ALPHA 10/10P SERVICE MANUAL

CIRCUIT DESCRIPTION

The mother PCB is common for both the A10 and A10P with the exception of the input mode switch and pre-amp output mute relay which are only fitted to the A10 and the power/standby LED and links to parallel the input connections to what would otherwise be the pre-amp output for use with a mono link. The amplifier is based on the D290/Alpha 9 design but with lower gain, a higher current and higher voltage driver stage and a high power output stage. The current servo has been improved over the Alpha 9 to be output device independent. A micro supervises the amplifier state, switch state and remote control functions. Provision is made for an additional 3rd channel PCB to be added with power supply and protection circuitry access.

Input stage
The input connections are taken either from the pre-amp connector, LK12X, or the external power amp input on the A10 depending on the position of SW1. On the A10P, the input is taken from the external power amp input only with provision for a mono shorting link by having two parallel input connectors. On the A10, there is a mute relay on the pre-amp outputs which are always connected to the pre-amp connector, LK12X.
The signal is passed through a low pass filter with a -3dB point of 550KHz at normal gain and 740KHz at low gain. The gain is selected by SW2. C72 and C74 are d.c. blocking capacitors with a -3dB point of 0.7Hz. A d.c. error correction current is injected into the base of Q19 and 26 from the voltage servo Z3 and 4, to null any voltage offset at the amplifier output.
The input and voltage amplifier stages both run off regulated 15 Volt suppies. The input stage is an NPN differential input, Q18, 19, 25 and 26, with an adjustable current source, Q21 and 28 which sets the quiescent current through all the stages but specifically the output stage. C37, R58, C49 and R66 keep the input stage and voltage amplifier stable. Q52, 53, 54 and 55 form a current mirror to ensure that the differential input is balanced during normal operation.

Voltage Amplifier
The voltage amplifier consists of another differential pair, Q48, 49, 50 and 51. Q48 and 50 are the positive pulling side of the voltage amplifier output and Q49 and 51 pull negative via a current mirror Q8, 9, 10 and 11. The network C12, 36, R74 and 77 give the current mirror gain to compensate for the fact that Q49 and Q51 is only driven from the low-impedance side of the input stage current mirror. The network ensures a fast, symmetrical slew rate of the voltage amplifier stage.
Network C69, 70, R172, 174 ensure the overall stability of the amplifier by reducing the open loop gain at high frequencies.

Second Voltage Amplifier and Driver Stage

Q33, 36, 41 and 44 are the next voltage amplifier stage with feedback applied from the output coupled to their emitters. This stage runs on the full supply rail voltages and splits the level shifts the signal via Q2, 3, 5 and 6 to drive the gates of the output MOSFETs, Q13, 14, 15 and 16. Q2 and 3 simply buffer the inverted signal at the collector of Q36 to drive the low side MOSFETs, Q13 and 15. Q5 and 6 invert the inverted signal at the collector of Q41 and Q44 to drive the high side MOSFETs, Q14 and 16. To ensure that the high side drive is able to swing far enough to ensure the high side MOSFETs can be driven to saturation, a bootstrap, C5, D41 R57, C78 and D22 boosts the driver stage power supply during positive excursions of the amplifier output. This is inactive at low output voltage swings as any distortion induced by the network would be more audible at such levels.

Output Stage

Both the high and low side output devices feature over-current protection, Q17, 23, 24, 30 which clamps the gate of the MOSFET it protects. A high current is permitted through the MOSFET for a few milliseconds after which time the current is throttled down to about 10A peak. A second current sensing network, Q32 and Q35 activates the over-current protection cut-out if the low side is current limiting for too long, a few hundred milliseconds. The current sensing resistors do not reduce the transconductance of the MOSFETs because the driver stage is referenced to the MOSFET source. This means that the current through the driver stage is also sensed but this is insignificant as fas as over-current protection sensing is concerned.

Auto-bias

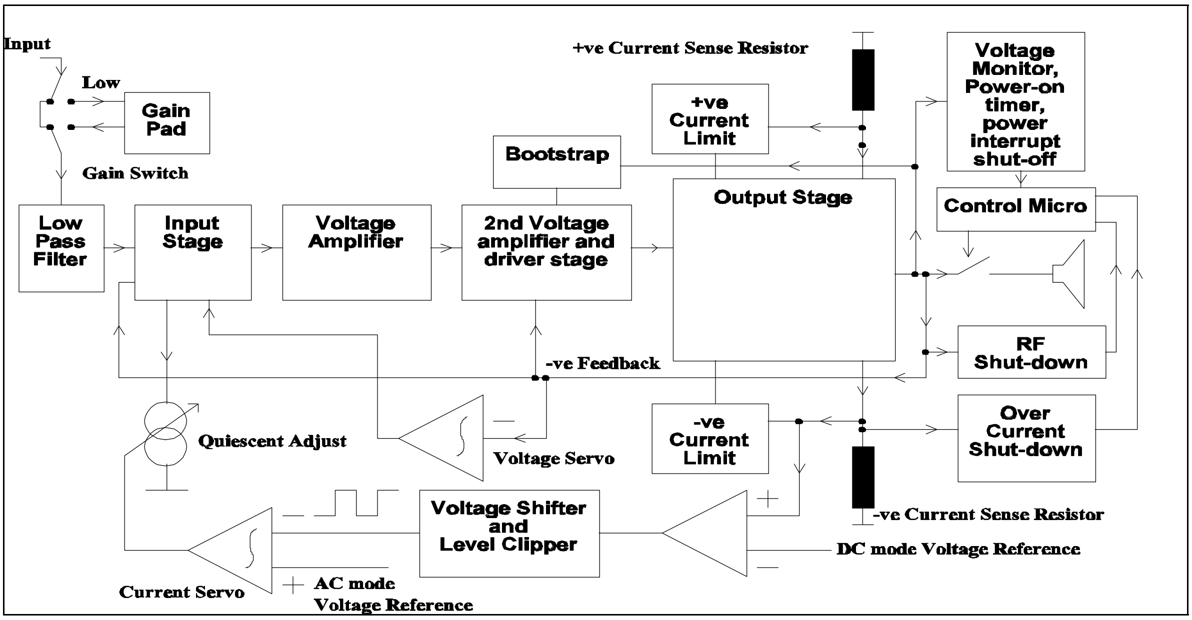


Figure 1 Block Diagram of Power Amplifier

The bias is regulated in two modes, one where these is no signal and one when signal is being split between the high and low side MOSFETs when driving a alternating signal into a load.

Under static conditions, Z8 simply compares the sensed current, which includes the driver stage current, with a d.c. mode reference of 13mV. The sense resistor is 0.11 so this corresponds to a current of about 120mA, some of which is driver current. The current through the MOSFETs is about 80mA at this point. The comparator output is level shifted to drive the integrating current servos Z3 and 4. This adjusts the amplifier current so that, on average, the bias level is held at the reference point.

Under dynamic conditions, the low side drive will definitely be conducting more current than the reference (80mA) for half the signal cycle and will be switched off for the other half. The result is a rectangle wave output from the comparator, Z4.

When the output stage is biassed correctly (class AB operation) the comparator output toggles when the current through the sense resistor for the -ve MOSFET is equal to the d.c. mode static reference level and at the half way point of the signal. The result is a perfect square wave output from the comparator. Under these conditions, the +ve MOSFET is also conducting the same amount of current at this point. If the bias level is lower than the reference, say, at zero (class B operation) then the -ve MOSFET will spend slightly less than half the time conducting at or above the reference level resulting in a rectangle wave output from the comparator at a duty cycle slightly less than 50%. If the bias level is higher than the reference then the -ve MOSFET will spend slightly more than half the time conducting at or above the reference level resulting in a rectangle wave output at a duty cycle slightly more than 50%. The change in duty cycle away from 50% causes the integrator, Z3 and Z4 to adjust the bias level via the bias adjusting transistors, Q22 and 29.

The integrator has a reference, the a.c. mode dynamic reference, for a bias point slightly higher than for a 50% duty cycle. This eliminates the possibility of the bias being slowly throttled due to component tolerance mismatch resulting in a reference which would pull the servo down. A high dynamic bias reference level simply stabilises the bias slightly higher than the static reference but a low dynamic reference causes the bias to drift down to complete throttle.

This system works if the signal is a.c., symmetrical and is not a rectangle wave. Certainly, only a.c. signals are passed

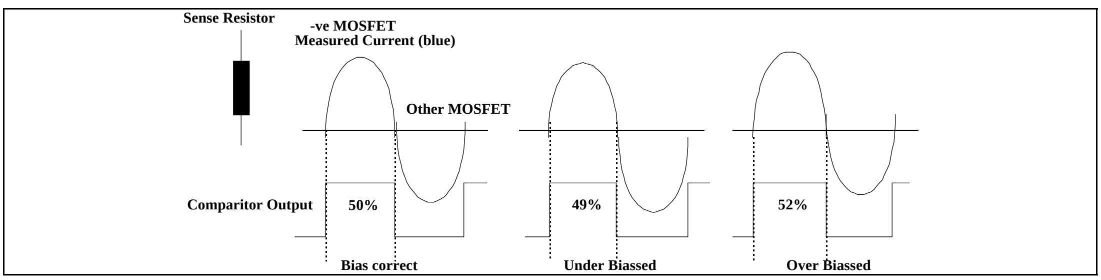


Figure 2 Auto-bias under dynamic conditions

through the amplifier due to C72 and 74 d.c. blocking capacitors and on average the signal will be symmetrical. Any short-term asymmetry will be ironed out by the long time constant of the integrator.

Main Power Supply

The main power supply is regulated in two stages. First it is pre-regulated by Q1 and 4 to about 11V less than the main supply rails. This supply is made available to an option board. The maximum load on these supplies is 150mA for less than 2W dissipation in Q1 and 4. These supplies are then regulated to +/-15V by Z1 and 2. These supplies are used by the input stages of the power amplifiers including any 3^{rd} channel board, the pre-amplifier board and an optional phono amplifier board. The positive voltage regulator, Z1, has a larger heatsink than Z2 because the phono board consumes much more current from the positive rail than from the negative rail.

Control Micro

The control micro performs the following functions...

- ♦ Switches the amplifier on or off,
- ♦ Mutes the speakers #1 or #2 or the pre-amp output,
- ♦ Monitors the heatsink temperature,
- ♦ Monitors RF content of speaker outputs,
- ♦ Handles the remote bus and infra red remote input,
- ♦ Reports fault conditions to the main display and LED,
- ♦ Reads the speaker and power switch positions.

The control micro runs of the constant power supply from standby transformer, TX2. This enables the amplifier to be switched on or off remotely from the remote bus or, in the case of the integrated amplifier, from an infra red remote control. This power supply is intended to supply all the digital circuitry in the amplifier including any option boards. This is supplied at 8V to the other boards where it will be locally regulated to 5V as required.
The micro communicates with the display board via a multi-master I^{2}C bus. This bus is used to report amplifier and power status to the display micro and remote control commands received. It is also possible for the display micro to control functions on the power amplifier board. The option board also uses this bus to receive any remote control commands and communicate with the display micro.
The external remote bus handles raw information from infra red sensors with no demodulating. The remote bus input can be echoed to the output through a buffer circuit. The incoming signal is demodulated by Z13. Raw signal is also sent to the micro interrupt line, pin 12, for assessing the noise on the remote bus. In addition, any d.c. signal on the remote bus is sensed on pin 2 of the micro in when it is not being used as an output to mute the hardware remote echo buffer. The micro must modulate any output it sends to this bus with a carrier (37KHz). The output will drive one or two series infra red LEDs directly.

The list below shows how various fault conditions can be deduced simply from the Power LED behaviour.

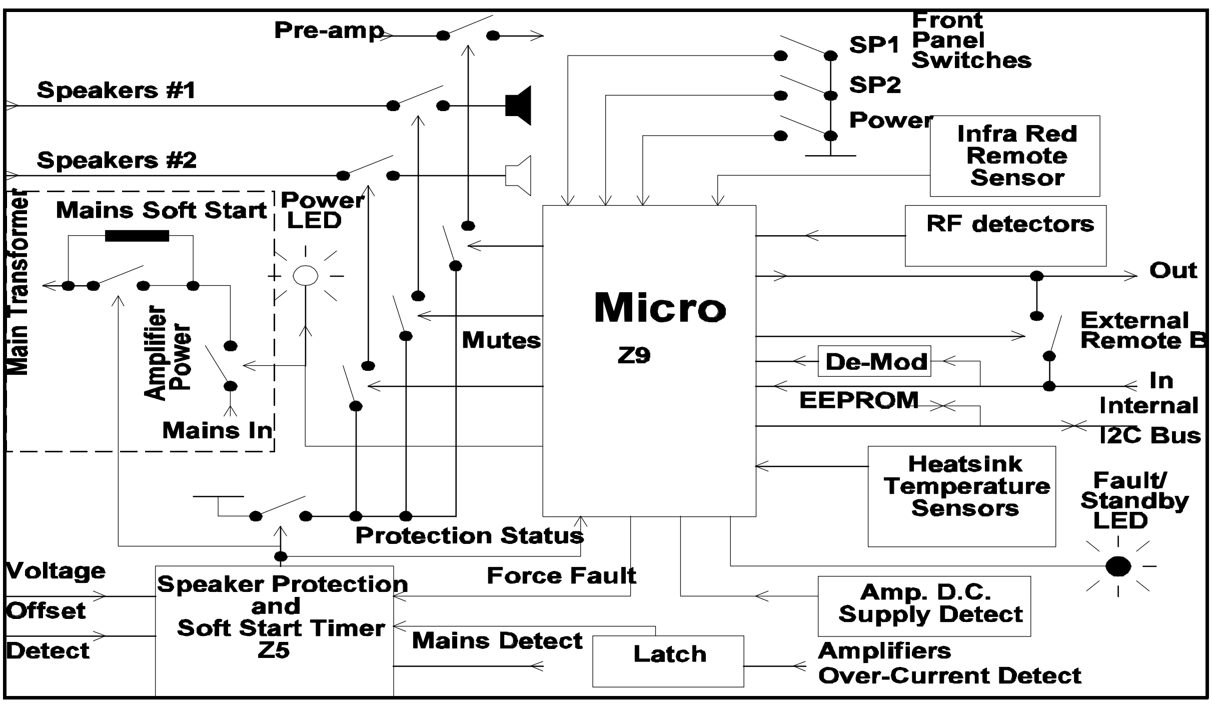


Figure 3 Micro Block Diagram

- On power up, the protection should be engaged. This is checked after 3 seconds on pin 9 of Z9. If it isn't happening, the unit shuts down with flashing red.
- If the protection does not clear after about 16 seconds on power-up the unit shuts down to flashing red. This is usually caused by a voltage offset.
- Any main amp power loss detected on pin 26 after power-up causes a shut down to flashing red.
- Any RF detected on pin 3 results on immediate shut down to flashing red.
- Any protection fault detected after power up on pin 9 results in a flashing amber LED for about 16 seconds max. If it has not cleared by then the unit is shut down to flashing red. Protection faults are caused by voltage offset or over-current. Over-current should latch resulting in a shut down after 16 seconds. Voltage offsets should clear themselves if brief.
- A temperature fault on pin 25 results in the power LED flashing slow amber and can last indefinitely until it clears. When it clears the flashing will speed up until the protection times back in.

ALPHA 10P POWER AMP MAIN BOARD PARTS LIST

Ref No.	Description	Part No
C1	ELST 100U 100V	2N710B
C2	ELST 100U 100V	2N710B
C3	MLC 100N 50V X7R 10% SM	2C410
C4	ELST 100U 100V	2N710B
C5	ELST 100U 100V	2N710B
C6	ELST 22U 63V	2N622
C7	ELST 10U 50V	2N610
C8	ELST 22U 63V	2N622
C9	ELST 10U 50V	2N610
C10	ELST 10U 50V	2N610
C11	ELST 1U0 50V	2N510
C12	PPRO 4N7 63V 5% RA	2D247N
C13	SUPPR CAP 4N7 250V	2K247
C14	PPRO 150P 5% 63V RA	2D115
C15	ELST 10U 50V	2N610
C16	ELST 10U 50V	2N610
C17	ELST 10U 50V	2N610
C18	ELST TNC 10m 63V RA 40mm	2N910A
C19	ELST TNC 10m 63V RA 40mm	2N910A
C20	PPRO 4N7 63V 5% RA	2D247N
C21	PPRO 4N7 63V 5% RA	2D247N
C22	ELST 100U 25V	2N710
C23	ELST 100U 25V	2N710
C24	ELST 100U 25V	2N710
C25	ELST 100U 25V	2N710
C26	ELST 100U 25V	2N710
C27	ELST 100U 25V	2N710
C28	MLC 470P 100V NPO 5% SM	2C147
C29	MLC 470P 100V NPO 5% SM	2C147
C30	MLC 470P 100V NPO 5% SM	2C147
C31	MLC 100N 50V X7R 10% SM	2C410
C32	ELST 22U 63V	2N622
C33	ELST 22U 63V	2N622
C34	MLC 100N 50V X7R 10% SM	2C410
C35	PPRO 150P 5% 63V RA	2D115
C36	PPRO 4N7 63V 5% RA	2D247N
C37	PPRO 1N0 5% 63V RA	2D210
C38	PPRO 680P 63V 5% RA	2D168
C39	PPRO 680P 63V 5% RA	2D168
C40	MLC 10N 50V X7R 10% SM	2C310
C41	MLC 10N 50V X7R 10% SM	2C310
C42	MLC 10N 50V X7R 10% SM	2C310
C43	MLC 10N 50V X7R 10% SM	2C310
C44	SUPPR CAP 4N7 250V	2K247
C45	ELST 10U 50V	2N610
C46	SUPPR CAP 4N7 250V	2K247
C47	SUPPR CAP 4N7 250V	2K247
C48	ELST 3M3 25V	2N833
C49	PPRO 1N0 5% 63V RA	2D210
C50	ELST 1U0 50V	2N510
C51	ELST 220U 16V	2N722
C52	ELST 220U 16V	2N722
C53	ELST 220U 16V	2N722
C54	ELST 220U 16V	2N722
C55	PCRB 100N 100V 10% RA 5mm	2H410
C56	PCRB 100N 100V 10% RA 5mm	2H410
C57	PCRB 100N 100V 10% RA 5mm	2H410
C58	PCRB 100N 100V 10% RA 5mm	2H410
C59	PCRB 100N 100V 10% RA 5mm	2H410
C60	PCRB 100N 100V 10% RA 5mm	2H410
C61	PPRO 100P 63V 5% RA	2D110N

C62	PPRO 100P 63V 5% RA	2D110N
C63	PPRO 150P 5% 63V RA	2D115
C64	PPRO 330P 5% 63V RA	2D133
C65	PPRO 150P 5% 63V RA	2D115
C66	PPRO 330P 5% 63V RA	2D133
C67	PEST 15N 63V 5%	2K315
C68	PEST 15N 63V 5%	2K315
C69	PSTY 56P 160V ENCAP 1PF%	2F056
C70	PSTY 56P 160V ENCAP 1PF%	2F056
C71	ELST NON POLAR 10UF 35V	2U610
C72	ELST NON POLAR 10UF 35V	2U610
C73	ELST NON POLAR 10UF 35V	2U610
C74	ELST NON POLAR 10UF 35V	2U610
C75	PEST 47N 63V 10%	2K347
C76	PEST 47N 63V 10%	2K347
C77	PEST 47N 63V 10%	2K347
C78	PEST 47N 63V 10%	2K347
C79	ELST NON POLAR 10UF 35V	2U610
C80	ELST NON POLAR 10UF 35V	2U610
C81	MLC 22P 100V NPO 5% SM	2C022
C82	MLC 22P 100V NPO 5% SM	2C022
C83	ELST 100U 25V	2N710
C84	MLC 100N 50V X7R 10% SM	2C410
C85	MLC 100N 50V X7R 10% SM	2C410
C86	MLC 100N 50V X7R 10% SM	2C410
C87	MLC 100N 50V X7R 10% SM	2C410
C88	MLC 100N 50V X7R 10% SM	2C410
C89	MLC 100N 50V X7R 10% SM	2C410
C90	ELST 10U 50V	2N610
C91	PPRO 680P 63V 5% RA	2D168
C92	MLC 10N 50V X7R 10% SM	2C310
C93	MLC 1N0 50V X7R 10% SM	2C210
C94	MLC 10N 50V X7R 10% SM	2C310
C95	ELST 10U 50V	2N610
C96	ELST 10U 50V	2N610
C97	MLC 100N 50V X7R 10% SM	2C410
C98	MLC 10N 50V X7R 10% SM	2C310
C99	CERD 10PF 63V 10%	2A010
C100	CERD 10PF 63V 10%	2A010
D1	ZENER 15V 400MW	3C11504
D2	ZENER 15V 400MW	3C11504
D3	ZENER 10V 400MW	3C11004
D4	ZENER 10V 400MW	3C11004

D5	ZENER 10V 400MW	3C11004
D6	ZENER 10V 400MW	3C11004
D7	ZENER 10V 400MW	3C11004
D8	ZENER 10V 400MW	3C11004
D9	ZENER 10V 400MW	3C11004
D10	RECT FIER 6A40 6A 400V	3B6A40
D11	RECT FIER 6A40 6A 400V	3B6A40
D12	RECT FIER 6A40 6A 400V	3B6A40
D13	RECT FIER 6A40 6A 400V	3B6A40
D14	RECT FIER 1N4003F 1A 200V	3B4003
D15	RECT FIER 1N4003F 1A 200V	3B4003
D16	SSDIODE 1N4148 75V	3A4148
D17	SSDIODE 1N4148 75V	3A4148
D18	RECT FIER 1N4003F 1A 200V	3B4003
D19	RECT FIER 1N4003F 1A 200V	3B4003
D20	SSDIODE 1N4148 75V	3A4148
D21	RECT FIER 1N4003F 1A 200V	3B4003
D22	RECT FIER 1N4003F 1A 200V	3B4003
D23	RECT FIER 1N4003F 1A 200V	3B4003
D24	RECT FIER 1N4003F 1A 200V	3B4003
D25	RECT FIER 1N4003F 1A 200V	3B4003
D26	SSDIODE 1N4148 75V	3A4148
D27	RECT FIER 1N4003F 1A 200V	3B4003
D28	SSDIODE 1N4148 75V	3A4148
D29	ZENER 4V7 400MW	3C04704
D30	SSDIODE 1N4148 75V	3A4148
D31	SSDIODE 1N4148 75V	3A4148
D32	SSDIODE 1N4148 75V	3A4148
D33	SSDIODE 1N4148 75V	3A4148
D34	SSDIODE 1N4148 75V	3A4148
D35	SSDIODE 1N4148 75V	3A4148
D36	SSDIODE 1N4148 75V	3A4148
D37	SSDIODE 1N4148 75V	3A4148
D38	SSDIODE 1N4148 75V	3A4148
D39	ZENER 12V 3W SM	3C03C12
D40	SSDIODE 1N4148 75V	3A4148
D41	ZENER 12V 3W SM	3C03C12
D42	SSDIODE 1N4148 75V	3A4148
D43	ZENER 5V6 400MW	3C05604
D44	ZENER 24V 3W SM	3C03C24
D45	RECT FIER 1N4003F 1A 200V	3B4003
D46	SSDIODE 1N4148 75V	3A4148
D47	SSDIODE 1N4148 75V	3A4148

D48	ZENER 4V7 400MW	3C04704
D49	SSDIODE 1N4148 75V	3A4148
D50	ZENER 5V6 400MW	3C05604
F4	FUSE 20mm 2.5A AS	C12256
F4	INS COVER PCB FUSEHOLDER	F022
F4	FUSEHOLDER 20mm PCB	8S004
F5	FUSEHOLDER 20mm PCB	8S004
F5	INS COVER PCB FUSEHOLDER	F022
HS1	HEATSINK CLIP TO220 13/8.6 DC/W	F006
HS1	HEATSINK TO220 13 DEGC/W	F005
HS3	HEATSINK TO220 CLIP 23DEG/W	F004
HS5	CARBON THERMAL PAD	E816MC
HS5	HEATSINK TO247 CL P 2DEGC/W E803HK	E803HK
HS5	HEATSINK CLIP TO220 13/8.6 DC/W	F006
HS7	HEATSINK TO220 CLIP 23DEG/W	F004
HS9	HEATSINK CLIP TO220 13/8.6 DC/W	F006
HS9	CARBON THERMAL PAD	E816MC
HS9	HEATSINK TO247 CL P 2DEGC/W E803HK	E803HK
HS10	HEATSINK TO220 CLIP 23DEG/W	F004
HS11	HEATSINK TO247 CL P 2DEGC/W E803HK	E803HK
HS11	HEATSINK CLIP TO220 13/8.6 DC/W	F006
HS11	CARBON THERMAL PAD	E816MC
HS12	CARBON THERMAL PAD	E816MC
HS12	HEATSINK TO247 CL P 2DEGC/W E803HK	E803HK
HS12	HEATSINK CLIP TO220 13/8.6 DC/W	F006
HS13	HEATSINK TO220 CLIP 23DEG/W	F004
HS14	HEATSINK TO220 CLIP 23DEG/W	F004
L1	INDUCT 2U2 15x25mm AD2018	7D002A
L2	INDUCT 2U2 15x25mm AD2018	7D002A
L3	27mH NDUCTOR	7D327
LED1P	LED RED/GREEN 5MM	3D002
LK9P	JUMPER 4-WAY LEAD	L836CA
O1	OPTO ISOLATOR 4N35	5T4N35
PCB	PRINTED CIRCUIT BOARD	L829PB
Q1	TRANS AUDIO DRIVER N 2SC5248	4B5248
Q2	TRANS AUDIO DRIVER N 2SC5248	4B5248
Q3	TRANS AUDIO DRIVER N 2SC5248	4B5248
Q4	TRANS AUDIO DRIVER P 2SA1964	4B1964
Q5	TRANS AUDIO DRIVER P 2SA1964	4B1964
Q6	TRANS AUDIO DRIVER P 2SA1964	4B1964
Q7	TRANS LF SS P SM BC856B	4A856B
Q8	TRANS LF SS N SM BC846B	4A846B
Q9	TRANS LF SS N SM BC846B	4A846B

Q10	TRANS LF SS N SM BC846B	4A846B
Q11	TRANS LF SS N SM BC846B	4A846B
Q12	TRANS LF SS N SM BC847B	4A847
Q13	TRANS POWER MOSFET IRPF360LC	4K360
Q14	TRANS POWER MOSFET IRPF360LC	4K360
Q15	TRANS POWER MOSFET IRPF360LC	4K360
Q16	TRANS POWER MOSFET IRPF360LC	4K360
Q17	TRANS LF SS N SM BC849B	4A849B
Q18	TRANS LF SS N SM BC849B	4A849B
Q19	TRANS LF SS N SM BC849B	4A849B
Q20	TRANS LF SS N SM BC849B	4A849B
Q21	TRANS LF SS N SM BC849B	4A849B
Q22	TRANS LF SS N SM BC849B	4A849B
Q23	TRANS LF SS N SM BC849B	4A849B
Q24	TRANS LF SS N SM BC849B	4A849B
Q25	TRANS LF SS N SM BC849B	4A849B
Q26	TRANS LF SS N SM BC849B	4A849B
Q27	TRANS LF SS N SM BC849B	4A849B
Q28	TRANS LF SS N SM BC849B	4A849B
Q29	TRANS LF SS N SM BC849B	4A849B
Q30	TRANS LF SS N SM BC849B	4A849B
Q31	TRANS LF SS N SM BC849B	4A849B
Q32	TRANS LF SS N 2SC2547	4A2546
Q33	TRANS LF SS P 2SA1085	4A1085
Q34	TRANS LF SS N SM BC849B	4A849B
Q35	TRANS LF SS N 2SC2547	4A2546
Q36	TRANS LF SS P 2SA1085	4A1085
Q37	TRANS LF SS N SM BC849B	4A849B
Q38	TRANS LF SS P 2SA1085	4A1085
Q39	TRANS LF SS N SM BC849B	4A849B
Q40	TRANS LF SS N 2SC2547	4A2546
Q41	TRANS LF SS N 2SC2547	4A2546
Q42	TRANS LF SS N SM BC847B	4A847
Q43	TRANS LF SS N 2SC2547	4A2546
Q44	TRANS LF SS N 2SC2547	4A2546
Q45	TRANS LF SS N 2SC2547	4A2546
Q46	TRANS LF SS N 2SC2547	4A2546
Q47	TRANS LF SS N 2SC2547	4A2546
Q48	TRANS LF SS P SM BC856B	4A856B
Q49	TRANS LF SS P SM BC856B	4A856B
Q50	TRANS LF SS P SM BC856B	4A856B
Q51	TRANS LF SS P SM BC856B	4A856B
Q52	TRANS LF SS P SM BC859B	4A859B

Q53	TRANS LF SS P SM BC859B	4A859B
Q54	TRANS LF SS P SM BC859B	4A859B
Q55	TRANS LF SS P SM BC859B	4A859B
Q56	TRANS LF SS P SM BC859B	4A859B
Q57	TRANS LF SS P SM BC859B	4A859B
Q58	TRANS LF SS P SM BC859B	4A859B
Q59	TRANS LF SS N SM BC849B	4A849B
Q60	TRANS LF SS P SM BC859B	4A859B
Q61	TRANS LF SS N SM BC849B	4A849B
Q62	TRANS LF SS N SM BC849B	4A849B
R1	RES MF FU W3 1R0 5% NFR25	1G810
R2	RES MF FU W3 1R0 5% NFR25	1G810
R3	RES MF FU W3 1R0 5% NFR25	1G810
R4	RES CF 1W 330R 5%	1E133
R5	RES CF 1W 330R 5%	1E133
R6	RES CF W2 100R 5%	1D110
R7	RES MF FU W3 470R 5% NFR25	1G147
R8	RES MF FU W3 470R 5% NFR25	1G147
R9	RES MF FU W3 220R 5% NFR25	1G122
R10	RES MF FU W3 220R 5% NFR25	1G122
R11	RES MF FU W3 1K0 5% NFR25	1G210
R12	RES MF FU W3 470R 5% NFR25	1G147
R13	RES MF FU W3 470R 5% NFR25	1G147
R14	RES MF FU W3 220R 5% NFR25	1G122
R15	RES MF FU W3 220R 5% NFR25	1G122
R16	RES MF FU W3 1K0 5% NFR25	1G210
R17	RES MF FU W3 470R 5% NFR25	1G147
R18	RES MF FU W3 470R 5% NFR25	1G147
R19	RES MF FU W3 1K0 5% NFR25	1G210
R20	RES MF FU W3 1K0 5% NFR25	1G210
R21	RES MF FU W3 1K0 5% NFR25	1G210
R22	RESISTOR SM W8 220R 1%	1A122A
R23	RESISTOR SM W8 220R 1%	1A122A
R24	RESISTOR SM W8 2K4 1%	1A224A
R25	RESISTOR SM W8 2K4 1%	1A224A
R26	RESISTOR SM W4 22K 2%	1A322
R27	RESISTOR SM W4 22K 2%	1A322
R28	RESISTOR SM W4 10K 2%	1A310
R29	RESISTOR SM W4 1K5 2%	1A215
R30	RESISTOR SM W4 120K 2%	1A412
R31	RESISTOR SM W4 120K 2%	1A412
R32	RESISTOR SM W4 100K 2%	1A410
R33	RESISTOR SM W4 12K 2%	1A312

R34	RESISTOR SM W4 11K 2%	1A311
R35P	RESISTOR SM W4 0R0 2%	1A000
R35	RESISTOR SM W4 1K0 2%	1A210
R36	RESISTOR SM W4 47K 2%	1A347
R37	RESISTOR SM W4 22K 2%	1A322
R38	RESISTOR SM W4 47K 2%	1A347
R39	RESISTOR SM W4 47K 2%	1A347
R40	RESISTOR SM W4 22K 2%	1A322
R41	RESISTOR SM W4 47K 2%	1A347
R42	RESISTOR SM W4 47K 2%	1A347
R43	RESISTOR SM W4 47K 2%	1A347
R44	RESISTOR SM W4 47K 2%	1A347
R45	RESISTOR SM W4 47K 2%	1A347
R46	RESISTOR SM W4 47K 2%	1A347
R47	RESISTOR SM W4 68K 2%	1A368
R48	RESISTOR SM W4 180R 2%	1A118
R49	RES CF W2 100R 5%	1D110
R50	RES MF FU W3 100R 5% NFR25	1G110
R51	RES MF FU W3 10R 5% NFR25	1G010
R52	RES MF FU W3 10R 5% NFR25	1G010
R53	RES CF 2W 220R 5%	1C122
R54	RES MF FU W3 100R 5% NFR25	1G110
R55	RES MF FU W3 10R 5% NFR25	1G010
R56	RES MF FU W3 10R 5% NFR25	1G010
R57	RES CF 2W 220R 5%	1C122
R58	RESISTOR SM W4 47R 2%	1A047
R59	RESISTOR SM W4 1M0 2%	1A510
R60	RESISTOR SM W4 1M0 2%	1A510
R61	RESISTOR SM W4 2M2 2%	1A522
R62	RESISTOR SM W4 1M0 2%	1A510
R63	RESISTOR SM W4 1M0 2%	1A510
R64	RESISTOR SM W4 2M2 2%	1A522
R65	RESISTOR SM W4 220R 2%	1A122
R65P	RESISTOR SM W4 0R0 2%	1A000
R66	RESISTOR SM W4 47R 2%	1A047
R67	RESISTOR SM W4 47R 2%	1A047
R68	RESISTOR SM W4 10K 2%	1A310
R69	RESISTOR SM W4 10K 2%	1A310
R70	RESISTOR SM W4 10K 2%	1A310
R71	RESISTOR SM W4 4K7 2%	1A247
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 1K0 2%	1A210
R76	RESISTOR SM W4 100R 2%	1A110
R77	RESISTOR SM W4 100R 2%	1A110
R78	RESISTOR SM W4 100R 2%	1A110
R79	RESISTOR SM W4 1K0 2%	1A210
R80P	RESISTOR SM W4 0R0 2%	1A000
R80	RESISTOR SM W4 10K 2%	1A310
R81	RESISTOR SM W4 180R 2%	1A118
R82	RESISTOR SM W4 180R 2%	1A118
R83P	RESISTOR SM W4 0R0 2%	1A000
R83	RESISTOR SM W4 100R 2%	1A110
R84	RES MO 3W 5% 0R22 KOASPR3	1Q922
R85	RES MO 3W 5% 0R22 KOASPR3	1Q922
R86	RES MO 3W 5% 0R22 KOASPR3	1Q922
R87	RES MO 3W 5% 0R22 KOASPR3	1Q922
R88	RES MO 3W 5% 0R22 KOASPR3	1Q922
R89	RES MO 3W 5% 0R22 KOASPR3	1Q922
R90	RES MO 3W 5% 0R22 KOASPR3	1Q922
R91	RES MO 3W 5% 0R22 KOASPR3	1Q922
R92	RESISTOR SM W4 47R 2%	1A047
R93	RESISTOR SM W4 47R 2%	1A047
R94	RESISTOR SM W4 150R 2%	1A115
R95	RESISTOR SM W4 47R 2%	1A047
R96	RESISTOR SM W4 47R 2%	1A047
R97	RESISTOR SM W4 150R 2%	1A115
R98	RESISTOR SM W4 27K 2%	1A327
R99	RESISTOR SM W4 470R 2%	1A147
R100	RESISTOR SM W4 4K7 2%	1A247
R101	RESISTOR SM W4 470R 2%	1A147
R102	RESISTOR SM W4 68K 2%	1A368
R103	RESISTOR SM W4 68K 2%	1A368
R104	RESISTOR SM W4 120K 2%	1A412
R105	RESISTOR SM W4 68K 2%	1A368
R106	RESISTOR SM W4 68K 2%	1A368
R107	RESISTOR SM W4 120K 2%	1A412
R108	RESISTOR SM W4 1K2 2%	1A212
R109	RESISTOR SM W4 1K2 2%	1A212
R110	RES CF 1W 1R5 5%	1E815
R111	RES CF 1W 1R5 5%	1E815
R112	RES CF 1W 5R6 5%	1E856
R113	RES CF 1W 5R6 5%	1E856
R114	RESISTOR SM W4 47R 2%	1A047
R115	RESISTOR SM W4 1K5 2%	1A215

R116	RESISTOR SM W4 10K 2%	1A310
R117	RESISTOR SM W4 1K5 2%	1A215
R118	RESISTOR SM W4 33K 2%	1A333
R119	RESISTOR SM W4 33K 2%	1A333
R120	RESISTOR SM W4 33K 2%	1A333
R121	RESISTOR SM W4 33K 2%	1A333
R122	RESISTOR SM W4 33K 2%	1A333
R123	RESISTOR SM W4 33K 2%	1A333
R124	RESISTOR SM W4 33K 2%	1A333
R125	RESISTOR SM W4 33K 2%	1A333
R126	RESISTOR SM W4 33K 2%	1A333
R127	RESISTOR SM W4 33K 2%	1A333
R128	RESISTOR SM W4 22K 2%	1A322
R129	RESISTOR SM W4 220R 2%	1A122
R130	RESISTOR SM W4 220R 2%	1A122
R131	RESISTOR SM W4 220R 2%	1A122
R132	RESISTOR SM W4 220R 2%	1A122
R133	RESISTOR SM W4 220R 2%	1A122
R134	RESISTOR SM W4 220R 2%	1A122
R135	RESISTOR SM W4 220R 2%	1A122
R136	RESISTOR SM W4 220R 2%	1A122
R137	RESISTOR SM W4 100K 2%	1A410
R138	RES MF FU W3 220R 5% NFR25	1G122
R139	RES MF FU W3 100R 5% NFR25	1G110
R140	RES MF FU W3 100R 5% NFR25	1G110
R141	RES MF FU W3 220R 5% NFR25	1G122
R142	RESISTOR SM W4 4K7 2%	1A247
R143	RES MF FU W3 220R 5% NFR25	1G122
R144	RES MF FU W3 100R 5% NFR25	1G110
R145	RES MF FU W3 100R 5% NFR25	1G110
R146	RES MF FU W3 220R 5% NFR25	1G122
R147	RESISTOR SM W4 470R 2%	1A147
R148	RES MF FU W3 1K0 5% NFR25	1G210
R149	RES MF FU W3 1K0 5% NFR25	1G210
R150	RES MF FU W3 470R 5% NFR25	1G147
R151	RES MF FU W3 1K0 5% NFR25	1G210
R152	RES MF FU W3 1K0 5% NFR25	1G210
R153	RES MF FU W3 470R 5% NFR25	1G147
R154	RESISTOR SM W4 2K2 2%	1A222
R155	RESISTOR SM W4 2K2 2%	1A222
R156	RESISTOR SM W4 2K2 2%	1A222
R157	RESISTOR SM W4 2K2 2%	1A222
R158	RESISTOR SM W4 1K5 2%	1A215

R159	RESISTOR SM W4 1K5 2%	1A215
R160	RESISTOR SM W4 100R 2%	1A110
R161	RESISTOR SM W4 100R 2%	1A110
R162	RESISTOR SM W4 100R 2%	1A110
R163	RESISTOR SM W4 100R 2%	1A110
R164	RESISTOR SM W8 560R 1%	1A156A
R165	RESISTOR SM W8 560R 1%	1A156A
R166	RESISTOR SM W4 2K2 2%	1A222
R167	RESISTOR SM W4 2K2 2%	1A222
R168	RESISTOR SM W4 220R 2%	1A122
R169	RESISTOR SM W4 220R 2%	1A122
R170	RES MF W4 22K 1%	1H322
R171	RES MF W4 22K 1%	1H322
R172	RESISTOR SM W4 10R 2%	1A010
R173	RESISTOR SM W4 470R 2%	1A147
R174	RESISTOR SM W4 10R 2%	1A010
R175	RESISTOR SM W4 4K7 2%	1A247
R176	RESISTOR SM W4 470K 2%	1A447
R177	RESISTOR SM W4 470K 2%	1A447
R178	RESISTOR SM W4 470K 2%	1A447
R179	RESISTOR SM W4 470K 2%	1A447
R180	RESISTOR SM W8 47K 1%	1A347A
R181	RESISTOR SM W8 47K 1%	1A347A
R182	RESISTOR SM W8 2K7 1%	1A227A
R183	RESISTOR SM W8 2K7 1%	1A227A
R184	RESISTOR SM W4 100K 2%	1A410
R185	RESISTOR SM W4 100K 2%	1A410
R186	RESISTOR SM W4 120K 2%	1A412
R187	RESISTOR SM W8 8K2 1%	1A282A
R188	RESISTOR SM W8 8K2 1%	1A282A
R189	RESISTOR SM W4 27K 2%	1A327
R190	RESISTOR SM W4 1M0 2%	1A510
R191	RESISTOR SM W4 27K 2%	1A327
R192	RESISTOR SM W4 470K 2%	1A447
R193	RESISTOR SM W4 22R 2%	1A022
R194	RESISTOR SM W4 22R 2%	1A022
R195	RESISTOR SM W4 22R 2%	1A022
R196	RESISTOR SM W4 22R 2%	1A022
R197	RESISTOR SM W4 100K 2%	1A410
R198	RESISTOR SM W4 4K7 2%	1A247
R199	RES MF FU W3 1R0 5% NFR25	1G810
R200	RES CF 1W 2K7 5%	1E227
R201	RESISTOR SM W4 22K 2%	1A322

R202	RESISTOR SM W4 100K 2%	1A410
R203	RESISTOR SM W4 2K4 2%	1A224
R204	RESISTOR SM W4 10K 2%	1A310
R205	RES CF 1W 5% 6K8	1E268
R206	RESISTOR SM W4 100K 2%	1A410
R207	RESISTOR SM W4 100K 2%	1A410
R208	RESISTOR SM W4 470R 2%	1A147
R209	RESISTOR SM W4 4K7 2%	1A247
R210	RESISTOR SM W4 1K5 2%	1A215
R211	RESISTOR SM W4 4K7 2%	1A247
R212	RESISTOR SM W4 1K5 2%	1A215
R213	RESISTOR SM W4 47R 2%	1A047
R214	RESISTOR SM W4 4K7 2%	1A247
R215	RESISTOR SM W4 4K7 2%	1A247
R216	RESISTOR SM W4 1K0 2%	1A210
R217	RESISTOR SM W4 10K 2%	1A310
R218P	RESISTOR SM W4 220R 2%	1A122
R218	RESISTOR SM W4 120K 2%	1A412
R219	RESISTOR SM W4 10K 2%	1A310
R220	RESISTOR SM W4 100K 2%	1A410
R221	RES CF 1W 470R 5%	1E147
R222	RESISTOR SM W4 100K 2%	1A410
R223	RESISTOR SM W4 10K 2%	1A310
R224	RES MF FU W3 10R 5% NFR25	1G010
R225	RESISTOR SM W4 10K 2%	1A310
R226	RESISTOR SM W4 10K 2%	1A310
R227	RES MF W4 10R 1%	1H010
R228	RES CF 1W 2K7 5%	1E227
R229	RES CF 1W 2K7 5%	1E227
R230	RESISTOR SM W4 47K 2%	1A347
R231	RESISTOR SM W4 47K 2%	1A347
R232	RESISTOR SM W4 1K0 2%	1A210
R233	RESISTOR SM W4 3K3 2%	1A233
R234	RESISTOR SM W4 3K3 2%	1A233
R235	RESISTOR SM W4 100K 2%	1A410
R236	RESISTOR SM W4 10K 2%	1A310
R237	RESISTOR SM W4 1K5 2%	1A215
R238	RESISTOR SM W4 1K8 2%	1A218
R239	RESISTOR SM W4 1K8 2%	1A218
RLY1	RLY SPST 24V SPKR	A213
RLY2	RLY SPST 24V SPKR	A213
RLY3	RLY SPST 24V SPKR	A213
RLY4	RLY SPST 24V SPKR	A213

RLY6	RELAY MA NS 24V 10A	A212
RLY7	RELAY MAINS DPDT 12V 5A	A211
SH1	MAINS EMC SHIELD	E5402
SH2	PHONO EMC SHIELD	E808MC
SK1	PHONO SKT 4-WAY EMC GOLD	8D225
SK2	CAMCON BIND NG POST 4WAY GOLD	8D417G
SK3	CAMCON BIND NG POST 4WAY GOLD	8D417G
SK4	IEC MA NS CONN PCB NS PX	8A001
SK5	STEREO JACK PCB	8D301
SK6	22-WAY FFC CONN	8K8022
SK7	CAGE CLAMP 16A 3 WAY	8Q001
SK8	CAGE CLAMP 16A 4 WAY	8Q002
SK9	CAGE CLAMP 16A 1 WAY ARC003-236	8Q003
SK10	MIN JACK DUAL 3.5mm HSJ1002-01-1020	8D302
SKT1	JST 6 WAY HEADER	8K709
SW2	SW PUSH 2PCO	A1008
SW3	SW PUSH 2PCO	A1008
SW4	SW PUSH 2PCO	A1008
SW5	SW PUSH 2PCO	A1008
TH2	THERMISTOR MAINS SURGE	1T004
TH3	THERMISTOR MAINS SURGE	1T004

TX1	ALPHA10 AMP POWER TX 230V	L831TX
TX2	ALPHA 10 AMP 230V/115V TRANSFORMER	L825TX
X1	CER RESON 4.00MHz	7W005
Y1	TX WIRE RESTRAINT	F185
Y2	TX WIRE RESTRAINT	F185
Z1	IC VREG POS LM317T	5D317T
Z2	IC VREG POS LM337T	5D337
Z3	IC AUDIO SM DUAL TL072	5B072D
Z4	IC AUDIO SM DUAL TL072	5B072D
Z5	IC COMPARITOR TA7317P	5M7317
Z6	IC VREG POS 7805	5D7805
Z7	IC VREG POS 7808	5D7808
Z8	IC COMPARITOR SM DUAL LM393A	5M393AD
Z9	IC SOCKET 28 NARROW	8S028N
Z9	IC CMOS MICRO HT48R30 28-DIP-B-0	5B483028
Z10	IC THERMOSTAT SM LM56CIM	5M56
Z11	IC THERMOSTAT SM LM56CIM	5M56
Z12	IC CMOS EPROM 24C02 SM	5G2402
Z13	IC COMPARITOR SM DUAL LM393A	5M393AD

ALPHA 10 PREAMPLIFIER BOARD PARTS LIST

Ref No.	Description	Part No.
C1	ELST NON POLAR 10UF 35V	2U610
C2	ELST 22U 63V	2N622
C3	ELST NON POLAR 10UF 35V	2U610
C4	ELST 22U 63V	2N622
C8	MLC 1N0 50V X7R 10% SM	2C210
C9	MLC 1N0 50V X7R 10% SM	2C210
C10	PPRO 680P 5% 63V RA	2D168
C11	PPRO 680P 5% 63V RA	2D168
C13	MLC 47P 100V NPO 5% SM	2C047
C14	MLC 47P 100V NPO 5% SM	2C047
C15	MLC 47P 100V NPO 5% SM	2C047
C16	MLC 47P 100V NPO 5% SM	2C047
C17	MLC 47P 100V NPO 5% SM	2C047
C18	MLC 47P 100V NPO 5% SM	2C047
C19	MLC 47P 100V NPO 5% SM	2C047
C20	MLC 47P 100V NPO 5% SM	2C047
C21	MLC 47P 100V NPO 5% SM	2C047
C22	MLC 47P 100V NPO 5% SM	2C047
C23	MLC 47P 100V NPO 5% SM	2C047

C24	MLC 47P 100V NPO 5% SM	2C047
C25	MLC 47P 100V NPO 5% SM	2C047
C26	MLC 47P 100V NPO 5% SM	2C047
C31	ELST 22U 63V	2N622
C32	ELST 22U 63V	2N622
C33	MLC 1N0 50V X7R 10% SM	2C210
C34	MLC 1N0 50V X7R 10% SM	2C210
C35	MLC 1N0 50V X7R 10% SM	2C210
C36	MLC 1N0 50V X7R 10% SM	2C210
C37	MLC 1N0 50V X7R 10% SM	2C210
C38	MLC 1N0 50V X7R 10% SM	2C210
D1	ZENER 6V8 400MW	3C06804
D2	ZENER 6V8 400MW	3C06804
LK1	JUMPER 8-WAY LEAD FOR A10 PRE-AMP	L823CA
LK2	JUMPER 8-WAY LEAD FOR A10 PRE-AMP	L832CA
PCB	PRINTED C RCUIT BOARD	L832PB
PL6	16 WAY DIL P N HEADER	8K6316
R1	RESISTOR SM W4 1K0 2%	1A210
R2	RESISTOR SM W4 1K0 2%	1A210
R3	RESISTOR SM W4 56R 2%	1A056

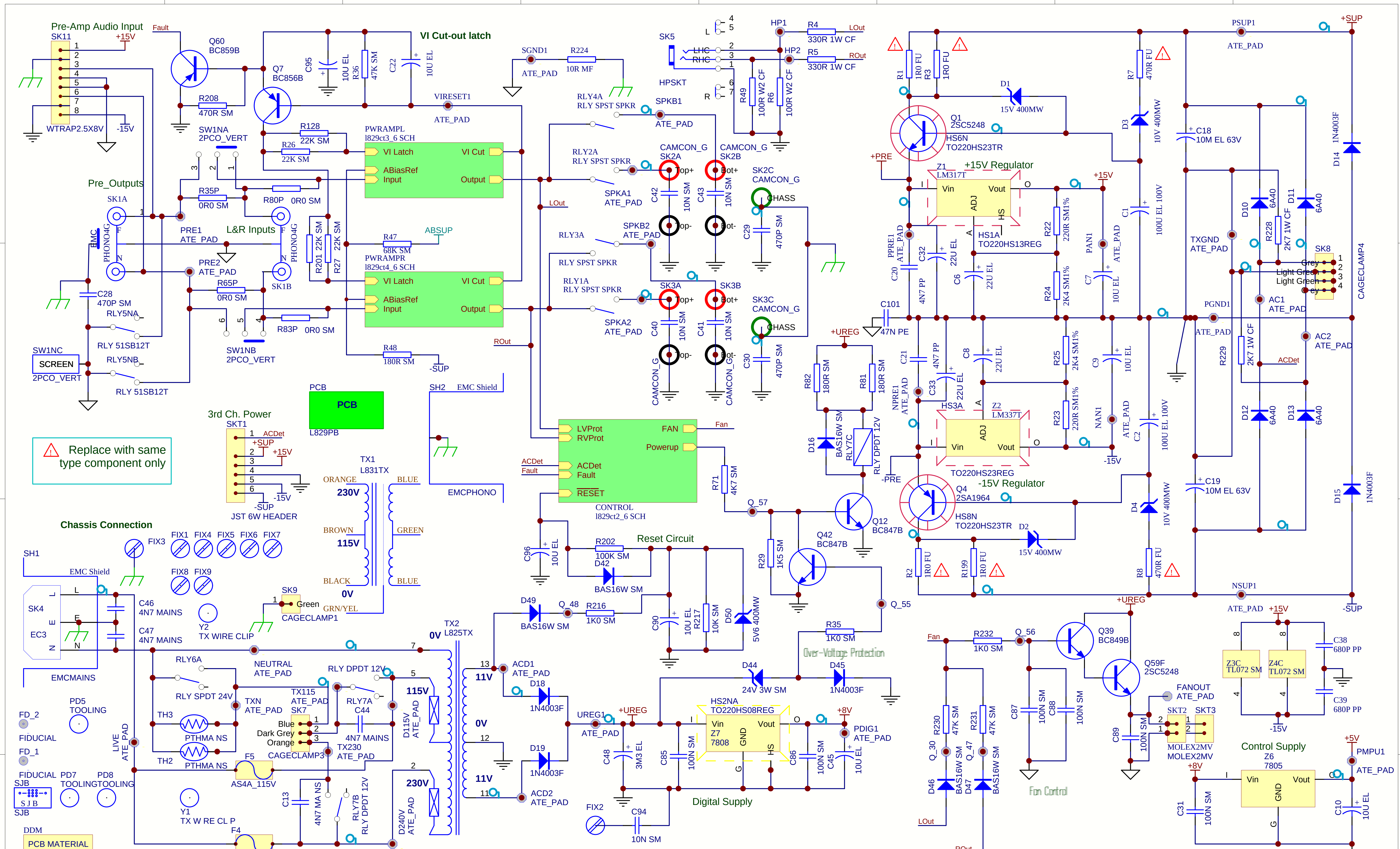
R4	RESISTOR SM W4 56R 2%	1A056
R5	RESISTOR SM W4 1K8 2%	1A218
R6	RESISTOR SM W4 100K 2%	1A410
R7	RESISTOR SM W4 100K 2%	1A410
R14	RESISTOR SM W4 10K 2%	1A310
R17	RESISTOR SM W4 1K0 2%	1A210
R18	RESISTOR SM W4 1K0 2%	1A210
R19	RESISTOR SM W4 1K0 2%	1A210
R20	RESISTOR SM W4 1K0 2%	1A210
R21	RESISTOR SM W4 1K0 2%	1A210
R22	RESISTOR SM W4 1K0 2%	1A210
R23	RESISTOR SM W4 1K0 2%	1A210
R24	RESISTOR SM W4 1K0 2%	1A210
R25	RESISTOR SM W4 1K0 2%	1A210
R26	RESISTOR SM W4 1K0 2%	1A210
R27	RESISTOR SM W4 1K0 2%	1A210
R28	RESISTOR SM W4 1K0 2%	1A210
R29	RESISTOR SM W4 1K0 2%	1A210
R30	RESISTOR SM W4 1K0 2%	1A210
R31	RESISTOR SM W4 1K0 2%	1A210
R32	RESISTOR SM W4 1K0 2%	1A210
R33	RESISTOR SM W4 1K0 2%	1A210
R34	RESISTOR SM W4 1K0 2%	1A210
R38	RESISTOR SM W4 100K 2%	1A410
R39	RESISTOR SM W4 100K 2%	1A410
R40	RESISTOR SM W4 100K 2%	1A410
R41	RESISTOR SM W4 100K 2%	1A410
R44	RESISTOR SM W4 22K 2%	1A322
R45	RESISTOR SM W4 22K 2%	1A322
R46	RESISTOR SM W4 22K 2%	1A322
R47	RESISTOR SM W4 22K 2%	1A322
R48	RESISTOR SM W4 22K 2%	1A322
R49	RESISTOR SM W4 22K 2%	1A322
R50	RESISTOR SM W4 22K 2%	1A322
R51	RESISTOR SM W4 22K 2%	1A322
R52	RESISTOR SM W4 22K 2%	1A322
R53	RESISTOR SM W4 22K 2%	1A322
R54	RESISTOR SM W4 22K 2%	1A322
R55	RESISTOR SM W4 22K 2%	1A322
R56	RESISTOR SM W4 22K 2%	1A322
R57	RESISTOR SM W4 22K 2%	1A322

R58	RESISTOR SM W4 47R 2%	1A047
R59	RESISTOR SM W4 47R 2%	1A047
R60	RESISTOR SM W4 47R 2%	1A047
R61	RESISTOR SM W4 47R 2%	1A047
R62	RESISTOR SM W4 47R 2%	1A047
R63	RESISTOR SM W4 47R 2%	1A047
R64	RESISTOR SM W8 1K5 1%	1A215A
R65	RESISTOR SM W8 1K5 1%	1A215A
R66	RESISTOR SM W8 6K8 1%	1A268A
R67	RESISTOR SM W8 6K8 1%	1A268A
R68	RESISTOR SM W4 100K 2%	1A410
R69	RESISTOR SM W4 100K 2%	1A410
R70	RESISTOR SM W4 100K 2%	1A410
R71	RESISTOR SM W4 100K 2%	1A410
R72	RESISTOR SM W4 100K 2%	1A410
R73	RESISTOR SM W4 100K 2%	1A410
R74	RESISTOR SM W4 100K 2%	1A410
R75	RESISTOR SM W4 100K 2%	1A410
R76	RESISTOR SM W4 100K 2%	1A410
R77	RESISTOR SM W4 100R 2%	1A110
R80	RESISTOR SM W4 22K 2%	1A322
R81	RESISTOR SM W4 22K 2%	1A322
SK1	PHONO SKT 4-WAY EMC GOLD	8D225
SK2	PHONO SKT 4-WAY EMC GOLD	8D225
SK3	PHONO SKT 4-WAY EMC GOLD	8D225
SK4	PHONO SKT 4-WAY EMC GOLD	8D225
SK5	PHONO SKT 2-WAY EMC GOLD	8D226
SK7	22-WAY FFC CONN	8K8022
SK8	32-WAY FFC CONN VERT	8K8032
Z3	IC OPAMP DUAL SM OPA2134PA	5B2134
Z4	IC OPAMP DUAL SM OPA2134PA	5B2134
Z6	IC HCMOS SM MAX 4051	5K4051M
Z7	IC HCMOS SM MAX 4051	5K4051M
Z8	IC HCMOS SM MAX 4051	5K4051M
Z9	IC HCMOS SM MAX 4051	5K4051M
Z10	IC HCMOS SM MAX 4051	5K4051M
Z11	IC HCMOS SM MAX 4051	5K4051M
Z12	IC AUDIO SM DUAL TL072	5B072D
Z13	IC AUDIO SM DUAL TL072	5B072D
Z14	IC AUDIO DUAL VOLPOT LM1972	5C1972

ALPHA 10 DISPLAY BOARD PARTS LIST

Ref No.	Description	Part No.
C1	CERD 100N 63V 20% RA	2A410
C2	ELST 470U 25V RA	2N747
C3	CERD 100N 63V 20% RA	2A410
C4	CERD 100N 63V 20% RA	2A410
C5	CERD 100N 63V 20% RA	2A410
C6	ELST 220U 16V	2N722
C8	CERD 100N 63V 20% RA	2A410
D1	SSDIODE 1N4148 75V	3A4148
D2	SSDIODE 1N4148 75V	3A4148
D3	SSDIODE 1N4148 75V	3A4148
D4	SSDIODE 1N4148 75V	3A4148
D5	SSDIODE 1N4148 75V	3A4148
D6	SSDIODE 1N4148 75V	3A4148
D7	SSDIODE 1N4148 75V	3A4148
D8	SSDIODE 1N4148 75V	3A4148
D9	SSDIODE 1N4148 75V	3A4148
D10	SSDIODE 1N4148 75V	3A4148
D11	SSDIODE 1N4148 75V	3A4148
L831PB	PRINTED C RCUIT BOARD	L831PB
LED1	LED GREEN 5MM	3D001
LED2	LED GREEN 5MM	3D001
LED3	LED GREEN 5MM	3D001
LED4	LED GREEN 5MM	3D001
LED5	LED GREEN 5MM	3D001
LED6	LED GREEN 5MM	3D001
LED7	LED GREEN 5MM	3D001
LED100	LED RED/GREEN 5MM	3D002
LK1	LINK PLA N 10mm	1X010A
LK3	JUMPER 3 WAY x 125mm	L815CA
M1	NORITAKE ITRON CU20025RCPB-U1J	B1010
Q1	TRANS LF SS P BC557B	4A557
Q2	TRANS MOSFET SW ZVNL120A	4K120
R1	RES MF FU W3 3R3R 5% NFR25	1G833
R2	RES MF W4 150R 1%	1H115
R3	RES MF W4 150R 1%	1H115
R4	RES MF W4 150R 1%	1H115
R5	RES MF W4 150R 1%	1H115

R6	RES MF W4 150R 1%	1H115
R7	RES MF W4 150R 1%	1H115
R8	RES MF W4 150R 1%	1H115
R9	RES MF W4 4K7 1%	1H247
R10	RES MF W4 4K7 1%	1H247
R11	RES MF W4 10K 1%	1H310
R12	RES MF W4 10K 1%	1H310
R13	RES MF W4 150R 1%	1H115
R14	RES MF W4 330R 1%	1H133
R15	RES MF W4 4K7 1%	1H247
R16	RES MF W4 4K7 1%	1H247
R17	RES MF W4 10K 1%	1H310
R18	RES MF W4 100R 1%	1H110
R19	RES MF W4 100R 1%	1H110
R20	RES MF W4 100K 1%	1H410
R21	RES MF W4 100R 1%	1H110
R22	RES MF W4 100K 1%	1H410
RP1	RES NETWORK 100Kx8 COMMON	1V410
RX1	REMOTE CONTROL RECEIVER SBX1610-62 38KHZ	B2103
SK1	22-WAY FFC CONN HORIZ	8K8122
SK2	22-WAY FFC CONN HORIZ	8K8122
SK3	EC16B2414	A1211
SW1	TACT SWITCH 2-P N LOW PROF	A1504
SW2	TACT SWITCH 2-P N LOW PROF	A1504
SW3	TACT SWITCH 2-P N LOW PROF	A1504
SW4	TACT SWITCH 2-P N LOW PROF	A1504
SW5	TACT SWITCH 2-P N LOW PROF	A1504
SW6	TACT SWITCH 2-P N LOW PROF	A1504
SW7	TACT SWITCH 2-P N LOW PROF	A1504
SW8	TACT SWITCH 2-P N LOW PROF	A1504
SW9	TACT SWITCH 2-P N LOW PROF	A1504
SW10	TACT SWITCH 2-P N LOW PROF	A1504
SW11	TACT SWITCH 2-P N LOW PROF	A1504
X1	CER RESON 4 00MHz	7W005
Z1	IC VREG POS 7805	5D7805
Z2	40 PIN IC SOCKET	8S040
Z2	IC CMOS MICRO PIC16C65	5H16C65



PCB MATERIAL
FR4, 2 OZ Cu

A2 Horizontal Paper Marker

Drilling Detail

A2 Vertical Paper Marker

Drilling Detail Issue Box

Update Box

BARCODE LABEL

Photo Strip

Kit Masks:
1) For Integrated Amp use...
N, F inclusive
2) For Power Amp use...
P,S,F inclusive

Designators ending in...
N - For integrated amp only,
P - For power amp only,
R - For power amp with remote only,
S - For power amp with no remote only,
X - Other end of wire link.

DRAWING TITLE
Alpha 10 Amp Main

Circuit Diagram

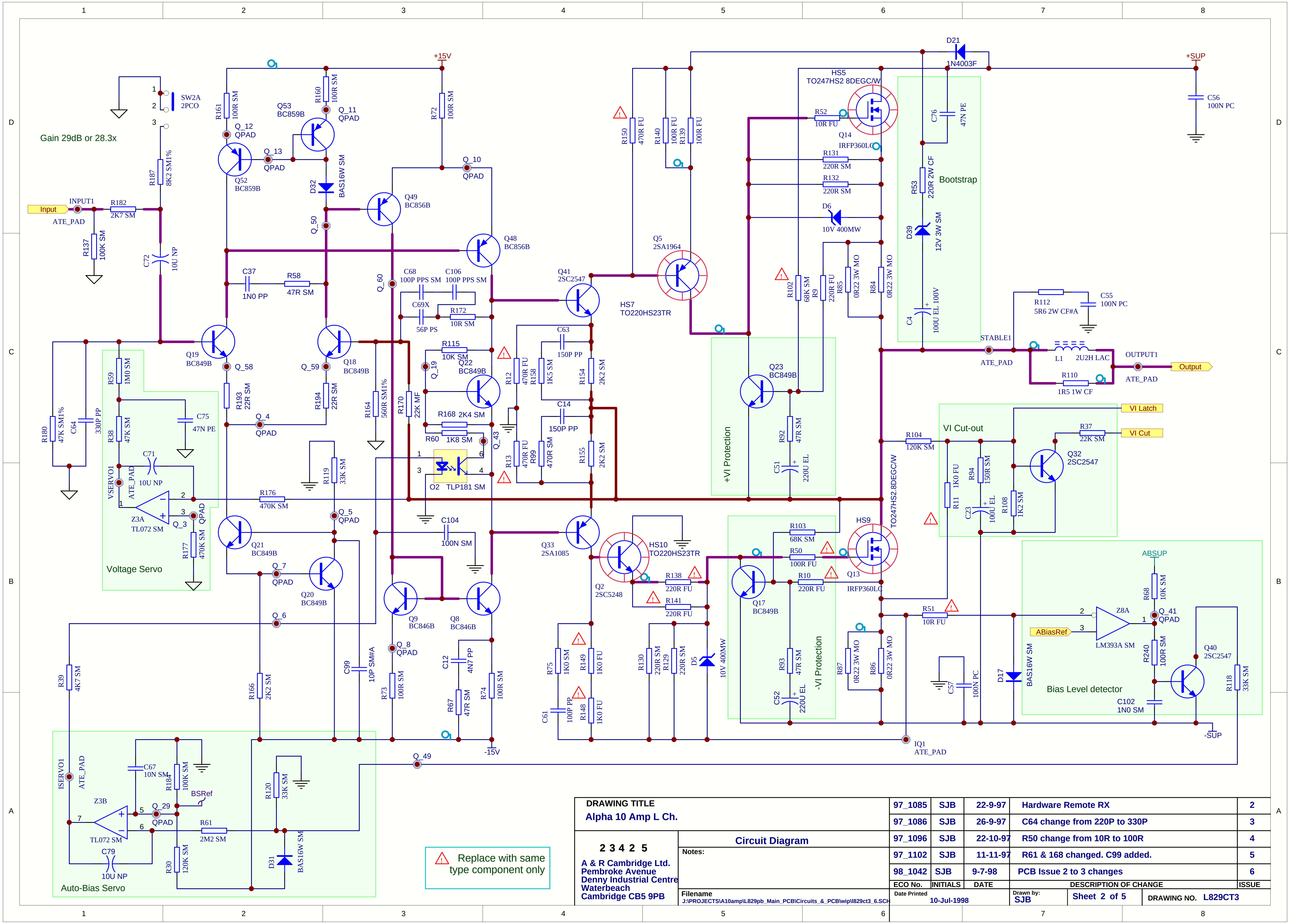
2 3 4 2 5

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

Notes:

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
97_1085	SJB	22-9-97	Hardware Remote RX	2
97_1086	SJB	26-9-97	C6 & C8 change from 10u to 22u	3
97_1096	SJB	22-10-97	No Change	4
97_1102	SJB	11-11-97	HS2N change to larger size	5
98_1042	SJB	9-7-98	PCB Issue 2 to 3 changes	6

Filename J:\PROJECTS\A10amp\L829pb_Main_PCB\Circuits_&_PCB\wip\L829ct1_6.prj
Date Printed 10-Jul-1998
Drawn by: SJB
Sheet 1 of 5
DRAWING NO. L829CT1



DRAWING TITLE
Alpha 10 Amp L Ch.

2 3 4 2 5

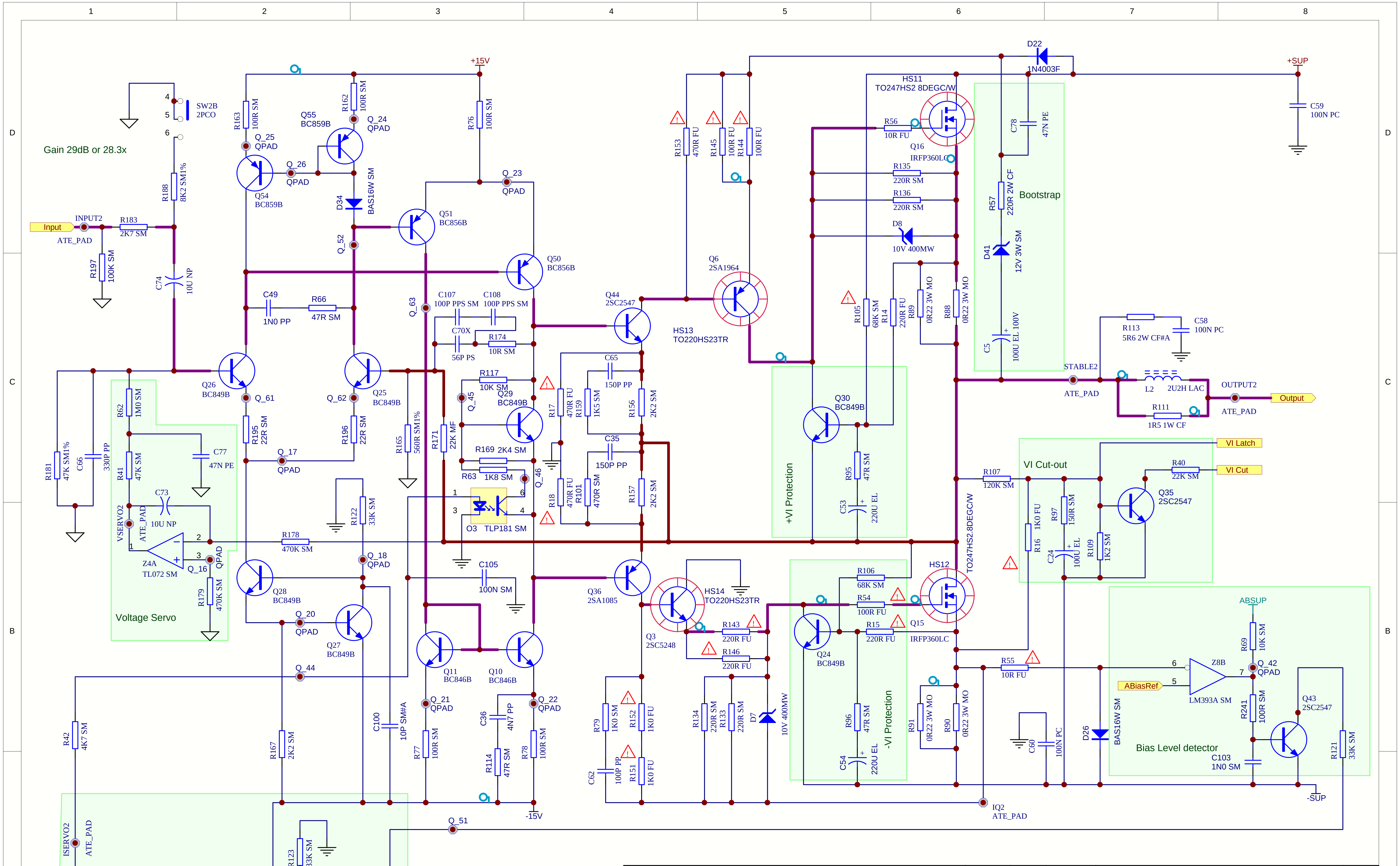
Circuit Diagram

Notes:

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

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
97_1085	SJB	22-9-97	Hardware Remote RX	2
97_1086	SJB	26-9-97	C64 change from 220P to 330P	3
97_1096	SJB	22-10-97	R50 change from 10R to 100R	4
97_1102	SJB	11-11-97	R61 & 168 changed. C99 added.	5
98_1042	SJB	9-7-98	PCB Issue 2 to 3 changes	6

Filename J:\PROJECTS\A10amp\L829pb_Main_PCB\Circuits_&_PCB\wip\l829ct3_6.SCH
Date Printed 10-Jul-1998
Drawn by: SJB
Sheet 2 of 5
DRAWING NO. L829CT3



DRAWING TITLE
Alpha 10 Amp R Ch.

2 3 4 2 5

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

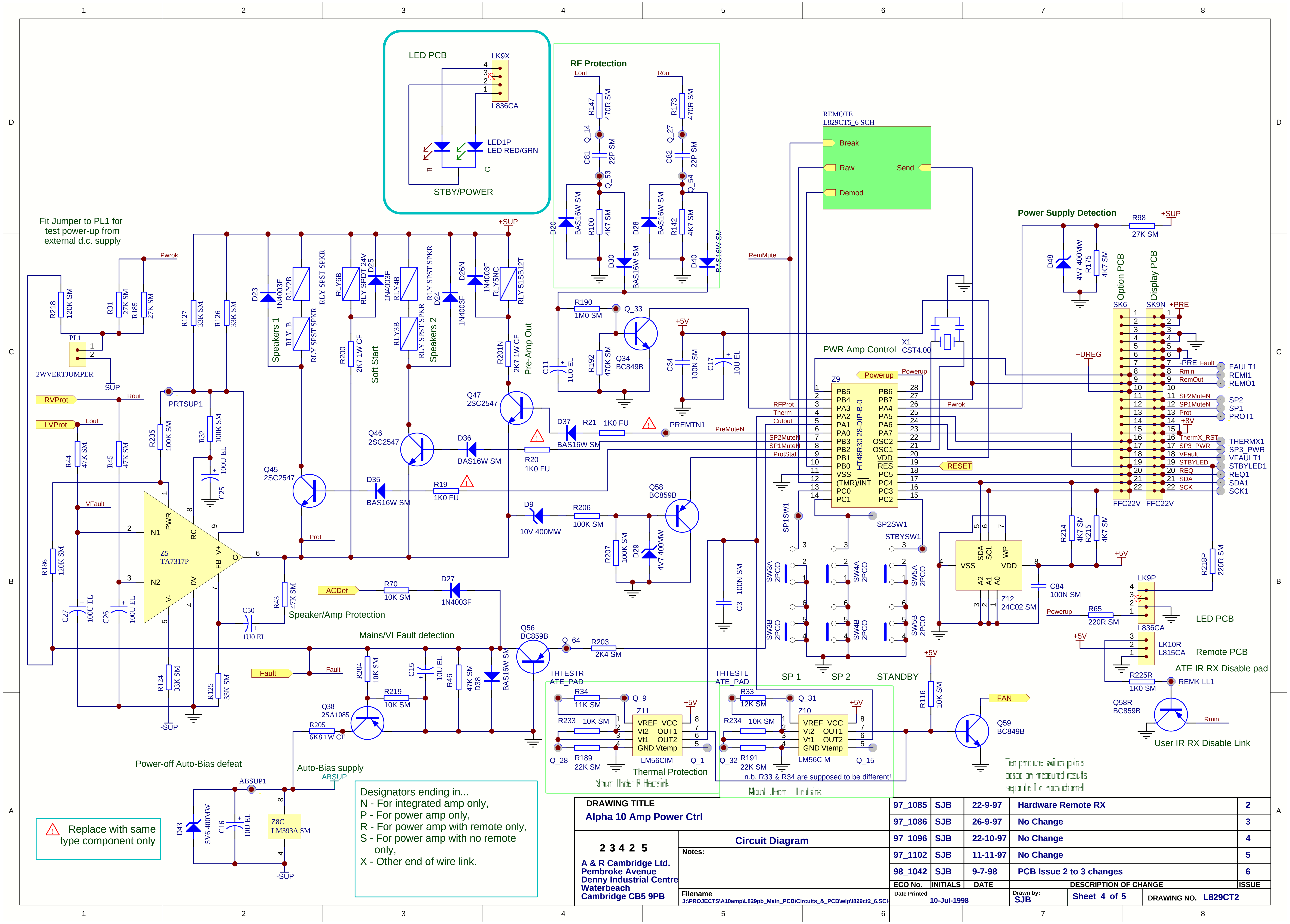
Circuit Diagram

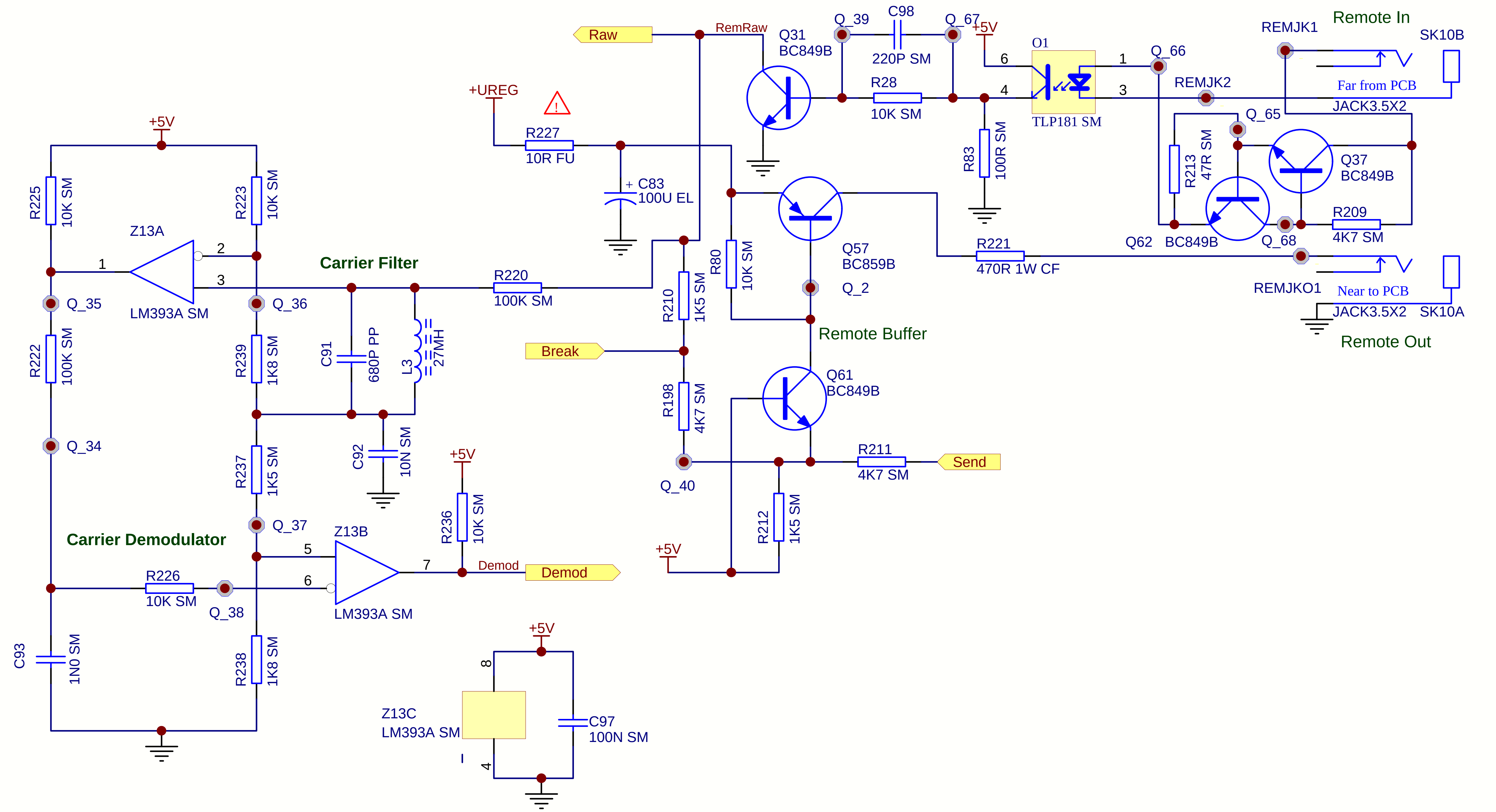
Notes:

Filename
J:\PROJECTS\A10amp\L829pb_Main_PCB\Circuits_&_PCB\wip\l829ct4_6.SCH

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
97_1085	SJB	22-9-97	Hardware Remote RX	2
97_1086	SJB	26-9-97	C66 change from 220P to 330P	3
97_1096	SJB	22-10-97	R54 chage from 10R to 100R	4
97_1102	SJB	11-11-97	R64 & 169 changed. C100 added.	5
98_1042	SJB	9-7-98	PCB Issue 2 to 3 changes	6

Date Printed 10-Jul-1998 | Drawn by: SJB | Sheet 3 of 5 | DRAWING NO. L829CT4


LED PCB
LK9X
L836CA
LED1P
LED RED/GRN
STBY/POWER
RF Protection
Lout
Rout
R147 470R SM
R173 470R SM
C81 22P SM
C82 22P SM
D20 BAS16W SM
D28 BAS16W SM
R100 4K7 SM
R142 4K7 SM
D30 BAS16W SM
D40 BAS16W SM
REMOTE
L829CT5_6 SCH
Break
Raw
Send
Demod
Power Supply Detection
R98 27K SM
+SUP
D48 4V7 400MW
R175 4K7 SM
Option PCB
Display PCB
SK6
SK9N
+PRE
FFC22V
Fit Jumper to PL1 for test power-up from external d.c. supply
PL1
2WVERTJUMPER
-SUP
Pwrok
R218 120K SM
R31 27K SM
R185 27K SM
R127 33K SM
R126 33K SM
D23 1N4003F
Speakers 1
RLY2B
RLY1B
RLY SPST SPKR
RLY6B
RLY SPDT 24V
D25 1N4003F
Soft Start
R200 2K7 1W CF
RLY4B
RLY3B
Speakers 2
D24 1N4003F
D26N 1N4003F
RLY5NC
RLY 51SB12T
R201N 2K7 1W CF
Pre-Amp Out
R190 1M0 SM
Q34 BC849B
R192 470K SM
C11 1U0 EL
+5V
C34 100N SM
C17 10U EL
X1 CST4.00
PWR Amp Control
Z9
HT48R30 28-DIP-B-0
Powerup
RESET
RemMute
RFProt
Therm
Cutout
SP2MuteN
SP1MuteN
ProtStat
PREMTN1
PreMuteN
FAULT1
REMI1
REMO1
SP2
SP1
PROT1
THERMX1
SP3_PWR
VFAULT1
STBYLED1
REQ1
SDA1
SCK1
RVProt
LVProt
PRTSUP1
R235 100K SM
R32 100K SM
C25 100U EL
R44 47K SM
R45 47K SM
VFault
Z5 TA7317P
R186 120K SM
C27 100U EL
C26 100U EL
Q47 2SC2547
Q46 2SC2547
Q45 2SC2547
D37 BAS16W SM
R21 1K0 FU
D36 BAS16W SM
R20 1K0 FU
D35 BAS16W SM
R19 1K0 FU
Prot
D9 10V 400MW
R206 100K SM
Q58 BC859B
R207 100K SM
D29 4V7 400MW
R43 47K SM
C50 1U0 EL
Speaker/Amp Protection
ACDet
R70 10K SM
D27 1N4003F
Mains/VI Fault detection
Q56 BC859B
R203 2K4 SM
Fault
R204 10K SM
C15 10U EL
R46 47K SM
D38 BAS16W SM
R124 33K SM
R125 33K SM
Q38 2SA1085
R219 10K SM
R205 6K8 1W CF
Power-off Auto-Bias defeat
Auto-Bias supply
ABSUP
ABSUP1
D43 5V6 400MW
C16 10U EL
Z8C LM393A SM
C3 100N SM
SP1SW1
SP2SW1
STBYSW1
SW3A 2PCO
SW4A 2PCO
SW5A 2PCO
SW3B 2PCO
SW4B 2PCO
SW5B 2PCO
SP 1
SP 2
STANDBY
Z12 24C02 SM
C84 100N SM
R214 4K7 SM
R215 4K7 SM
R218P 220R SM
LK9P
L836CA
LED PCB
R65 220R SM
LK10R
L815CA
Remote PCB
ATE IR RX Disable pad
R225R 1K0 SM
REMK LL1
Q58R BC859B
Rmin
User IR RX Disable Link
THTESTR
ATE_PAD
R34 11K SM
R233 10K SM
Z11
LM56CIM
R189 22K SM
Thermal Protection
Mount Under R Heatsink
THTESTL
ATE_PAD
R33 12K SM
R234 10K SM
Z10
LM56C M
R191 22K SM
n.b. R33 & R34 are supposed to be different!
Mount Under L Heatsink
R116 10K SM
FAN
Q59 BC849B
Temperature switch points based on measured results separate for each channel.
Replace with same type component only
Designators ending in...
N - For integrated amp only,
P - For power amp only,
R - For power amp with remote only,
S - For power amp with no remote only,
X - Other end of wire link.
DRAWING TITLE
Alpha 10 Amp Power Ctrl
2 3 4 2 5
Circuit Diagram
Notes:
A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB
97_1085 SJB 22-9-97 Hardware Remote RX 2
97_1086 SJB 26-9-97 No Change 3
97_1096 SJB 22-10-97 No Change 4
97_1102 SJB 11-11-97 No Change 5
98_1042 SJB 9-7-98 PCB Issue 2 to 3 changes 6
ECO No. INITIALS DATE DESCRIPTION OF CHANGE ISSUE
Filename
J:\PROJECTS\A10amp\L829pb_Main_PCB\Circuits_&_PCB\wip\l829ct2_6.SCH
Date Printed 10-Jul-1998
Drawn by: SJB
Sheet 4 of 5
DRAWING NO. L829CT2



DRAWING TITLE

Alpha 10 Amp Remote Bus

2 3 4 2 5

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

Circuit Diagram

Notes:

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
97_1085	SJB	22-9-97	Hardware Remote RX	2
97_1086	SJB	26-9-97	No Change	3
97_1096	SJB	22-10-97	R210, R198, R212 change	4
97_1102	SJB	11-11-97	No Change	5
98_1042	SJB	9-7-98	PCB Issue 2 to 3 changes	6

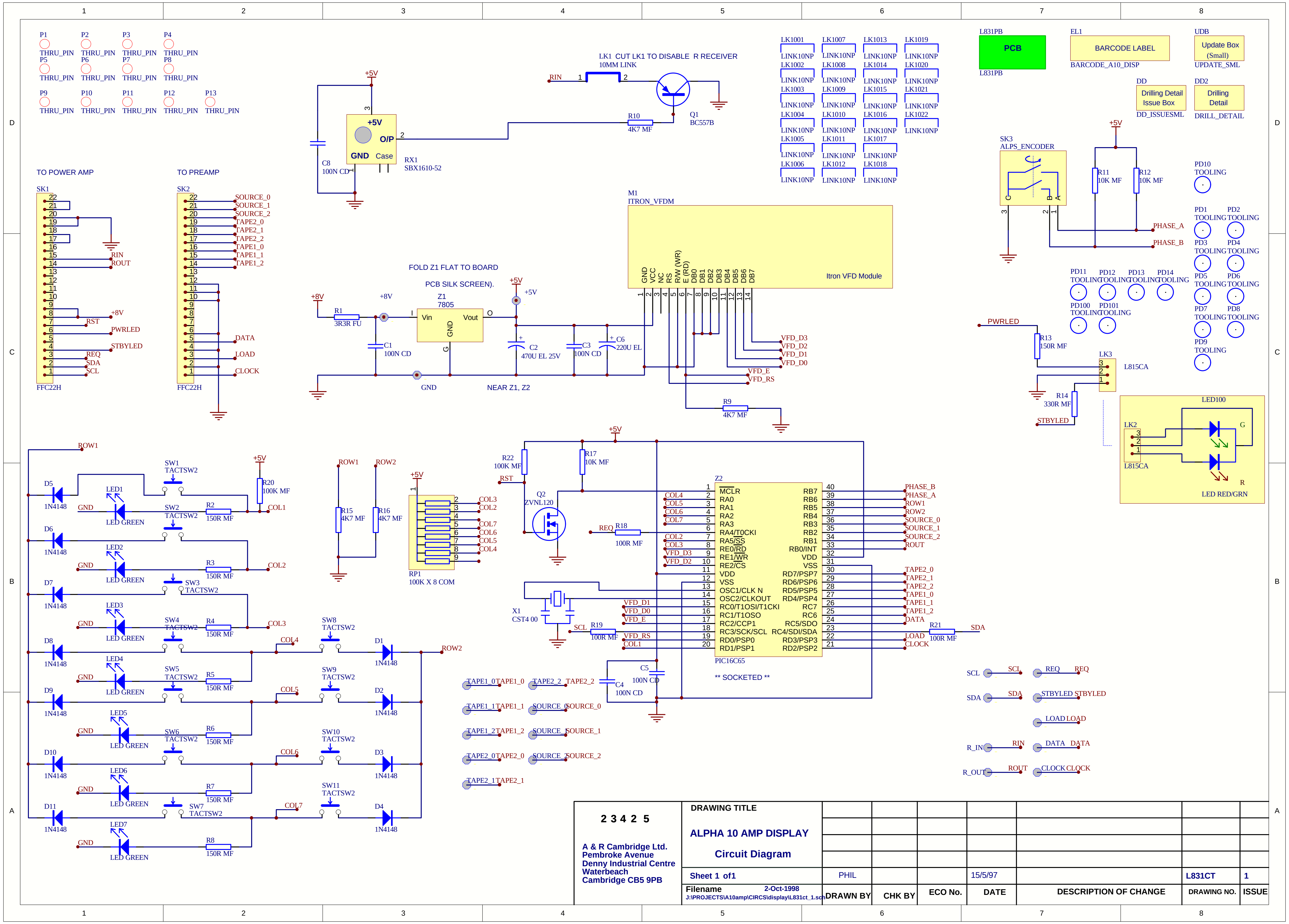
Filename: J:\PROJECTS\A10amp\L829pb_Main_PCB\Circuits_&_PCB\wip\L829CT5_6.SCH

Date Printed: 10-Jul-1998

Drawn by: SJB

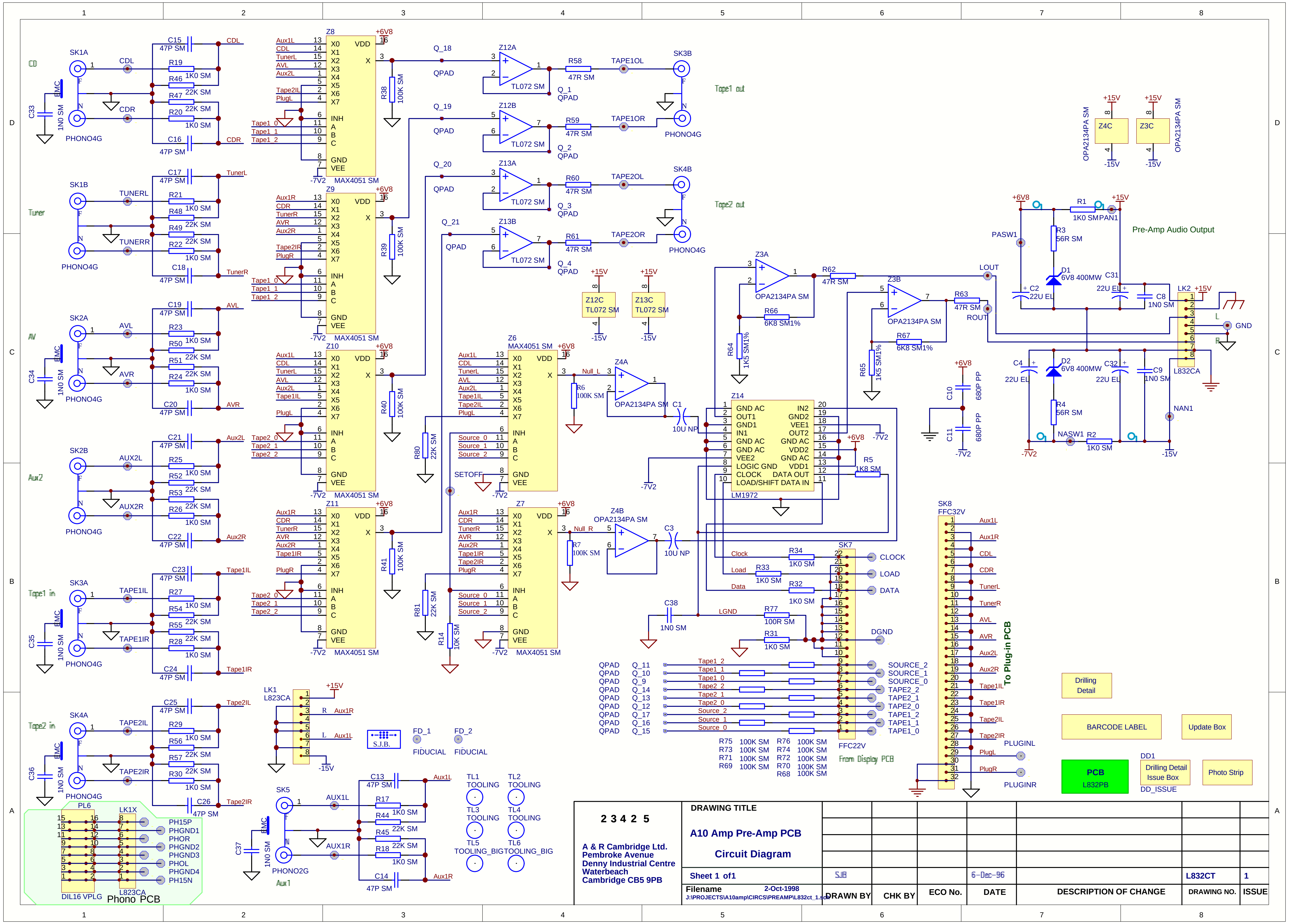
Sheet 5 of 5

DRAWING NO. L829CT5



2 3 4 2 5	DRAWING TITLE
A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB	**ALPHA 10 AMP DISPLAY** **Circuit Diagram**
	Sheet 1 of1
	Filename 2-Oct-1998 J:\PROJECTS\A10amp\CIRCS\display\L831ct_1.sch

DRAWN BY	CHK BY	ECO No.	DATE	DESCRIPTION OF CHANGE	DRAWING NO.	ISSUE
PHIL			15/5/97		L831CT	1



CD
Tuner
AV
Aux2
Tape1 in
Tape2 in
Tape1 out
Tape2 out
Pre-Amp Audio Output
To Plug-in PCB
From Display PCB
Phono PCB
MAX4051 SM
TL072 SM
OPA2134PA SM
LM1972
FFC22V
FFC32V
L832CA
L823CA
DIL16 VPLG
PHONO4G
PHONO2G
CLOCK
LOAD
DATA
DGND
GND
LOUT
ROUT
PLUGINL
PLUGINR
Drilling Detail
BARCODE LABEL
Update Box
PCB
L832PB
Drilling Detail Issue Box
Photo Strip
DD_ISSUE
TOOLING
TOOLING_BIG
FIDUCIAL
2 3 4 2 5
A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB
DRAWING TITLE
A10 Amp Pre-Amp PCB
Circuit Diagram
Sheet 1 of1
Filename
2-Oct-1998
J:\PROJECTS\A10amp\CIRCS\PREAMP\L832ct_1.sch
SJB
6-Dec-96
L832CT
1
DRAWN BY
CHK BY
ECO No.
DATE
DESCRIPTION OF CHANGE
DRAWING NO.
ISSUE