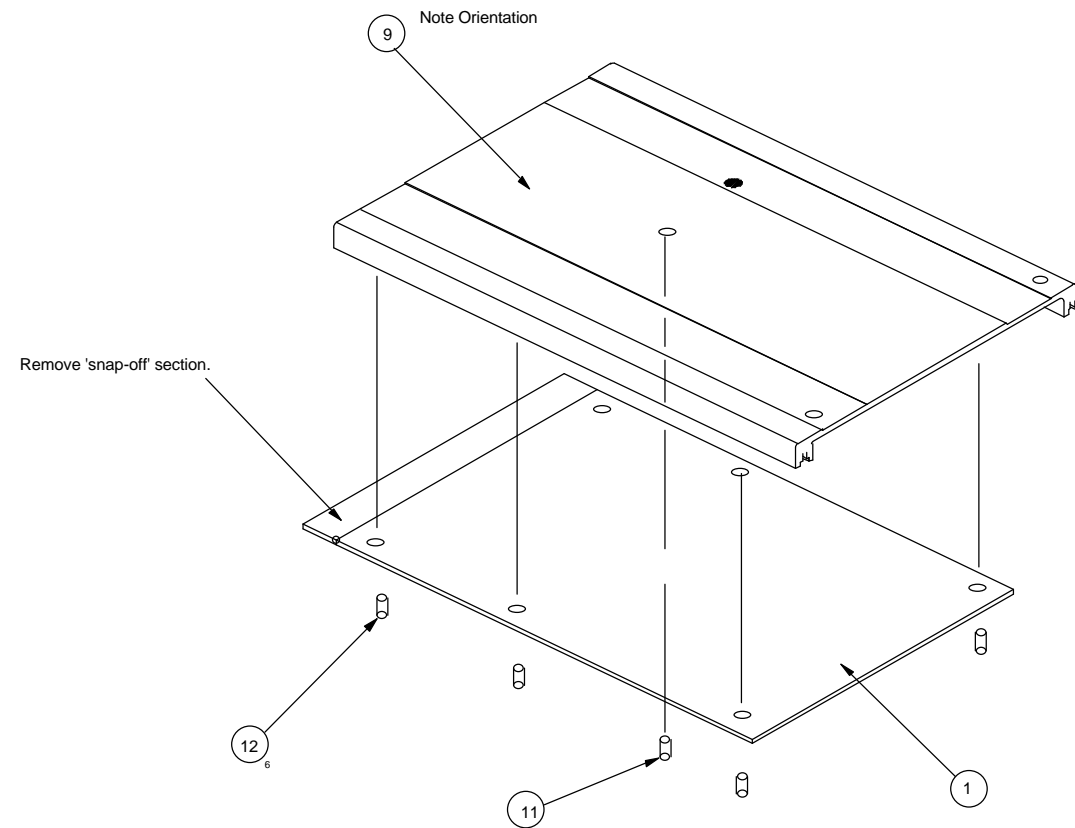
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<b>9 CD DAC Clock</b>				
<p style="text-align: center;">23425</p> <p><b>A &amp; R Cambridge Ltd.</b> Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB</p>		<b>Circuit Diagram</b>		
		Notes:		
Filename	J:\Change_Control\ECO_AGENDA\02_E014 A9 DAC I912AY AND L100 AYL912 2.2.ddb - Documents\L912C8_2.2.SCH			
ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
02_E014	WAF	23/1/02	L100AY INCORPORATED INTO DESIGN AS SHEET 10 OF CT	2.2
01_E031	WAF	19/12/01	HEATSINK SCREW CHANGE, RING DAC NAME UPDATED	2.1
01_1112	CW	9-6-01		2.0
01_1103	MGM	5/6/01	ADMIN CHANGE SCHEMATIC UPDATED TO LIBRARY TO CHANGE C320 (2C082) TO 100N	2.0
01_1084	CW	30-4-01	Listening component changes	1.1
01_1078	CW	1-5-01	Production release	1.0
Date Printed		Drawn by:		
23-Jan-2002		CW		
Sheet 7 of 8			DRAWING NO. L912CT	



DRAWING TITLE							
<b>9 CD DAC Re-clocking &amp; PMD-200</b>							
<b>23425</b> <b>A &amp; R Cambridge Ltd.</b> <b>Pembroke Avenue</b> <b>Denny Industrial Centre</b> <b>Waterbeach</b> <b>Cambridge CB5 9PB</b>	<b>Circuit Diagram</b>		02_E014	WAF	23/1/02	L100AY INCORPORATED INTO DESIGN AS SHEET 10 OF CT	2.2
	Notes:		01_E031	WAF	19/12/01	HEATSINK SCREW CHANGE, RING DAC NAME UPDATED	2.1
			01_1112	CW	9-6-01		2.0
			01_1084	CW	30-4-01	Listening component changes	1.1
			01_1078	CW	1-5-01	Production release	1.0
Filename	J:\Change_Control\ECO_AGENDA\02_E014 A9 DAC I912AY AND L100 AYL912 2.2.ddb - Documents\L912C9_2.2.SCH	ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE	
Date Printed	23-Jan-2002	Drawn by:	CW		Sheet 8 of 8	DRAWING NO. L912CT	

IC500	IC CMOS 27C512	IC31
	IC CMOS 27C512	
IC501	IC PIC 16C54X	IC406
	IC PIC 16C54XT	
PAD500	SORBOTHANE PAD 15 X 6 X 3 mm	USED ON IC63
	SORBO E802AP	
PAD501	SORBOTHANE HALF PAD 7.5 X 6 X 3 mm	USED ON X300
	SORBO HALF PAD E802AP	
SC500	E806MC	SUB CHASSIS
	E806MC	
CA500	23 WAY FLEXFOIL	USED ON SK1
	L805CA	
CA501	32 WAY FLEXFOIL	USED ON SK3
	L807CA	

Y500	SCREW HF4V09B	EDGE OF PCB FIXINGS AND SUB CHASSIS TO CASE
Y501	SCREW HF4V09B	
Y502	SCREW HF4V09B	
Y503	SCREW HF4V09B	
Y504	SCREW HF4V09B	
Y505	SCREW HF4V09B	
Y506	SCREW HA3A06A	CENTRE OF PCB FIXING



**Notes**

1. Use half sorbathane pad, Pad501, on one side of Xtal X300
2. Use sorbathane pad Pad500 on IC63
3. Pads must NOT overhang component.

DRAWING TITLE		<b>A9CD DAC ASSEMBLY DETAILS</b>			
Filename: L912C10_2.2.Sch					
23425		Notes:			
A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB		ECD No.	INITIALS	DATE	DESCRIPTION OF CHANGE
Contact Engineer: EngNameXXXX	Contact Tel: (01223) 203XXX tel No	Printed: 23-Jan-2002	Sheet 10 of 10	DRAWING NO. L912CT	ISSUE
					2.2
				L100AY INCORPORATED INTO DESIGN AS SHEET 10 OF CT	

# Transformer Specifications

## Contents

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- **L859TX**
- **L860TX**
- **L883TX**

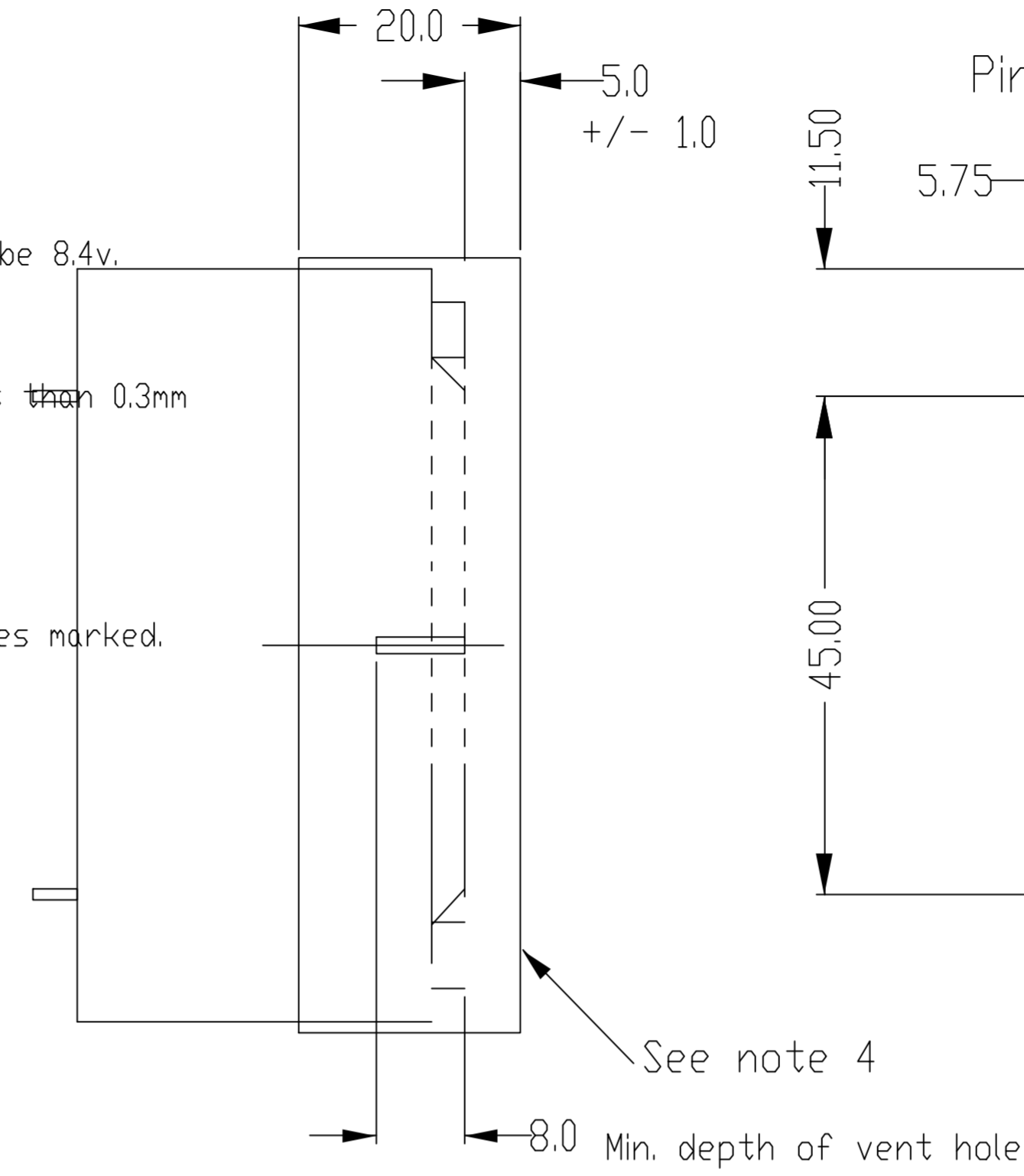
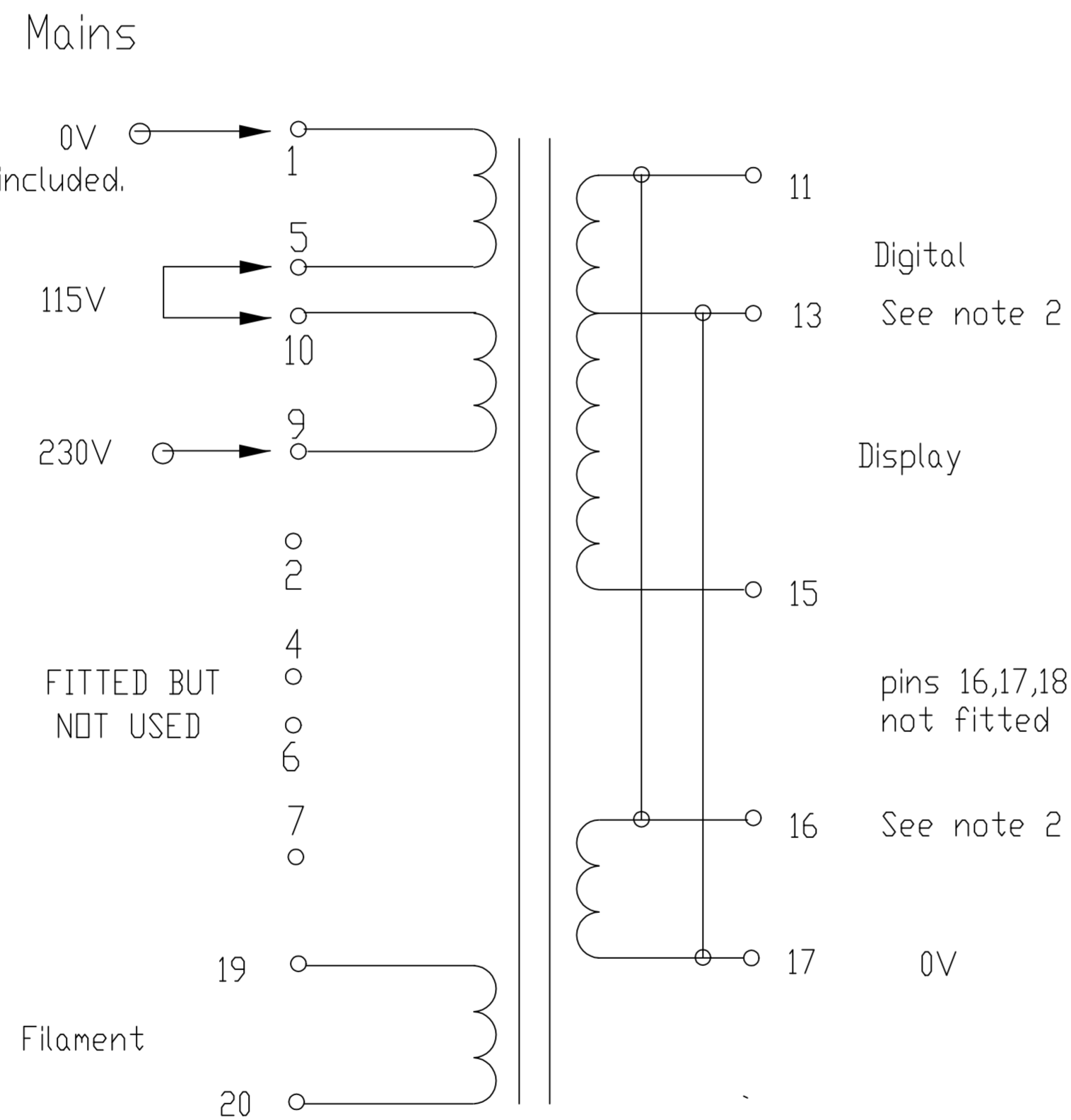


Notes

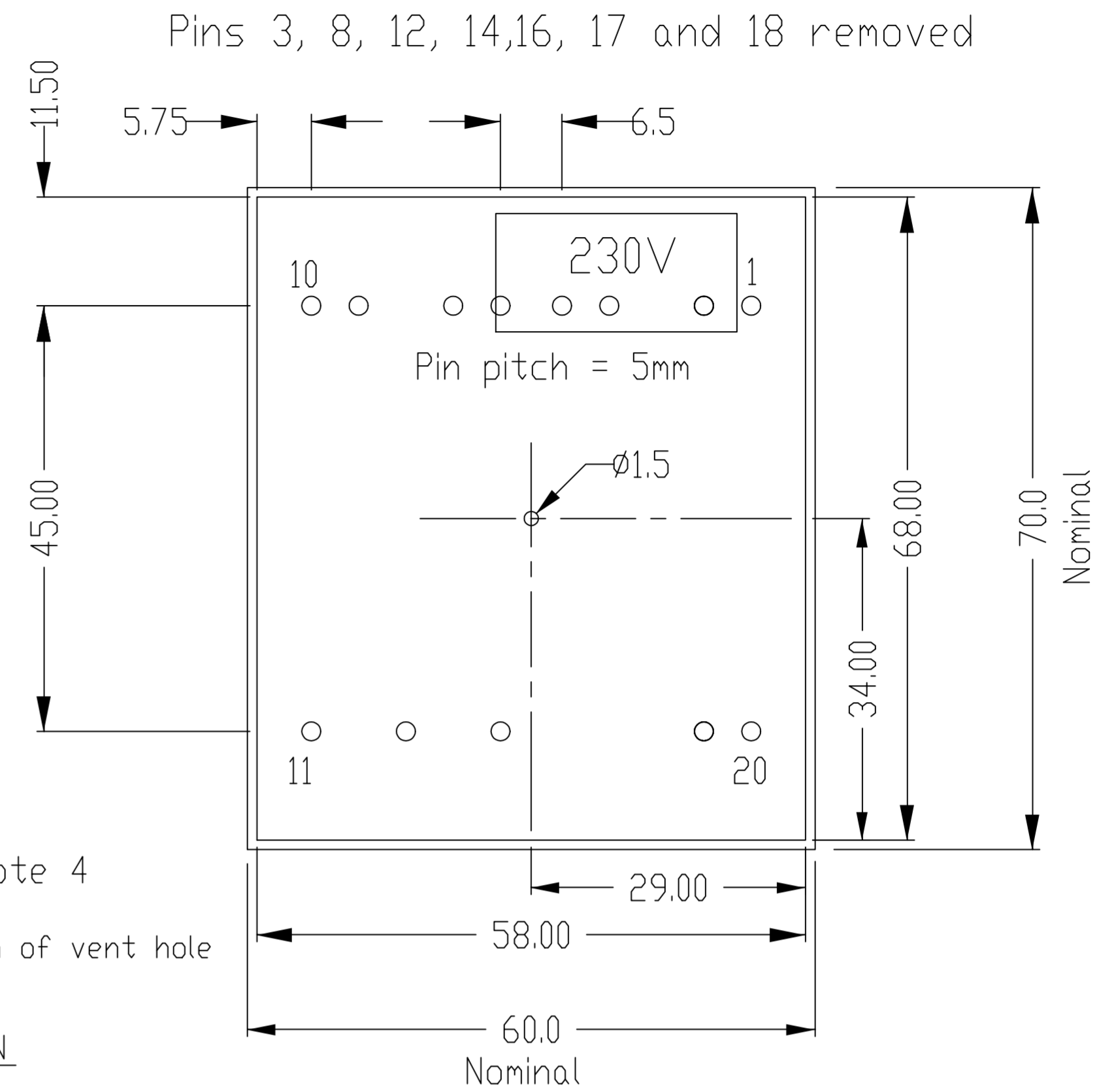
- Mains primary consists of two equal windings wired in series.
- Output for windings 11-13 and 16-17 must have as good a regulation as possible.  
The DC output required is 11.6V after a bridge rectifier, using a 3300uF reservoir capacitor, at 500mA load.  
Nominal load current : 470 mA. Peak load current : 850mA. The minimum DC voltage at full load and 198v should be 8.4v.
- Bobbin type UI39 x 21mm
- Fit three layers of approx 0.3mm thick Silicon Steel core strip around TX where shown ensuring a tight fit (less than 0.3mm clearance typically). Then cover with black crepe tape and fill well with potting compound/varnish as necessary.
- A hole must be drilled where shown to vent gasses when hot.
- Stick a 25.5 x 12.7 label on top of TX where shown. Label to have black text on white background.  
Label to have voltage (large underlined text) Arcam part # and manufacturers name, part # and any date codes marked.
- Pins 17 to 13, 16 to 11 linked internally.

Pins not specified in table should not be included.

PIN No's	VAC	AT LOAD
1	0V	Mains
9	230V	"
19	0V	Filament
20	5.0V	150mA
15	32V	50mA
13	0V	
11	Note 2	1A
16	see note 2	1A
17	0V	



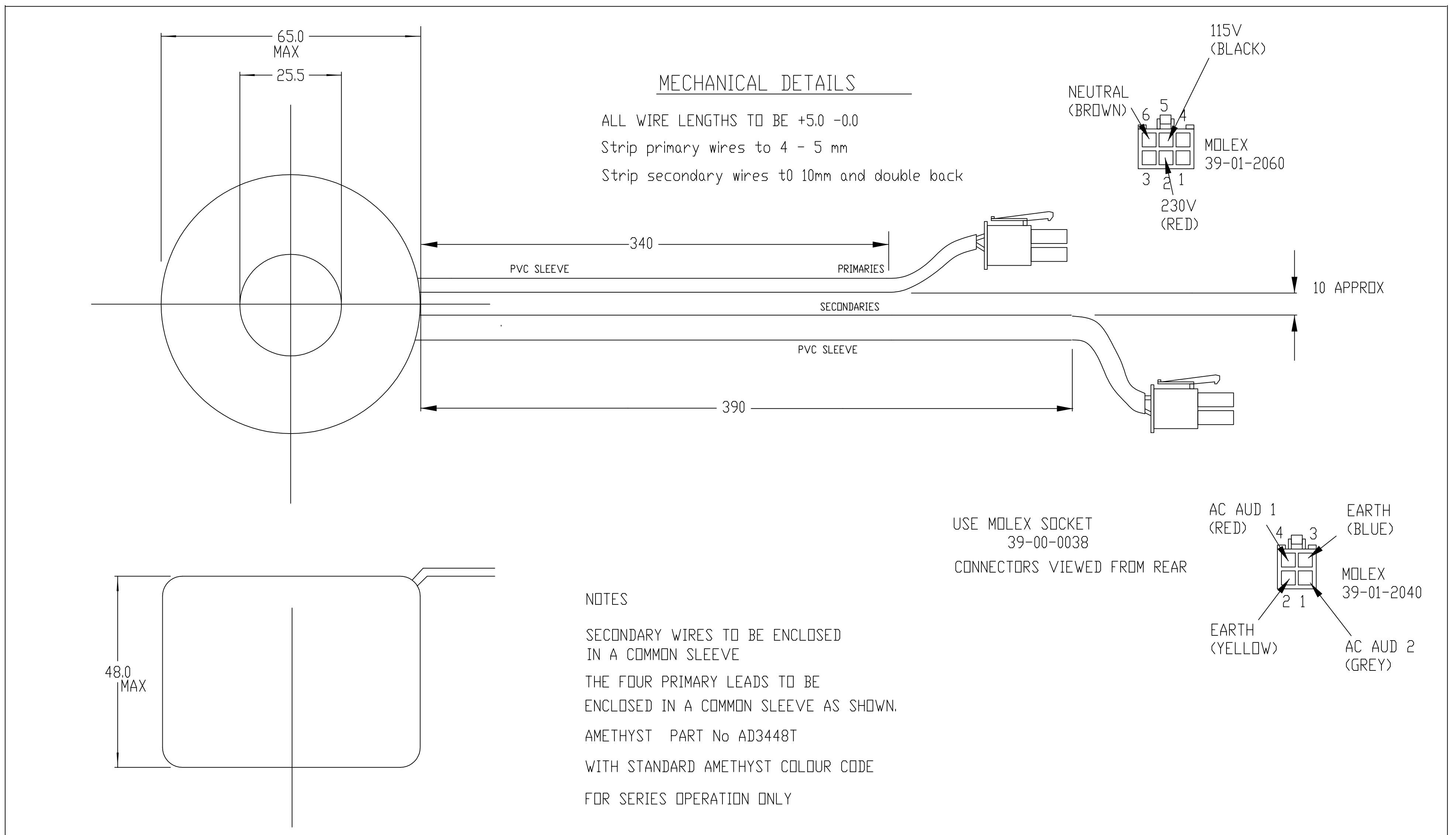
Mechanical details, viewed from top of transformer



ELECTRICAL SPECIFICATION

- FREQUENCY :- 50 - 60Hz
- INTERWINDING SCREEN :-
- SECONDARY WINDING :-
  - Regulation (AC)/load current -
  - Continuous VA rating @ 230v
  - Voltage unbalance -
- GENERAL
  - Magnetic radiation LOW & CONSISTENT
  - Acoustic noise THE DEVICE SHOULD BE DESIGNED TO BE AS QUIET AS POSSIBLE.
  - Maximum ambient temperature 50° C
  - Application POWER SUPPLY FOR CD PLAYER USING BRIDGE RECTIFIER AND 3300uF/1000uF CAPACITORS. QUIESCENT LOAD 300mA DC.
- SAFETY APPROVAL :- To meet BS415/IEC65

	DRAWING TITLE FMJ 9 CD Player Mains Transformer MULTI VOLTAGE	DRAWN BY SKH				
		DATE 5/7/99				
DRAWN TO THIRD ANGLE PROJECTION	ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED	CHECKED BY				
		ANGULAR TOL. ± 2 DEGREES				
TOLERANCES UNLESS OTHERWISE STATED 0.00 - 0.20 0.0 - 0.5		ORIGINAL SCALE NTS	PLOT SCALE 1X	DATE 26/1/00	PRODUCTION RELEASE	1
MATERIAL	SHT 1 OF 1	SHT SIZE A3	ECO NUMBER	DATE	DESCRIPTION OF CHANGE	ISSUE
FINISH	DRAWN WITH REFERENCE TO BS 308		PART NUMBER AND DRAWING NUMBER			L859TX



<b>ARCAM</b> A & R CAMBRIDGE LTD DRAWN TO THIRD ANGLE PROJECTION	DRAWING TITLE FMJ CD TOROID MULTI-VOLTAGE TRANSFORMER SPEC.	DRAWN BY	SKH				
		DATE	12/7/99				
TOLERANCES UNLESS OTHERWISE STATED 0.00 - 0.20 0.0 - 0.5	ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED	CHECKED BY		01_1160	21/8/01	INCREASE LENGTH OF SECONDARY LEAD	3
		ANGULAR TOL. ± 2 DEGREES		00_0037	24/5/00	CHANGE NEUTRAL POSITION FROM LEFT TO RIGHT OF PLUG	2
		ORIGINAL SCALE	NTS	PLOT SCALE	× 0.5	26/1/00	PRODUCTION RELEASE
MATERIAL	MELINEX WRAP	SHT 1 OF 2	SHT SIZE	A3	ECD NUMBER	DATE	DESCRIPTION OF CHANGE
FINISH	TO BE SUPPLIED WITH 2 OFF HARD RUBBER WASHER (50.0 DIA × 2.0 THK) AND FIXING CLAMP (50.0 DIA).	DRAWN WITH REFERENCE TO BS 308		PART NUMBER AND DRAWING NUMBER			L860TX

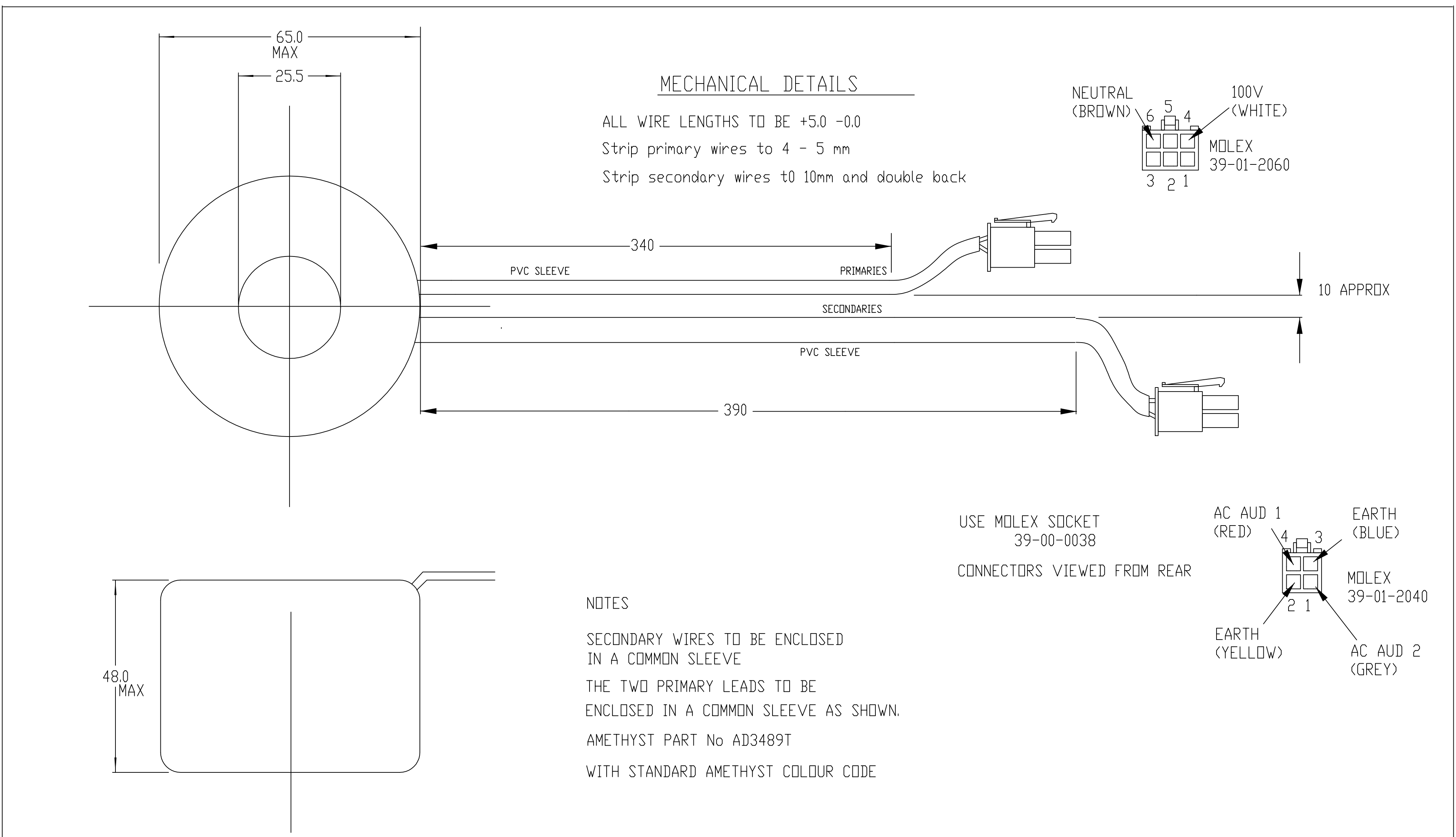
**ELECTRICAL SPECIFICATION**

- FREQUENCY :- 50 - 60Hz
- INTERWINDING SCREEN :- NO
- SECONDARY WINDING :-
  - Continuous VA rating - 15VA
- GENERAL
  - Magnetic radiation - LOW AND CONSISTENT.
  - Acoustic noise VERY LOW (INAUDIBLE AT 2m IN A QUIET ROOM ON QUIESCENT LOAD)
  - Maximum ambient temperature - 50°C
  - Application POWER SUPPLY FOR CD PLAYER USING CIRCUIT SHOWN ABOVE
  - Supplier Pt. No. - AMETHYST PART No. AD3448T

FOR SERIES OPERATION ONLY
- SAFETY APPROVAL :- To meet BS415/IEC65 Class II, EN60742/BS3535, UL506 & C22.2 No. 66-1988

WIRE COLOUR	VAC	AT LOAD	WIRE TYPE	WIRE LENGTH	
RED	13.7V	0.4VA	SELF ENDS	390mm	SEC.
BLUE	0V	see drg	SELF ENDS	390mm	SEC.
YELLOW	0V	see drg	SELF ENDS	390mm	SEC.
GREY	13.7V	0.4VA	SELF ENDS	390mm	SEC.
RED	230V	5.5V	22 AWG Flexi	340mm	PRIM.
BLACK	115V	11VA	22 AWG Flexi	340mm	PRIM.
BROWN	0V		22 AWG Flexi	340mm	PRIM.

<b>ARCAM</b> A & R CAMBRIDGE LTD DRAWN TO THIRD ANGLE PROJECTION	DRAWING TITLE FMJ CD TOROIDAL MULTI-VOLTAGE TRANSFORMER SPEC.	DRAWN BY	SKH				
		DATE	12/7/99				
TOLERANCES UNLESS OTHERWISE STATED 0.00 - 0.20 0.0 - 0.5	ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED	CHECKED BY		01_1160	21/8/01	INCREASE LENGTH OF SECONDARY LEAD	3
		ANGULAR TOL. ± 2 DEGREES		00_0037	24/5/00	CHANGE NEUTRAL POSITION FROM LEFT TO RIGHT OF PLUG	2
		ORIGINAL SCALE	NTS	PLOT SCALE	× 0.5	10/2/00	PRODUCTION RELEASE
MATERIAL		SHT 2 OF 2	SHT SIZE	A3	ECD NUMBER	DATE	DESCRIPTION OF CHANGE
FINISH		DRAWN WITH REFERENCE TO BS 308		PART NUMBER AND DRAWING NUMBER			L860TX



<b>ARCAM</b> A & R CAMBRIDGE LTD DRAWN TO THIRD ANGLE PROJECTION	DRAWING TITLE		DRAWN BY	SKH					
	FMJ CD TOROID 100V TRANSFORMER SPEC.		DATE	12/7/99					
TOLERANCES UNLESS OTHERWISE STATED 0.00 - Ø20 0.0 - Ø5	ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED	ORIGINAL SCALE	NTS	PLOT SCALE	x 0.5	01_1160	21/8/01	INCREASE LENGTH OF SECONDARY LEAD	2
MATERIAL	MELINEX WRAP	SHT 1 OF 2	SHT SIZE	A3	ECD NUMBER	DATE	DESCRIPTION OF CHANGE	ISSUE	
FINISH	TO BE SUPPLIED WITH 2 OFF HARD RUBBER WASHER (50.0 DIA x 2.0 thk) AND FIXING CLAMP (50.0 DIA).	DRAWN WITH REFERENCE TO BS 308		PART NUMBER AND DRAWING NUMBER		L883TX			

**ELECTRICAL SPECIFICATION**

- FREQUENCY :- 50 - 60Hz
- INTERWINDING SCREEN :- NO
- SECONDARY WINDING :-
  - Continuous VA rating - 15VA
- GENERAL
  - Magnetic radiation - LOW AND CONSISTENT.
  - Acoustic noise VERY LOW ( INAUDIBLE AT 2m IN A QUIET ROOM ON QUIESCENT LOAD )
  - Maximum ambient temperature - 50°C
  - Application POWER SUPPLY FOR CD PLAYER USING CIRCUIT SHOWN ABOVE
  - Supplier Pt. No. - AMETHYST PART No. AD3489T

FOR SERIES OPERATION ONLY
- SAFETY APPROVAL :- To meet BS415/IEC65 Class II, EN60742/BS3535, UL506 & C22.2 No. 66-1988

WIRE COLOUR	VAC	AT LOAD	WIRE TYPE	WIRE LENGTH	
RED	13.7V	0.4VA	SELF ENDS	390mm	SEC.
BLUE	0V	see drg	SELF ENDS	390mm	SEC.
YELLOW	0V	see drg	SELF ENDS	390mm	SEC.
GREY	13.7V	0.4VA	SELF ENDS	390mm	SEC.
WHITE	100V	11VA	22 AWG Flexi	340mm	PRIM.
BROWN	0V		22 AWG Flexi	340mm	PRIM.

<b>ARCAM</b> A & R CAMBRIDGE LTD DRAWN TO THIRD ANGLE PROJECTION	DRAWING TITLE		DRAWN BY	SKH					
	FMJ CD TOROIDAL 100V TRANSFORMER SPEC.		DATE	12/7/99					
TOLERANCES UNLESS OTHERWISE STATED 0.00 - Ø20 0.0 - Ø5	ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED	ORIGINAL SCALE	NTS	PLOT SCALE	x 0.5	01_1160	21/8/01	INCREASE LENGTH OF SECONDARY LEAD	2
MATERIAL		SHT 2 OF 2	SHT SIZE	A3	ECD NUMBER	DATE	DESCRIPTION OF CHANGE	ISSUE	
FINISH		DRAWN WITH REFERENCE TO BS 308		PART NUMBER AND DRAWING NUMBER		L883TX			

# **Mechanical Assembly**

## **Contents**

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- **General assembly  
parts list**

## CD23 (TEXT) General Assembly Parts List

ITEM	230V	115V	100V	WFC23P 8 SILVER	WFC23P 8B BLACK	DESCRIPTION	WHERE USED	QTY
	L815RC					REMOTE CONTROL		1
	L859TX	L859TX	L862TX			FMJ PCB TRANSFORMER		1
				E850PM	E850PMB	FMJ MAINS BUTTON		1
	E887PM					DIVA POWER BUTTON ADAPTER		1
				E069AY	E069AYB	DRAWER FRONT		1
				E073AY	E073AYB	FASCIA ASSEMBLY		1
				E843CP	E843CPB	COVER PLATE		1
				HA4V06S	HA4V06B	M/C TORX M4X6	SIDE COVER TO CHASSIS	4
	B2012					SONY MECH		1
	C11166	C11256	C11316			MAINS FUSE		1
	E100AY					DAC SUB-CHASSIS ASSY		1
	E71501					FOAM DOUBLE SIDED TAPE	ON MECH	100MM
	E074AY					REAR PANEL ASSEMBLY		1
	E082AY					CHASSIS ASSEMBLY		1
	E939MC					DAMPING PLATE	FIT TO INSIDE CHASSIS	1
	E808MI					MAINS INSULATOR	UNDER MOTHER PCB	1
	E811AP					FMJ CD DRAWER ADHESIVE PAD		1
	E822PM1					FOOT		4
	E879SL					PRODUCT CONFIGURATION CONTROL LABEL	CHASSIS	1
	E887SL					FMJ CD23 FUSE LABEL		1
	F022					FUSE HOLDER COVER	FOR FUSE HOLDERS	2
	F065					CABLE CLIP	TORROID CABLES TO DAC FIXINGS	4
	F203					50MM TOROID CLAMP	TOROID TRANSFORMER	1
	F204					50MM NEOPRENE WASHER	TOROID TRANSFORMER	2
	H037					44MM STAND OFF	SUB CHASSIS FIXING	
	HA3V10A					M3 x 10mm MACHINE SCREW	MOTHER, DISP, IR PCBs TO CHASSIS	17
	HA4A12B					M/C PAN SUPA M4X12 STBK (500)	EARTH LEAD TO CHASSIS	1
	HA3V05B					M/C TORX M3X5	MECH	3
	HA5L25A					M5 x 25mm HEX CAP SCREW	TOROID TO CHASSIS	1
	HE6V06B					No. 6 x 6mm SELF TAPPER	FACIA ASSEMBLY TO CHASSIS	4
	HF4V09B					No. 4 x 9mm SELF TAPPER	REAR PAN, DAC ASSY	15
	HJ4A00A					NUT M4 FULL STZP (1000)	EARTH LEAD TO CHASSIS	1
	L805CA					23-WAY FLEX-FOIL	DAC PCB	1
	L806CA					5-WAY RIBBON & CONNS	CD MECH.	1
	L807CA					32-WAY FLEX-FOIL (ENDS FACING SAME WAY)	DAC PCB	1
	L860CA					32-WAY FLEXFOIL (ENDS FACING OPP WAY)	DISPLAY PCB	1
	L811CA3					23-WAY FLEX-FOIL	CD MECH.	1
	L860TX	L860TX	L883TX			FMJ CD TOROID TRANSFORMER		1
	L935AY	WFC23T 1A				CD23T MOTHER PCB		1
	SL025					LASER WARNING	FOR REAR PANEL	1
	SL115					LASER LABEL	FOR INSIDE OF CHASSIS	1

# ARCAM

All parts can be ordered via [spares@arcam.co.uk](mailto:spares@arcam.co.uk)

Pembroke Ave, Waterbeach, Cambridge, CB5 9PB, ENGLAND  
TEL: +44(0) 1223 203 203    FAX: +44(0) 1223 863 384