

Arcam Alpha 7/8/9 CD Service Manual

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Circuit Description

The following notes describe the operation of the Alpha 7/8/9 CD players. They include the circuitry on the main, DAC and display PCBs but not that on the servo PCB attached to the mechanism.

Power Supplies

The mains input is fitted with inductors L2,3,6,7 to filter electromagnetic interference coming out of the player.

Mains transformer T201 has three secondary windings supplying two separate power supplies and an AC supply for the display filament:

Analogue Supply

Bridge rectifier D4,5,6,7 and reservoir capacitors C209-C212 produce unregulated split rails of about $\pm 22V$.

Z204 and Z205 provide regulated outputs of +18V and -18V respectively that power the opamps in the audio output stage.

Since there is no power switch on this secondary, the analogue supplies are always connected.

Digital Supply

Switch SW201-A disconnects the digital secondary winding when the 'Power' switch is out.

An unregulated supply of about 11V is produced by the bridge rectifier D8,9,10,11 and reservoir capacitor C36.

This is then regulated to provide three +5 volt supplies (Z208 general logic supply, Z207 DAC supply, Z203 system clock generator supply) and a +7.3v supply for the mechanism and motor drive circuits (Z206).

A -30v supply is formed by Z209 and associated components to power the display grid.

Muting

When the unit is turned off SW201-A discharges capacitor C29 quickly. This along with the AMUTE signal from the microprocessor, controls the output mute transistors Q1,101 via level shifter Q3.

Clock Generator

The system clock is generated by a discrete oscillator based around Q2 and 16.9344MHz oscillator X1. The output of Q2 is amplified and buffered by inverters Z202-E & D and sent to the clock input of the DAC Z201.

DAC & Audio Outputs (Alpha 7 only)

The DAC is a Delta-Sigma design from Burr Brown, the PCM1710U.

The serial digital data from the decoder Z206 is input to pins 1 to 3. The system clock is input to pin 5.

The DAC is powered entirely from one 5V supply, although it is split and decoupled between the analogue and digital sections of the device.

The analogue outputs from each channel are processed identically. Three poles of filtering are provided by the active filter based around Z1-A. Z1-B buffers the audio output and sets the output level.

Muting is provided by turning on Q1 and Q101.

DAC & Audio Outputs (Alpha 8 only)

This is a similar circuit as the one used on the Arcam Alpha 6 DAC PCB but designed for Sony format input data and a better digital filter, the SM5843AP1, Z14. The digital filter is used with a SM5864AP 20-bit DAC chip, Z12, (described here as a PWM noise shaper to avoid confusion with the 1-bit DAC Latch which follows it). The output from this is re-latched by Z7, Z8.

Digital Filter A PIC micro on the mother board controls the filter with the signals RB0 to RB7. The SM5843 filter has internal pull-up resistors on its inputs resulting in RB4 & RB5 being logic 1.

The SM5843APT requires several control lines from the PIC...

RB7 FSEL2, Selects sampling rate for de-emphasis. Static low for 44.1K.

RB6 FSEL1, Selects sampling rate for de-emphasis. Static low for 44.1K.

RB5 IW2N, Selects input word length. Static high for 16 bits.

RB4 MDT, Serial data input for volume control. Burst at switch-on for setting to full.

RB3 RSTN, Reset line. Short pulse low at switch on, then static high.

RB2 MLEN, Serial data latch input for volume control.

RB1 MCK, Serial clock input for volume control.

RB0 Not connected.

No Dither On Silence

The digital filter adds 'dither' to the output signal. This improves the low-level performance of the DAC. The PWM filter normally mutes when it detects digital silence to prevent any unwanted noise and idle-tones on the audio outputs when no music is playing. A slight click is audible when this happens. Unfortunately, the added dither prevents this mute from operating because it holds it open. Q11 detects digital silence on the data input to the filter. When silence is detected, the dither function is switched off

allowing the PWM filter's mute to operate as normal.

Mute Relay

The mute relay is controlled from the PIC micro via RA0 after switch-on. In Standby mode, XRST is low which interrupts the relay via Q9. RA0 is low when the CD player comes out of standby mode and goes high after a short settling delay.

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.

PWM noise shaper

To reduce EMC, the clock signal going into this chip, Z12, is very weak on the XT1 pin (23) pin, taken directly off Q5. This is amplified so that there should be a larger signal on the CKO pin (26).

The PWM output on pins 11, 13, 16 and 18 can be resolved into an audio waveform on a scope simply by measuring them through a 100K resistor. The same is true for the PWM signals through the latch and the level shifter.

Latch

The PWM data from Z12 is re-latched using 74HC74

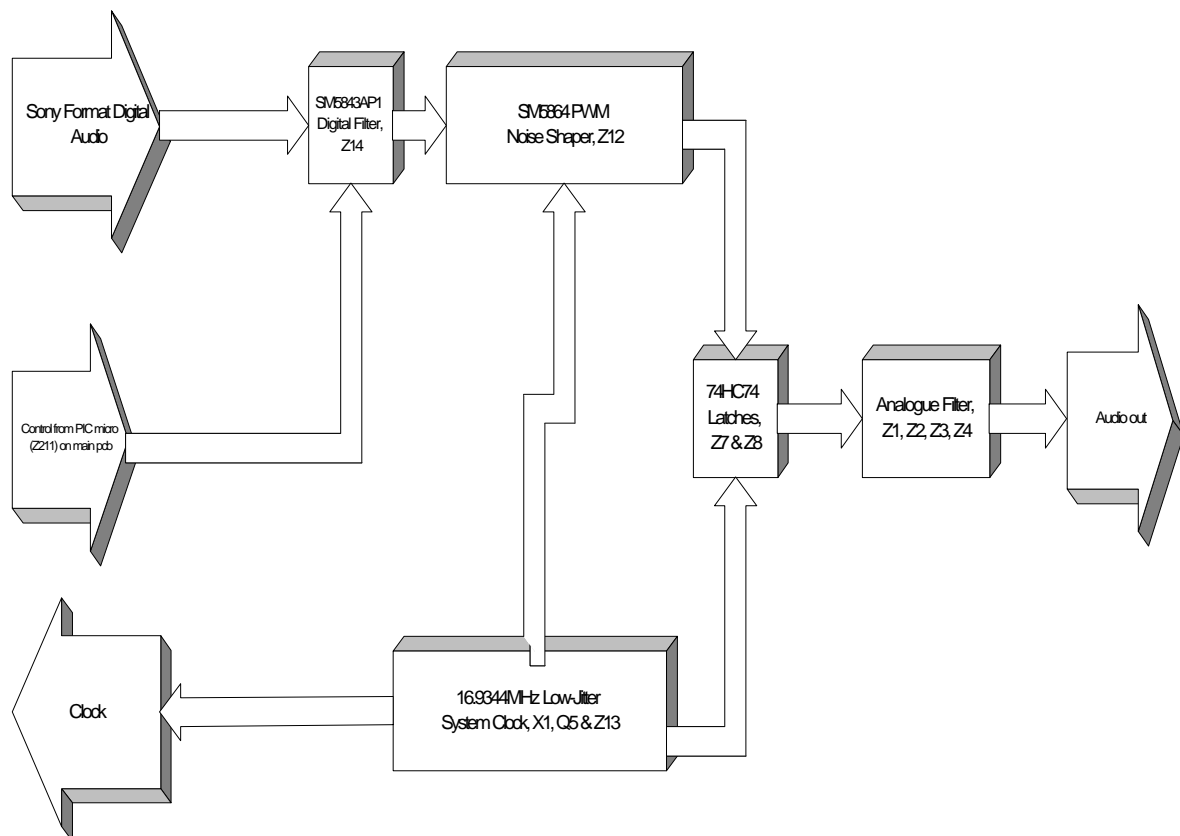
latches, Z7 and Z8. The power supply for these chips is the DAC voltage reference and the output drives the analogue filter stage directly. The latches reduce

any edge-timing jitter induced on the PWM signal coming from Z12.

Analogue filter

The first half of the analogue filter, Z3 and Z4 is balanced. The signal through one side of the op-amp, pin 1, should be phase inverted with respect to the other, pin 7. These signals should be viewed on a scope through a 100K resistor since there may still be quite a lot of RF noise on the signal.

Z1 and Z2 filter the audio signal further and also convert the balanced signal into a single ended signal. Z18 acts as a DC servo to reduce the output offset voltage. This has a very large time constant so an offset as high as 50mV is possible when the unit is first plugged in. This reduces to less than 3mV after 10 minutes and stays low if the unit is switched off and on with the Standby button.



Test Points Marked on Circuit Diagram Only

Test Points	Measurement Information
17MHz	Clock Output to mother board. 16.9344MHz +/- 40ppm, 4V to 5V peak to peak square wave.
AGND	Analogue ground point.
AMUTE	Digital audio mute input on SK203. 0V=off, 5V=Mute.
CK	Serial Data clock input on SK203. Sony format.
DA	Serial Data data input on SK203. Sony format.
CLKSYNC	Crystal clock override. A 16.9344MHz HCMOS clock can be injected from an external source.
DEEM	De-emphasis select input on SK203. 0V=off, 5V=On.
DGND	Digital ground point.
LOUT	Left channel audio output at SK1. Measure d.c. offset at switch-on and after 1 minute, see specifications.
LR	Serial Data LR input on SK203. Sony format.
MUTERLY	Mute Relay Voltage. Equal to RLYPWR voltage when output is muted and 0V d.c. +0.5V,-0.0V when output is un-muted.
N15	Regulated analogue supply. -15V d.c. +/- 0.6V.
N18V	-18.45V d.c. +/- 0.5V supply input on SK204 for analogue.
P5V(0)	+5V d.c. +/- 0.3V digital filter supply input on SK204.
P5V(1)	+5V d.c. +/- 0.3V PWM noise shaper supply input on SK204.
P5VCLK	Regulated clock supply. +5V d.c. +/- 0.3V.
P15	Regulated analogue supply. +15V d.c. +/- 0.6V.
P18V(0)	+18.45V d.c. +/- 0.5V supply input on SK204 for analogue.
P18V(1)	+18.45V d.c. +/- 0.5V supply input on SK204 for clock and latch.
PWRGND	Power ground point. Used by mute relay only.
RA0	Mute relay control from PIC micro on SK203.
RB0-RB7	Control lines from PIC micro on SK203.
REFL	DAC reference voltage, left channel. +5V +/- 0.3V.
REFR	DAC reference voltage, right channel.
RLYPWR	+12V d.c. +/- 1V supply input for mute relay on SK204.
ROUT	Right channel audio output at SK1. Measure d.c. offset at switch-on and after 1 minute, see specifications.
SRVL	Left d.c. servo voltage. -10 to +10V d.c.
SRVR	Right d.c. servo voltage.
SYSCLK	Clock used by latches. 4V to 5V peak to peak square wave at 16.9344MHz.

Disc Transport Module

The CDM 14 module comprises the disc loading mechanism, laser assembly, RF amplifier and analogue signal processing. All the servo control and motor drive circuits are also included.

Digital Signal Processor

Mute, attenuation and de-emphasis functions are controlled via a three-wire serial bus from the system controller (Z212) to pins 26, 27 & 28 of the DAC (Z201).

Digital audio is input to the DAC on pins 1, 2 & 3 in standard Sony format i.e. Word Clock, Data and Bit Clock.

A digital output complying to the SPDIF standard is generated by the decoder on the mechanism assembly. This is passed through an isolating transformer, T202, to the digital output socket SK5.

System Controller

The CXP826P16Q system controller (Z212) is a combined CD player controller, keyboard scanner, remote control decoder and fluorescent display driver. Its clock is generated by 4.00MHz resonator X201.

The controller detects the position of the disc drawer from the status of two microswitches, INSW & OUTSW, on socket SK205. The drawer motor is controlled via motor driver Z210

The keyboard scanning works by connecting the keys to a resistor ladder on an ADC (analogue to digital convertor) input to the microcontroller. Pressing a key presents a unique voltage to this input.

The signal from the remote control receiver is input to RMIN (pin 2) after first passing through the PIC microcontroller, Z211, on the small remote receiver pcb. This PIC ic converts the RC-5 format codes from the remote control handsets to NEC data, suitable for the Sony chipset. It also controls the configuration of the digital filter/DAC on the Alpha 8 and 9 DAC boards. The remote control data contains a 'customer code' that identifies it as an Arcam product. The microcontroller is configured to accept this code by means of the diode network D291 to D297.

Disassembly For Servicing

To remove the boards within the CD players follow the instructions below.

1. Remove the top cover.
2. Press load to eject the CD tray.

3. Unplug the unit from the mains.
4. Push the tray front upwards to remove it from the tray. Push the tray in manually.
5. Remove the 4 screws holding the front panel to the chassis and release the locating tabs.
6. Unplug the flexfoil from the display board where it enters the main pcb.
7. Remove the 2 screws holding the remote receiver pcb in place.
8. The front panel can now be pulled off the unit.
9. To remove the display pcb remove the 6 screws holding the board in place.

To remove the main pcb first remove the DAC board if it is an Alpha 8 or 9 CD player.

1. Remove the 3 screws holding the audio output sockets to the rear panel and 2 screws holding the aluminium extrusion in place.
2. Squeeze the tops of the 2 pcb pillars and lift the board up slightly to clear them.
3. Remove the 2 flexfoils from the DAC board.

The DAC board, still attached to the extrusion, can now be removed from the unit.

To remove the main pcb remove the 8 pcb securing screws and the screw holding the digital output socket to the chassis. (On Alpha 7 CDs also remove the 3 screws securing the audio output sockets in place). Release the cables which connect the mechanism to the main board.

The main pcb can now be slid out of the case.

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Alpha 7/8/9 Main PCB Parts List		
Ref. No.	Description	Part No.
C2	PPRO 680P 63V 5% RA	2D168
C3	PPRO 680P 63V 5% RA	2D168
C4	ELST NON POLAR 10UF 35V	2U610
C5	PPRO 100P 63V 5% RA	2D110N
C6	PPRO 680P 63V 5% RA	2D168
C7	PPRO 680P 63V 5% RA	2D168
C10	CERD 1N0 63V	2A210
C11	CERD 10N 100V 20%	2A310
C12	CERD 10N 100V 20%	2A310
C13	CERD 33P 63V	2A033
C14	CERD 33P 63V	2A033
C15	CERD 100P 63V	2A110
C16	CERD 100P 63V	2A110
C17	CERD 10N 100V 20%	2A310
C18	CERD 10N 100V 20%	2A310
C19	CERD 10N 100V 20%	2A310
C20	PPRO 680P 63V 5% RA	2D168
C21	ELST NON POLAR 10UF 35V	2U610
C22	ELST 100U 25V	2N710
C23	ELST 100U 25V	2N710
C24	ELST 100U 25V	2N710
C25	ELST 22U 20V OSCON	2P622
C26	ELST 100U 25V	2N710
C27	ELST 10U 50V	2N610
C28	CERD 470P 63V	2A147
C29	ELST 100U 25V	2N710
C32	CERD 10N 100V 20%	2A310
C33	ELST 1M0 25V	2N810
C34	ELST 100U 100V	2N710B
C35	ELST 100U 100V	2N710B
C36	ELST 3M3 25V	2N833
C37	ELST 10U 50V	2N610
C38	ELST 10U 50V	2N610
C39	ELST 100U 25V	2N710
C40	ELST 100U 25V	2N710
C41	ELST 100U 25V	2N710
C42	ELST 100U 25V	2N710
C43	ELST 1M0 25V	2N810
C44	ELST 1M0 25V	2N810
C45	ELST 1M0 25V	2N810
C46	ELST NON POLAR 10UF 35V	2U610
C47	ELST 1M0 25V	2N810
C48	ELST 1M0 25V	2N810

Alpha 7/8/9 Main PCB Parts List		
Ref. No.	Description	Part No.
C49	ELST 10U 50V	2N610
C50	ELST 10U 50V	2N610
C51	ELST 1M0 25V	2N810
C52	CERD 10N 100V 20%	2A310
C53	ELST 22U 20V OSCON	2P622
C54	CERD 10N 100V 20%	2A310
C55	CERD 10N 100V 20%	2A310
C56	ELST 10U 50V	2N610
C102	PPRO 680P 63V 5% RA	2D168
C103	PPRO 680P 63V 5% RA	2D168
C104	ELST NON POLAR 10UF 35V	2U610
C105	PPRO 100P 63V 5% RA	2D110N
C291	CERD 47N 63V 10%	2A347
C292	ELST 100U 25V	2N710
C293	CERD 47N 63V 10%	2A347
C294	CERD 47N 63V 10%	2A347
D1	SSDIODE 1N4148 75V	3A4148
D2	SSDIODE 1N4148 75V	3A4148
D3	SSDIODE 1N4148 75V	3A4148
D4	RECTIFIER 1N4003F 1A 200V	3B4003
D5	RECTIFIER 1N4003F 1A 200V	3B4003
D6	RECTIFIER 1N4003F 1A 200V	3B4003
D7	RECTIFIER 1N4003F 1A 200V	3B4003
D8	RECTIFIER 1N4003F 1A 200V	3B4003
D9	RECTIFIER 1N4003F 1A 200V	3B4003
D10	RECTIFIER 1N4003F 1A 200V	3B4003
D11	RECTIFIER 1N4003F 1A 200V	3B4003
D12	RECTIFIER 1N4003F 1A 200V	3B4003
D13	RECTIFIER 1N4003F 1A 200V	3B4003
D14	RECTIFIER 1N4003F 1A 200V	3B4003
D15	RECTIFIER 1N4003F 1A 200V	3B4003
D16	RECTIFIER 1N4003F 1A 200V	3B4003
D17	ZENER 15V 400MW	3C11504
D18	ZENER 7V5 400MW	3C07504
D19	ZENER 4V7 400MW	3C04704
D20	ZENER 4V7 400MW	3C04704
D21	SSDIODE 1N4148 75V	3A4148
D22	RECTIFIER 1N4003F 1A 200V	3B4003
D23	RECTIFIER 1N4003F 1A 200V	3B4003
D291	SSDIODE 1N4148 75V	3A4148
D292	SSDIODE 1N4148 75V	3A4148
D293	SSDIODE 1N4148 75V	3A4148
D294	SSDIODE 1N4148 75V	3A4148

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D295	SSDIODE 1N4148 75V	3A4148
D296	SSDIODE 1N4148 75V	3A4148
D297	SSDIODE 1N4148 75V	3A4148
DISP301	DISPLAY ALPHA 7/8/9 (SONY)	B1008
F1	INS COVER PCB FUSEHOLDER	F022
F1	FUSE 20mm 160mA T	C11166
F1	/ FUSEHOLDER 20mm PCB	8S004
F2	/ FUSEHOLDER 20mm PCB	8S004
F2	INS COVER PCB FUSEHOLDER	F022
F4	FUSE 20mm 160mA T	C11166
F4	SPARE FUSEHOLDER	F062
HS1	HEATSINK TO220 CLIP 30	F007
HS2	HEATSINK TO220 8.6 DEGC/W	F008
HS2	HEATSINK CLIP TO220 13/8.6 DC/W	F006
L1	FERRITE BEAD SINGLE AXIAL TAPED 2K BOX	7F003
L2	INDUCT 1R0 283AS-1R0K 34-10914	7D001
L3	INDUCT 1R0 283AS-1R0K 34-10914	7D001
L4	33UH IND 34-48330	7D033
L5	33UH IND 34-48330	7D033
L6	6U8H INDUCTOR	7D968A
L7	6U8H INDUCTOR	7D968A
LED201	LED RED 5MM	3D5119
LED301	LED GREEN 5MM	3D001
LK101A	JUMPER 4-WAY LEAD	L814CA
PAD1	Alpha 7/8/9 CD SUPPORT PAD	E805AP
PL1	16 WAY DIL PIN HEADER	8K6316
Q1	TRANS LF SS N BC547B	4A547
Q2	TRANS LF SS N BC547B	4A547
Q3	TRANS LF SS P BC557B	4A557
Q4	TRANS LF SS N BC547B	4A547
Q5	TRANS LF SS N BC547B	4A547
Q6	TRANS LF SS N BC547B	4A547
Q101	TRANS LF SS N BC547B	4A547
R2	RES MF W4 3K9 1%	1H239
R3	RES MF W4 3K9 1%	1H239
R4	RES MF W4 3K9 1%	1H239
R5	RES MF W4 1% 10K	1H310
R6	RES MF W4 1% 10K	1H310
R7	RES MF W4 1% 33K	1H333
R8	RES MF W4 3K9 1%	1H239
R9	RES MF W4 3K9 1%	1H239
R10	RES MF W4 22K 1%	1H322
R11	RES MF W4 120R 1%	1H112
R12	RES MF W4 22R 1%	1H022
R13	RES MF W4 1% 10K	1H310

R14	RES MF W4 1% 10K	1H310
R15	RES MF W4 1% 10K	1H310
R16	RES MF W4 330R 1%	1H133
R17	RES MF W4 1% 10K	1H310
R18	RES MF W4 1% 33K	1H333
R19	RES MF W4 1% 33K	1H333
R20	RES MF W4 22R 1%	1H022
R21	RES MF W4 470R 1%	1H147
R22	RES MF W4 1% 220R	1H122
R23	RES MF W4 120R 1%	1H112
R24	RES MF FU W3 5% 10R NFR25	1G010
R25	RES MF W4 120R 1%	1H112
R26	RES MF W4 100K 1%	1H410
R27	RES MF W4 100K 1%	1H410
R28	RES MF W4 1% 10K	1H310
R29	RES MF W4 1% 1K0	1H210
R30	RES MF W4 1% 10K	1H310
R31	RES MF W4 330R 1%	1H133
R32	RES MF W4 330R 1%	1H133
R33	RES MF W4 330R 1%	1H133
R34	RES MF W4 1% 10K	1H310
R35	RES MF W4 4M7 1%	1H547
R36	RES MF W4 1% 620R	1H162
R37	RES MF FU W3 5% 10R NFR25	1G010
R38	RES MF W4 330R 1%	1H133
R39	RES MF W4 1% 220R	1H122
R40	RES MF W4 1% 220R	1H122
R41	RES MF W4 1K6 1%	1H216
R42	RES MF W4 1% 1K0	1H210
R43	RES MF W4 330R 1%	1H133
R44	RES MF FU W3 5% 3R3 NFR25	1G833
R45	RES MF FU W3 5% 3R3 NFR25	1G833
R46	RES MF W4 3K0 1%	1H230
R47	RES MF W4 3K0 1%	1H230
R48	RES MF FU W3 5% 10R NFR25	1G010
R49	RES MF W4 120R 1%	1H112
R50	RES MF W4 100K 1%	1H410
R51	RES MF FU W3 22R 5% NFR25	1G022
R52	RES MF FU W3 22R 5% NFR25	1G022
R53	RES MF W4 1% 33K	1H333
R54	RES MF W4 330R 1%	1H133
R55	RES MF W4 1% 680R	1H168
R56	RES MF W4 330R 1%	1H133
R57	RES MF W4 330R 1%	1H133
R58	RES MF FU W3 5% 10R NFR25	1G010

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R59	RES MF W4 330R 1%	1H133
R60	RES MF W4 1% 8K2	1H282
R61	RES MF W4 1% 8K2	1H282
R62	RES MF W4 330R 1%	1H133
R63	RES MF W4 1% 33K	1H333
R64	RES MF FU W3 5% 10R NFR25	1G010
R102	RES MF W4 3K9 1%	1H239
R103	RES MF W4 3K9 1%	1H239
R104	RES MF W4 3K9 1%	1H239
R105	RES MF W4 1% 10K	1H310
R106	RES MF W4 1% 10K	1H310
R107	RES MF W4 1% 33K	1H333
R108	RES MF W4 3K9 1%	1H239
R109	RES MF W4 3K9 1%	1H239
R110	RES MF W4 22K 1%	1H322
R111	RES MF W4 120R 1%	1H112
R112	RES MF W4 22R 1%	1H022
R113	RES MF W4 1% 10K	1H310
R291	RES MF FU W3 5% 3R3 NFR25	1G833
R292	RES MF W4 1% 8K2	1H282
R293	RES MF W4 1% 8K2	1H282
R294	RES MF W4 1% 1K0	1H210
R295	RES MF W4 1% 10K	1H310
R296	RES MF W4 1% 10K	1H310
R297	RES MF W4 1% 10K	1H310
R298	RES MF W4 1% 10K	1H310
R301	RES MF W4 1% 33K	1H333
R302	RES MF W4 1% 12K	1H312
R303	RES MF W4 1% 5K6	1H256
R304	RES MF W4 1% 3K3	1H233
R305	RES MF W4 1% 2K2	1H222
R306	RES MF W4 1% 1K5	1H215
R307	RES MF W4 1% 1K2	1H212
R308	RES MF W4 1% 8K2	1H282
R309	RES MF W4 1% 3K3	1H233
R310	RES MF W4 1% 2K2	1H222
R311	RES MF W4 1% 1K5	1H215
R312	RES MF W4 1% 1K2	1H212
R313	RES MF W4 1% 8K2	1H282
R314	RES MF W4 1% 220R	1H122
RX201	REMOTE CONTROL RX SBX1610-62 38KHZ	B2103
SH1	PHONO EMC SHIELD	E808MC
SK1	IEC MAINS 2-PIN PCB	8A014
SK2	8+8 WAY FEMALE HORIZ SKT	8K6416
SK4	PHONO SKT 2-WAY HOR EMC	8D222

SK5	PHONO SKT SINGLE EMC	8D220
SK201	23-WAY FFC CONN VERT	8K8023
SK203	32-WAY FFC CONN VERT	8K8032
SK204	23-WAY FFC CONN VERT	8K8023
SK205	5-WAY AMP CT CONN	8K2005
SK291	32-WAY FFC CONN VERT	8K8032
SK301	32-WAY FFC CONN HORIZ	8K8132
SW201	SW PUSH 4PCO	A1014
SW301	TACT SWITCH 2-PIN LOW PROF	A1504
SW302	TACT SWITCH 2-PIN LOW PROF	A1504
SW303	TACT SWITCH 2-PIN LOW PROF	A1504
SW304	TACT SWITCH 2-PIN LOW PROF	A1504
SW305	TACT SWITCH 2-PIN LOW PROF	A1504
SW306	TACT SWITCH 2-PIN LOW PROF	A1504
SW307	TACT SWITCH 2-PIN LOW PROF	A1504
SW308	TACT SWITCH 2-PIN LOW PROF	A1504
SW309	TACT SWITCH 2-PIN LOW PROF	A1504
SW310	TACT SWITCH 2-PIN LOW PROF	A1504
SW311	TACT SWITCH 2-PIN LOW PROF	A1504
SW312	TACT SWITCH 2-PIN LOW PROF	A1504
T201	ALPHA 7 CD MAINS TRANSFORMER	L811TX
T202	DIGITAL OUTPUT COUPLER K	7E015
X1	CRYSTAL 16.9344MHz PARALLEL	7X012
X201	CER RESON 4.00MHz	7W005
Z1	IC OPAMP DUAL NJM2114D	5B2114
Z101	IC OPAMP DUAL NJM2114D	5B2114
Z201	IC CD DAC PCM1710U	5G1710
Z202	IC HCMOS 74HCU04	5J7404
Z203	IC VREG POS 78L05	5D78L05
Z204	IC VREG POS LM317T	5D317T
Z205	IC VREG POS LM337T	5D337
Z206	IC VREG POS LM317T	5D317T
Z207	IC VREG POS LM317T	5D317T
Z208	IC VREG POS 7805	5D7805
Z209	IC VREG NEG 7915	5D7915
Z210	IC MOTOR DRIVER LB1641	5Q1641
Z211	IC CMOS MICRO PIC16C54XT/P	5H16C54X
Z211	IC SOCKET 18 PIN 0.3"	8S018
Z212	IC CD CXP826P16Q MICRO	5G826

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Alpha 8 DAC PCB Only Parts List		
Ref. No.	Description	Part No.
C1	PPRO 2N7 63V 5% RA	2D227
C2	PPRO 2N7 63V 5% RA	2D227
C3	PPRO 2N7 63V 5% RA	2D227
C4	PPRO 2N7 63V 5% RA	2D227
C5	PPRO 2N7 63V 5% RA	2D227
C6	PPRO 2N7 63V 5% RA	2D227
C7	PPRO 1N0 63V 5% RA	2D210
C8	PPRO 1N0 63V 5% RA	2D210
C9	PPRO 1N0 63V 5% RA	2D210
C10	PPRO 1N0 63V 5% RA	2D210
C11	PPRO 1N0 63V 5% RA	2D210
C12	PPRO 1N0 63V 5% RA	2D210
C13	PPRO 470P 63V 5% RA	2D147N
C14	PPRO 470P 63V 5% RA	2D147N
C15	PPRO 470P 63V 5% RA	2D147N
C16	PPRO 470P 63V 5% RA	2D147N
C17	MLC 100P 100V NPO 5% SM	2C110
C18	ELST 10U 50V	2N610
C19	ELST 10U 50V	2N610
C20	PPRO 1N3 63V 5% RA	2D213N
C21	ELST 10U 50V	2N610
C22	PCRB 100N 100V 5% RA 5mm	2H410
C23	ELST 10U 50V	2N610
C24	ELST NON POLAR 10UF 35V	2U610
C25	ELST NON POLAR 10UF 35V	2U610
C26	PPRO 4N7 63V 5% RA	2D247N
C27	PCRB 100N 100V 5% RA 5mm	2H410
C29	ELST 10U 50V	2N610
C30	PPRO 4N7 63V 5% RA	2D247N
C34	MLC 10N 50V X7R 10% SM	2C310
C35	MLC 470P 100V NPO 5% SM	2C147
C36	MLC 470P 100V NPO 5% SM	2C147
C37	MLC 10N 50V X7R 10% SM	2C310
C38	MLC 10N 50V X7R 10% SM	2C310
C39	MLC 10N 50V X7R 10% SM	2C310
C40	MLC 10N 50V X7R 10% SM	2C310
C41	MLC 10N 50V X7R 10% SM	2C310
C42	PPRO 470P 63V 5% RA	2D147N
C43	PPRO 470P 63V 5% RA	2D147N
C44	PPRO 470P 63V 5% RA	2D147N
C45	PPRO 470P 63V 5% RA	2D147N
C46	MLC 100P 100V NPO 5% SM	2C110
C47	MLC 47P 100V NPO 5% SM	2C047

Alpha 8 DAC PCB Only Parts List		
Ref. No.	Description	Part No.
C49	ELST 22U 20V OSCON	2P622
C50	ELST 22U 20V OSCON	2P622
C53	ELST 220U 16V	2N722
C55	MLC 100N 50V X7R 10% SM	2C410
C56	ELST 100U 25V	2N710
C57	ELST 100U 25V	2N710
C58	ELST NON POLAR 10UF 35V	2U610
C59	ELST NON POLAR 10UF 35V	2U610
C60	PPRO 4N7 63V 5% RA	2D247N
C61	PPRO 4N7 63V 5% RA	2D247N
C62	MLC 10N 50V X7R 10% SM	2C310
C63	ELST 470U 25V RA	2N747
C64	ELST 470U 25V RA	2N747
C65	MLC 10N 50V X7R 10% SM	2C310
C66	ELST NON POLAR 2.2UF 50V	2V522
C67	ELST NON POLAR 2.2UF 50V	2V522
C68	MLC 10N 50V X7R 10% SM	2C310
C69	MLC 33P 100V NPO 5% SM	2C033
D1	SSDIODE 1N4148 75V	3A4148
D2	SSDIODE 1N4148 75V	3A4148
L1	33UH IND SM 1812 180mA	7B033
L2	33UH IND SM 1812 180mA	7B033
L3	33UH IND SM 1812 180mA	7B033
L4	33UH IND SM 1812 180mA	7B033
L5	33UH IND SM 1812 180mA	7B033
L6	2U2H INDUCTOR	7D922
Q1	TRANS LF SS N SM BC847B	4A847
Q3	TRANS LF SS N SM BC847B	4A847
Q5	TRANS LF SS N SM BC847B	4A847
Q6	TRANS LF SS N SM BC847B	4A847
Q8	TRANS LF SS N SM BC847B	4A847
Q9	TRANS LF SS N SM BC847B	4A847
Q11	TRANS MOSFET SW ZVNL120A	4K120
R1	RESISTOR SM W4 1K0 2%	1A210
R2	RESISTOR SM W4 1K0 2%	1A210
R3	RESISTOR SM W4 1K0 2%	1A210
R4	RESISTOR SM W4 1K0 2%	1A210
R5	RESISTOR SM W4 1K0 2%	1A210
R6	RESISTOR SM W4 1K0 2%	1A210
R7	RESISTOR SM W4 1K0 2%	1A210
R8	RESISTOR SM W4 1K0 2%	1A210
R9	RESISTOR SM W4 2K2 2%	1A222
R10	RESISTOR SM W4 2K2 2%	1A222

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R11	RESISTOR SM W4 2K2 2%	1A222
R12	RESISTOR SM W4 2K2 2%	1A222
R13	RESISTOR SM W4 2K2 2%	1A222
R14	RESISTOR SM W4 2K2 2%	1A222
R15	RESISTOR SM W4 2K2 2%	1A222
R16	RESISTOR SM W4 2K2 2%	1A222
R17	RES MF FU W3 10R 5% NFR25	1G010
R18	RESISTOR SM W4 10R 2%	1A010
R19	RESISTOR SM W4 47K 2%	1A347
R20	RESISTOR SM W4 47K 2%	1A347
R21	RES MF FU W3 100R 5% NFR25	1G110
R25	RESISTOR SM W4 0R0 2%	1A000
R34	RESISTOR SM W4 0R0 2%	1A000
R35	RESISTOR SM W4 100R 2%	1A110
R36	RESISTOR SM W4 100R 2%	1A110
R37	RESISTOR SM W4 100R 2%	1A110
R38	RESISTOR SM W4 100R 2%	1A110
R39	RESISTOR SM W4 220R 2%	1A122
R40	RESISTOR SM W4 100R 2%	1A110
R41	RESISTOR SM W4 220R 2%	1A122
R42	RESISTOR SM W4 0R0 2%	1A000
R43	RESISTOR SM W4 100R 2%	1A110
R44	RESISTOR SM W4 100R 2%	1A110
R45	RES MF W4 1K2 1%	1H212
R46	RES MF W4 1K2 1%	1H212
R47	RES MF W4 1K2 1%	1H212
R48	RES MF W4 1K2 1%	1H212
R49	RES MF W4 3K3 1%	1H233
R50	RES MF W4 3K3 1%	1H233
R51	RES MF W4 3K3 1%	1H233
R52	RES MF W4 3K3 1%	1H233
R53	RESISTOR SM W4 1K0 2%	1A210
R54	RESISTOR SM W4 1K0 2%	1A210
R55	RESISTOR SM W4 4K7 2%	1A247
R56	RESISTOR SM W4 11K 2%	1A311
R57	RESISTOR SM W4 11K 2%	1A311
R58	RESISTOR SM W4 18K 2%	1A318
R59	RESISTOR SM W4 18K 2%	1A318
R64	RESISTOR SM W4 47R 2%	1A047
R65	RESISTOR SM W4 47R 2%	1A047
R66	RESISTOR SM W4 100K 2%	1A410
R67	RESISTOR SM W4 470R 2%	1A147
R68	RESISTOR SM W4 10K 2%	1A310
R69	RESISTOR SM W4 10K 2%	1A310
R72	RESISTOR SM W4 100R 2%	1A110

R73	RESISTOR SM W4 100R 2%	1A110
R74	RESISTOR SM W4 100R 2%	1A110
R75	RESISTOR SM W4 100R 2%	1A110
R80	RESISTOR SM W4 2K2 2%	1A222
R81	RESISTOR SM W4 2K2 2%	1A222
R82	RESISTOR SM W4 680K 2%	1A468
R84	RESISTOR SM W4 680K 2%	1A468
R85	RESISTOR SM W4 680K 2%	1A468
R86	RESISTOR SM W4 0R0 2%	1A000
R91	RESISTOR SM W4 0R0 2%	1A000
R92	RESISTOR SM W4 0R0 2%	1A000
R94	RESISTOR SM W4 220R 2%	1A122
R95	RESISTOR SM W4 220R 2%	1A122
R96	RESISTOR SM W4 2K4 2%	1A224
R97	RESISTOR SM W4 2K4 2%	1A224
R98	RESISTOR SM W4 0R0 2%	1A000
R99	RESISTOR SM W4 0R0 2%	1A000
R102	RESISTOR SM W4 0R0 2%	1A000
R103	RESISTOR SM W4 0R0 2%	1A000
R104	RES MF W4 1K2 1%	1H212
R108	RESISTOR SM W4 100K 2%	1A410
R109	RESISTOR SM W4 100K 2%	1A410
R110	RESISTOR SM W4 100K 2%	1A410
R111	RESISTOR SM W4 100K 2%	1A410
R112	RESISTOR SM W4 680K 2%	1A468
R113	RESISTOR SM W4 680K 2%	1A468
R114	RESISTOR SM W4 100K 2%	1A410
R115	RESISTOR SM W4 0R0 2%	1A000
R117	RESISTOR SM W4 0R0 2%	1A000
RLY1	RELAY 960 OHM 51SB12T	A205
SH1	PHONO EMC SHIELD	E808MC
SK1	PHONO SKT 4-WAY EMC GOLD	8D225
SK203	32-WAY FFC CONN VERT	8K8032
SK204	23-WAY FFC CONN VERT	8K8023
X1	CRYSTAL 16.9344MHz PARALLEL	7X012
X1	GROMMET 8 I/D X 6.5 THK	F021
Z1	IC OPAMP SM OP27	5B027S
Z2	IC OPAMP SM OP27	5B027S
Z3	IC AUDIO DUAL SM 4560D	5B4560M
Z4	IC AUDIO DUAL SM 4560D	5B4560M
Z5	IC VREG POS 78L05	5D78L05
Z7	IC HCMOS SM 74HC74	5K7474
Z8	IC HCMOS SM 74HC74	5K7474
Z11	IC VREG POS 78L05	5D78L05
Z12	IC CMOS SDECO DAC SM5864AP	5G5864

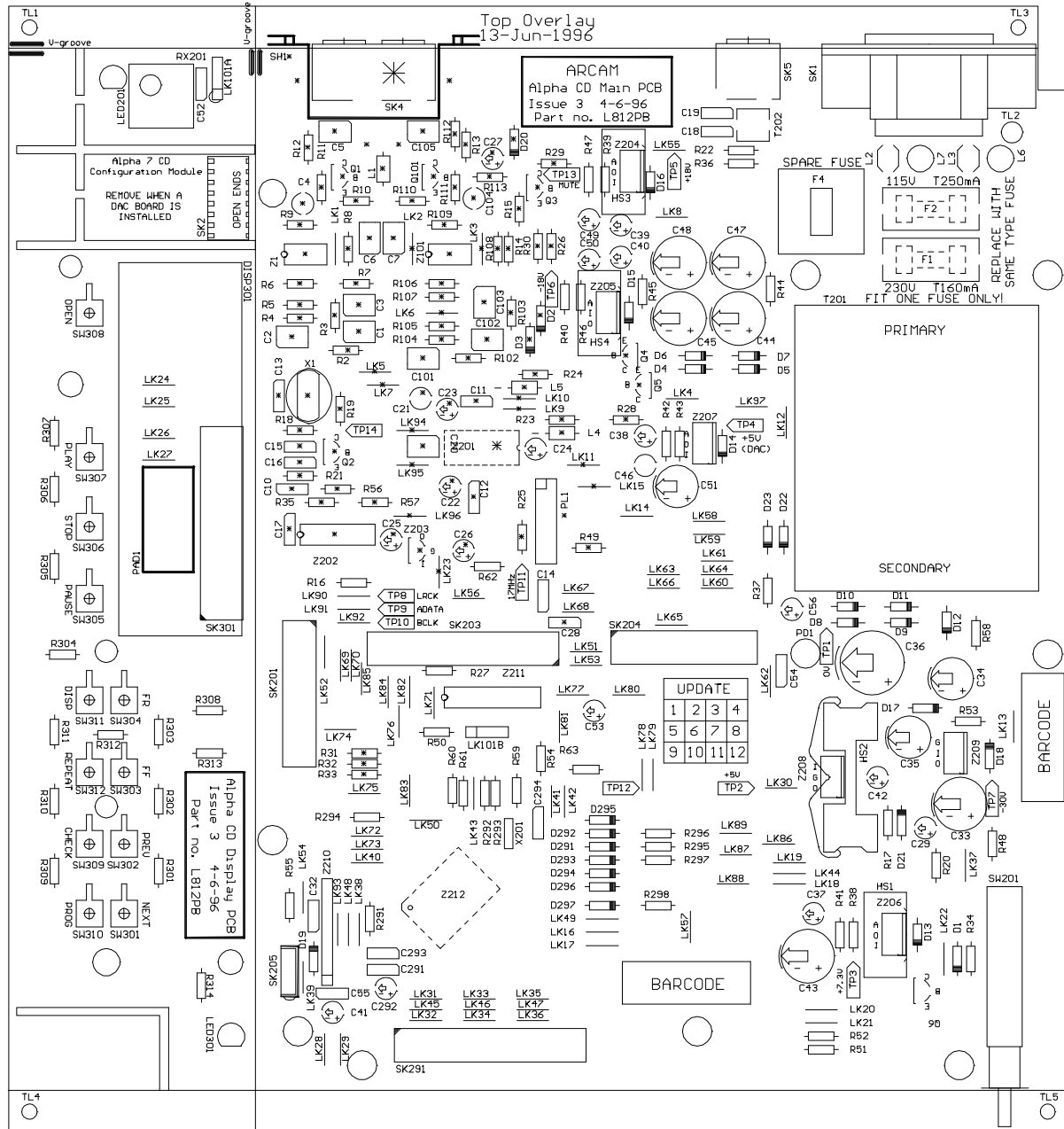
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Z13	IC HCMOS SM 74HCU04	5K7404
Z14	IC DIGITAL FILT SM5843APT	5G5843
Z16	IC VREG POS LM317T	5D317T
Z17	IC VREG POS LM337T	5D337
Z18	IC AUDIO DUAL SM 4560D	5B4560M

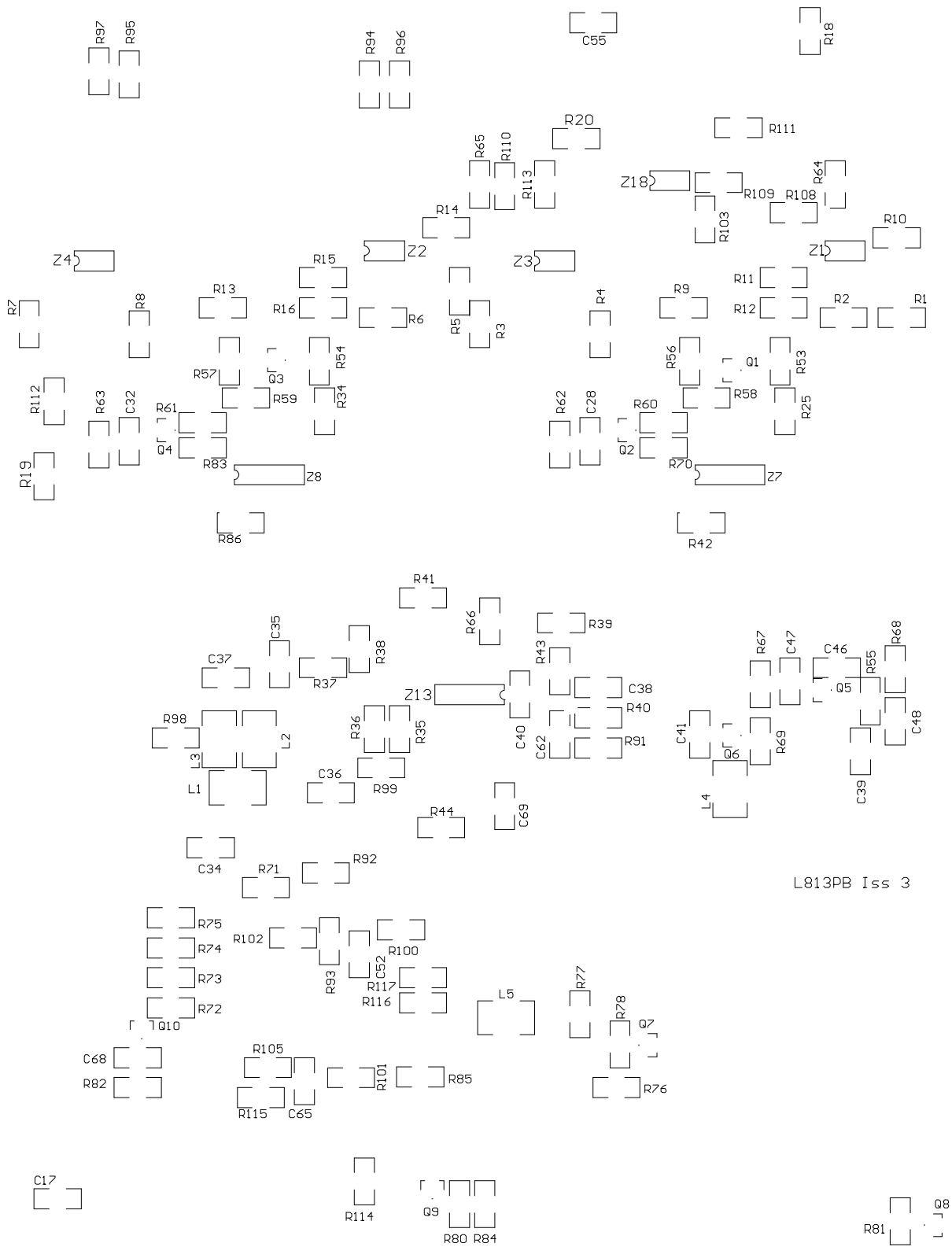
Alpha 7/8/9 CD Non PCB Parts, Metalwork etc.

Part No.	Description
B3002	BATTERY AA
B2009	CDM14 MECHANISM
E802CH	CHASSIS
E802CP	ALPHA 7/8/9 CD/TUNER COVERPLATE
E802MI	PCB INSULATOR
E806RP	REAR PANEL
E810FP	ALPHA 7/8 TUNER FASCIA
E813PM	CD DRAWER FRONT
E815PM	POWER BUTTON
E822PM	FOOT
E823PM	ALPHA 7 BADGE
E824PM	ALPHA 8 BADGE
E825PM	ALPHA 9 BADGE
HP006	SNAP RIVET (HOLDS MECH IN PLACE)
L801RC	CR14 REMOTE CONTROL HANSET
L807CA	FLEX FOILS MAIN BOARD TO DAC PCB
SH054	OWNERS HANDBOOK
SH058	WARRANTY LEAFLET

ALPHA 7/8/9 CD PLAYER MAIN PRINTED CIRCUIT BOARD LAYOUT

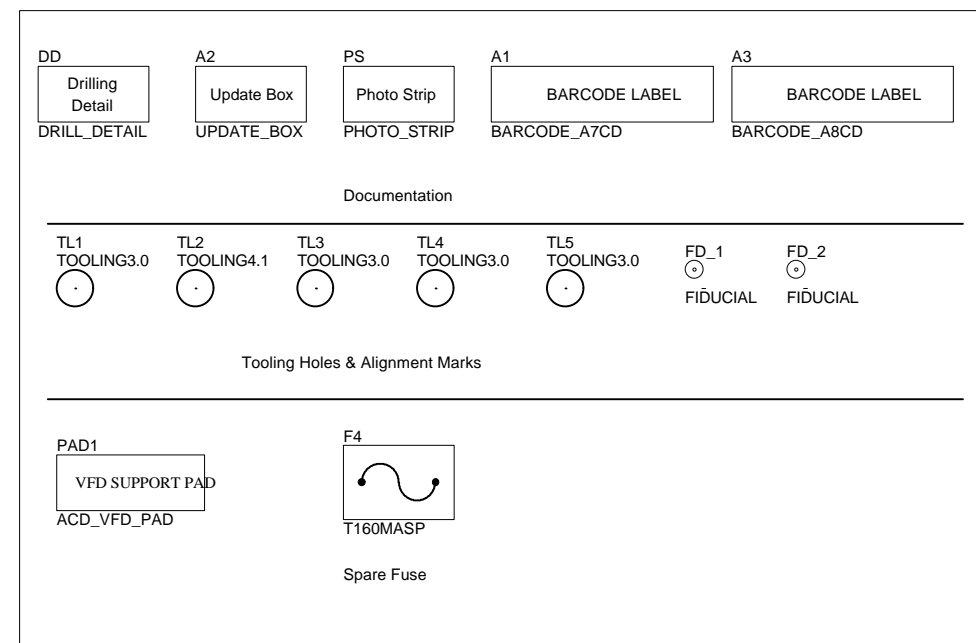
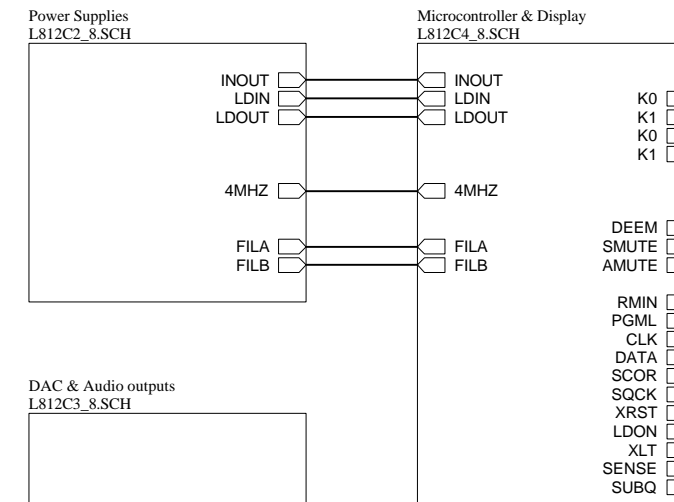
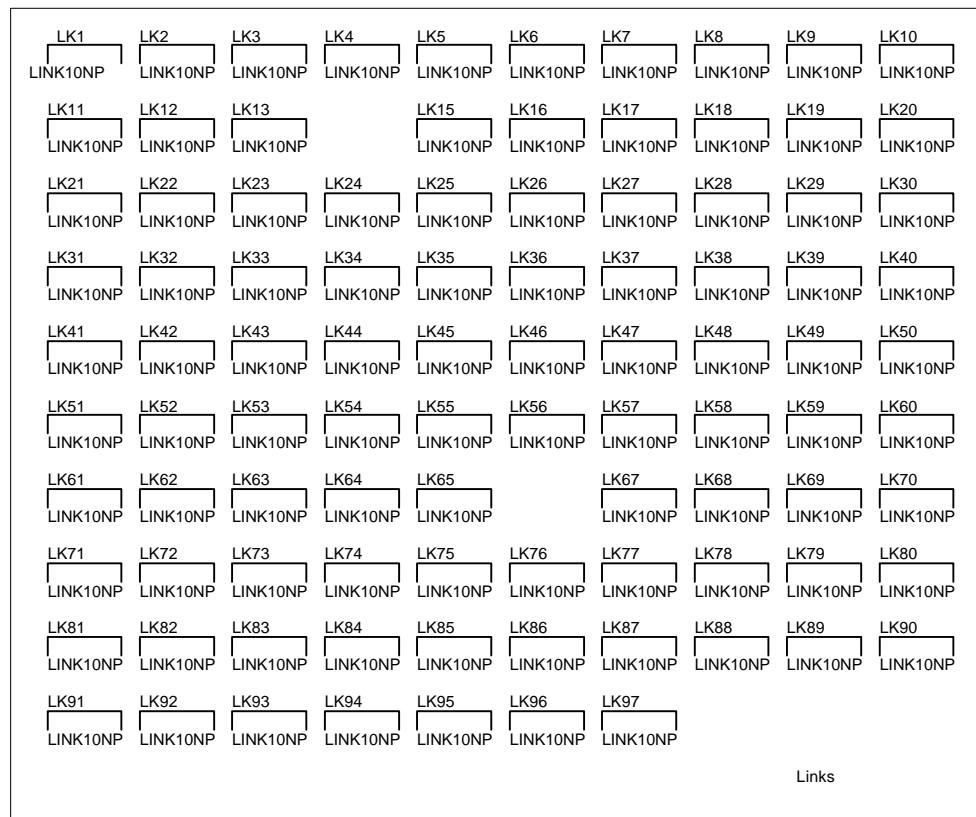


ALPHA 8 CD PLAYER DAC PRINTED CIRCUIT BOARD LAYOUT (underside view)





<Tooling hole



23425 A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB	DRAWING TITLE	CAH		96_1039	25 June 1996	C38 was 100U EL. LK14 removed & R64 added		4	A
	Alpha 7 CD Project Sheet Circuit Diagram	CAH		96_1104	20 Nov 1996	LK66 removed & R65 added		5	
		CAH		97_1037	24-4-97	UPGRADE IMPROVEMENTS		6	
		CAH		97_1069	2-9-97	HDCD LED changed		7	
		Sheet 1 of 4	CAH		97_1101	30-10-97	HDCD LED removed from Alpha 7 CD	L812CT	
	Filename 30-Oct-1997 J:\FILES\PCBS\CIRCUITS\L812C1_8.PRJ	DRAWN BY	CHK BY	ECO No.	DATE	DESCRIPTION OF CHANGE	DRAWING NO.	ISSUE	

