SERVICE MANUAL

for

Systemline MRA-4 Amplifier

Prepared by: PD Cheney

Authorised by: S Privett

Contents

Appendices

DISCLAIMER

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The information contained in this service manual may be subject to change without prior notice.

WARNING:
Dangerous voltages, capable of causing death are present in this unit. ONLY qualified personnel should attempt repair of this unit. Use extreme caution when the cover is removed, when testing and adjusting internal components.

1.0 FEATURES

LOOP THRU STEREO INPUTS (fully buffered) for each amplifier.

MUSIC SENSING for each stereo amplifier.

INDEPENDENT LEVEL CONTROLS for each stereo amplifier.

BASS & TREBLE CONTROLS for each stereo amplifier.

SIGNAL MONITOR LED lets you know when an audio signal is present at the amplifiers input.

SUPER COOL OPERATION An advanced power supply ensures that the amplifier reduces its heat output by up-to 60% over conventional class AB amplifiers.

SPEAKER SWITCHING Easy connection of a second pair of speakers to each stereo amplifier. A simple button press (from the front panel) controls the output to both pairs.

EASY CONFIGURATION Both stereo amps in the MRA4 can be driven by the same audio signal, using the 'comm input' switch.

2.0 MAIN ASSEMBLY

The Systemline MRA-4 amplifier comprises a basic construction of chassis, front panel, rear panel and cover. To remove the cover use a pozi-drive screwdriver to undo the two top self-tapping screws, located on the lip of the cover. Next, using a 2.5mm hex head driver, undo the four button-headed screws on the side. The cover should now slide off.

To remove the Input Buffer board, undo the M4 nut on the side nearest the PCB, remove the earthing strap and ease the rear panel back to allow the Input Buffer board to be removed.

Re-assembly is the reverse of the above instructions.

Refer to Appendix A for drawings and BOM information.

3.0 CIRCUIT DESCRIPTIONS

The amplifiers' consist of four PCB's: Power Supply, Main Amplifier, Front Panel and Input buffer.

3.1 Power Supply Circuit Description

WARNING:
Dangerous voltages, capable of causing death are present in this unit. ONLY qualified personnel should attempt repair of this unit. Use extreme caution when the cover is removed, when testing and adjusting internal components.

Both units feature a toroidal transformer with a single 230V or 120V primary and a single secondary with 5 tappings, one being a centre tap. An inrush suppresser in-line with the transformer primary limits the inrush current at switch On. The secondary tappings are fused by FS1,2,3 &4. Two balanced power supply rails are formed to supply the amplifier with both ±20VDC and ±40VDC via bridge rectifiers BR1 & BR2. Resistors R7,8,9 & 10 bleed the reservoir capacitors when the supply is disconnected. This feature helps prevent any unexpected discharge when the PSU not connected. The components around T2 provide power to the speaker relays and ensure a quick 'switch Off' function to ensure the speaker outputs are muted during power-down.

Refer to Appendix B for drawings and BOM information.

3.2 Main Amplifier Circuit Description

Each audio channel is configured around a DMOS high powered 'Multiwatt15' amplifier. These devices have a number of features including separate ± VVS supply pins for the MOS output drivers, and a low current standby mode. The TDA7293's operating mode is controlled via the Microcontroller

U1 on the Front Panel PCB. Internal protection is provided within the device against thermal overload and short circuit output conditions. The amplifiers are configured in a normal negative feedback configuration with additional bootstrapping from the output to pin-6 of the TDA7293. Low frequency roll-off is tailored by R1/C1, R25/C18, R61/C52 and R43/C35 respectively.

The power supply arrangement is designed to reduce the power dissipation by each amplifier. This is achieved by only increasing the voltage across the output devices when high output voltage swings are required. The sliding voltage arrangement is balanced and operates on the following principle: Considering Amplifier A/L, when the output power is low the ± VSS pins are supplied from the ± 20V rail via D19/D2. As the output voltage increases D1/D20 become reversed biased and the transistor darlington compound pairs T2/T1 & T8/T7 become forward biased causing the voltage at the ± VSS pins to increase in relation to the output signal. The current sources formed by T3/T4, T5/T6 ensure that there is always adequate voltage across the internal MOS devices as the variable rail voltage comes into operation. Additional inductors and snubber circuits R5/R15, C17/R16 are used to ensure stability within the power supply and output circuits.

Components R23 & R24 are thermistors which monitor the heatsink temperature for each stereo amplifier. The voltage drop across these devices determines whether the Fan is in operation or not. Transistor T33 controls the Fan motor under control from the Front Panel circuit. Relays RL-1/2,3 & 4 isolate the speakers from the amplifier during power up/down, and also provide independent speaker switching for both stereo amplifiers.

It is important to note that the amplfier signal ground is NOT connected directly to the power supply ground on the Main Amplifier. Signal grounding is routed to the Power Supply via the Front Panel PCB to reduce ground noise.

Refer to Appendix C for drawings and BOM information.

3.3 Input Buffer Circuit Description

The input buffer ensures that the input signal sources are not unduly loaded and that the loop-outs provide an adequately low source impedance. Capacitors C13-C20 prevent DC entering the amplifier, resistors R2,R4,R14 & R16 in combination with capacitors C1,C2,C5 & C6 Quad OpAmps U1 and U4 (TLO64) are used with the ability to adjust the gain of the input buffers (only) via their feedback resistors R49,R51,R53 & R54. Music sensing is carried out by Opamp U5 TLO64 which forms two non inverting summing amplifiers for each of the audio Right/Left channels, followed be a frequency dependent averaging circuit formed by D4/D3, R38/R37 and C9/C10. Capacitors C23/C24 prevent any DC drift in the high gain OpAmp section OP3/4 entering the averager. This would cause the voltage level to rise when there is no signal present. Resistors R33 and R34 set the level at which the comparator outputs OP2 and OP3 are driven high by the input signal. Resistors R31/R32 and D2/D1 ensure that the output voltage does not swing much below 0V.

Relay RL1 operates when the unit is in common input stereo mode. This enables both stereo amplifiers' in the MRA4 to receive the same Left/Right audio signal. This relay is controlled by the position of the DIP switch on SW1 and the software within U1.

Refer to Appendix D for drawings and BOM information.

3.4 Front Panel Circuit Description

The front panel circuit combines audio and control functions. Audio signals from the Input Buffer are processed in the tone control circuits formed around U4 A:B and U5 A:B. The dual potentiometers RV3/4 & RV1/2 together with the series and parallel capacitors form a frequency shaping network to give variable bass (RV2/3) and treble (RV1/4) lift of ± 15dB centred around 1kHz. The output of the tome control op-amps passes through a dual potentiometer RV5 and RV6 to enable the overal1 level to be attenuated. The signal is buffered by U9 A:B and U10 A:B before passing onto the main amplifier PCB via connector J5.

Fan control is accomplished by monitoring the heatsink thermistors R23/R24 (on the main PCB). The voltage from these thermistors is compared with 2 reference voltages using a quad (open collector output) comparitor. Resistors R71/R72 and R73/R74 set the two threshold levels for half and full speed fan operation. In order to stop the fan cycling ON/OFF around the low speed threshold, some hysteresis is built into the control system using software within U1. When RB1 changes state the voltage drive to T33 (emitter follower on main PCB via pin 11 of J6) rises to the voltage of Z1, as FC1 (RBO) goes low. Transistor T2 effectively shorts the cathode of Z1 to ground. If the temperature rises further the second temperature threshold is eventually reached and T2 is switched of taking the base voltage of T33 to Vz1+Vz2.

A very small amount of E^2 memory, U6, is used to remember the speaker settings when the unit is powered OFF. Transistors T5, T6, T7 & T8 act as relay drivers. The circuit formed around T1 is a 'brown out' which ensures that the software in U1 does not run erratically under low voltage conditions. As soon as the supply begins to collapse the collector of T1 quickly drops and performs a master clear reset.

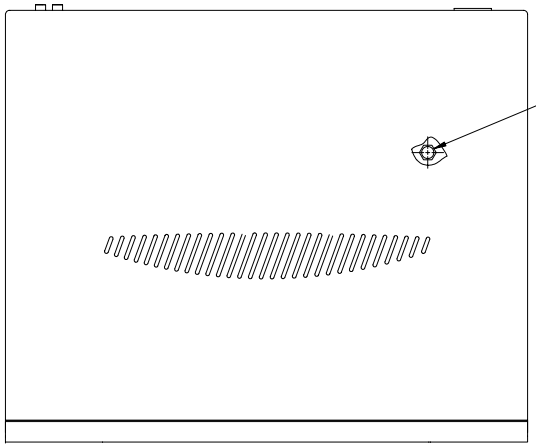
Refer to Appendix E for drawings and BOM information.

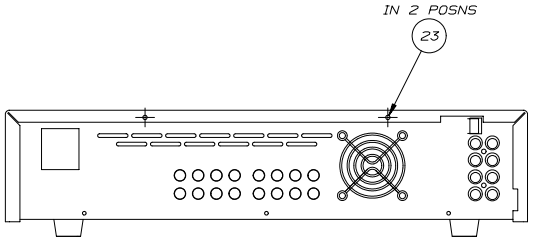
APPENDIX A

Main Assembly

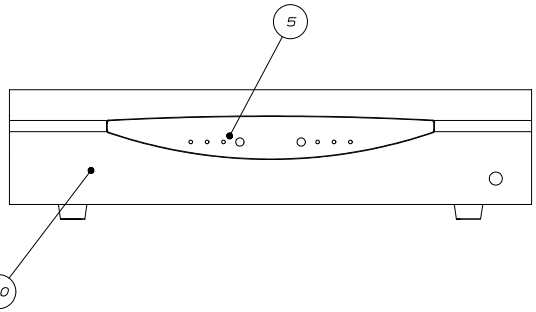
DRAWING NUMBER
Q10261/AS

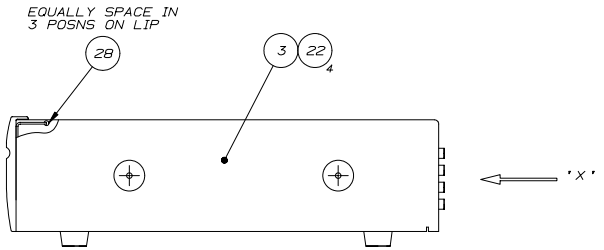
DO NOT SCALE





REAR VIEW ON ARROW 'X'





NOTES:

1. ENSURE CORRECT FUSES ARE FITTED IN PSU PCB BEFORE FITTING COVER.
2. ENSURE THAT FRONT AND REAR PANELS ARE NOT DAMAGED IN ANY WAY.
3. ENSURE LEDS ON THE FRONT PANEL PCB ARE LINED UP CORRECTLY

DRN	ISSUE	A	1					SCALE	
PDC	DATE	29-11-99	08-08-00					1 : 2	
CH'KD	Change No.								
	MATERIAL			FINISH				TOLERANCES: UNLESS OTHERWISE STATED, ARE: 1 DP: ±0.4 2 DP: ±0.15 ANG.: ±1.0°	
APP									

QED
Ridgeway House,
Ridgeway Close,
Lightwater,
Surrey, GU18 5XU.
TEL: 01276 451166
FAX: 01276 45221

TITLE
SYSTEMLINE POWER AMPLIFIER (QUAD) FINAL ASSEMBLY

DRAWING NUMBER
Q10261/AS

Drawing Number: Q10261/IL

Items List for: Q10261/AS **Approved for Production:** _____

QUAD POWER AMP FINAL ASSEMBLY

Issue: 1 **Date:** 08/08/2000 **Change Number:**

QED

Item No.	Part No.	Description	Manf. Part No.	Qty	Iss	Remarks
A						
1	ZENC201	S4.3 BASE PANEL METALWORK		1	5	
2	ZENC204	QUAD POWER AMP REAR PANEL		1	1	
3	ZENC202	S4.3 TOP COVER METALWORK		1	5	
4	ZENC203	S4.3 FRONT PANEL		1	2	
5	ZENC002	QUAD AMPLIFIER LENS		1	1	
6	ZMET021	TRANS SUPPORT PLATE 4.3/ROTEL		1	2	
7						
8	ZMIS018	MAINS SWITCH BUTTON	KB1510	1		PAINTED ZPRT001
9						
10		QUAD POWER AMP SUB-ASSY		1	1	
11	ZCAR018	CONTROLLER / AMP PACKAGING		1		
12	ZSKA003	QUAD JALCO GOLD PHONO SOCKET	PS-320G	2		FREE ISSUE
13						
14						
15	ZMIS000	FEET CONTROLLER / AMPLIFIER		4		
16	ZTXA000	TRANSFORMER 600VA QUAD PA	DELTA - 91791 P1S4	1		
17						
18	ZSRW062	M4 NYLOC NUT	GNYLTM040B	2		REAR PANEL FIXING
19	ZSRW063	M4 WASHER PLAIN	EWFMAM040B	2		REAR PANEL FIXING
20	ZSRW064	M4 X 6MM HEX HEAD SCREW	TBHHSM040000A	4		FRONT EXTRUSION FIXING
21	ZSRW065	M4 CRINKLE WASHER	NWCR1M040	4		FRONT EXTRUSION FIXING
22	ZSRW054	M4 X 8 HX SKT CSK HEAD ST ST	JSCOUM040008A	4		COVER FIXING
23	ZSRW056	4 X 3/8 SELF TAP POZI BRIGHT	AZ127040X0024D	2		FIT ON REAR PANEL
24	ZMIS015	3MM SPONGE SELF ADHESIVE BACK		1		FIT ON TRANSFORMER
25	ZCAB028	MAINS LEAD IEC/5A PLUG	MC-5520	1		

Production Cross Reference:

Drawing Number: Q10261/IL

Items List for: Q10261/AS **Approved for Production:** _____

QUAD POWER AMP FINAL ASSEMBLY

Issue: 1 **Date:** 08/08/2000 **Change Number:**

Item No.	Part No.	Description	Manf. Part No.	Qty	Iss	Remarks
26						
27	ZSRW070	NUT COVER M6 NYLON		1		FIT ON TRANSFORMER
28	ZSRW071	GROMIT STRIP		3		FIT ON FRONT LIP (50MM LONG)
29						
30						
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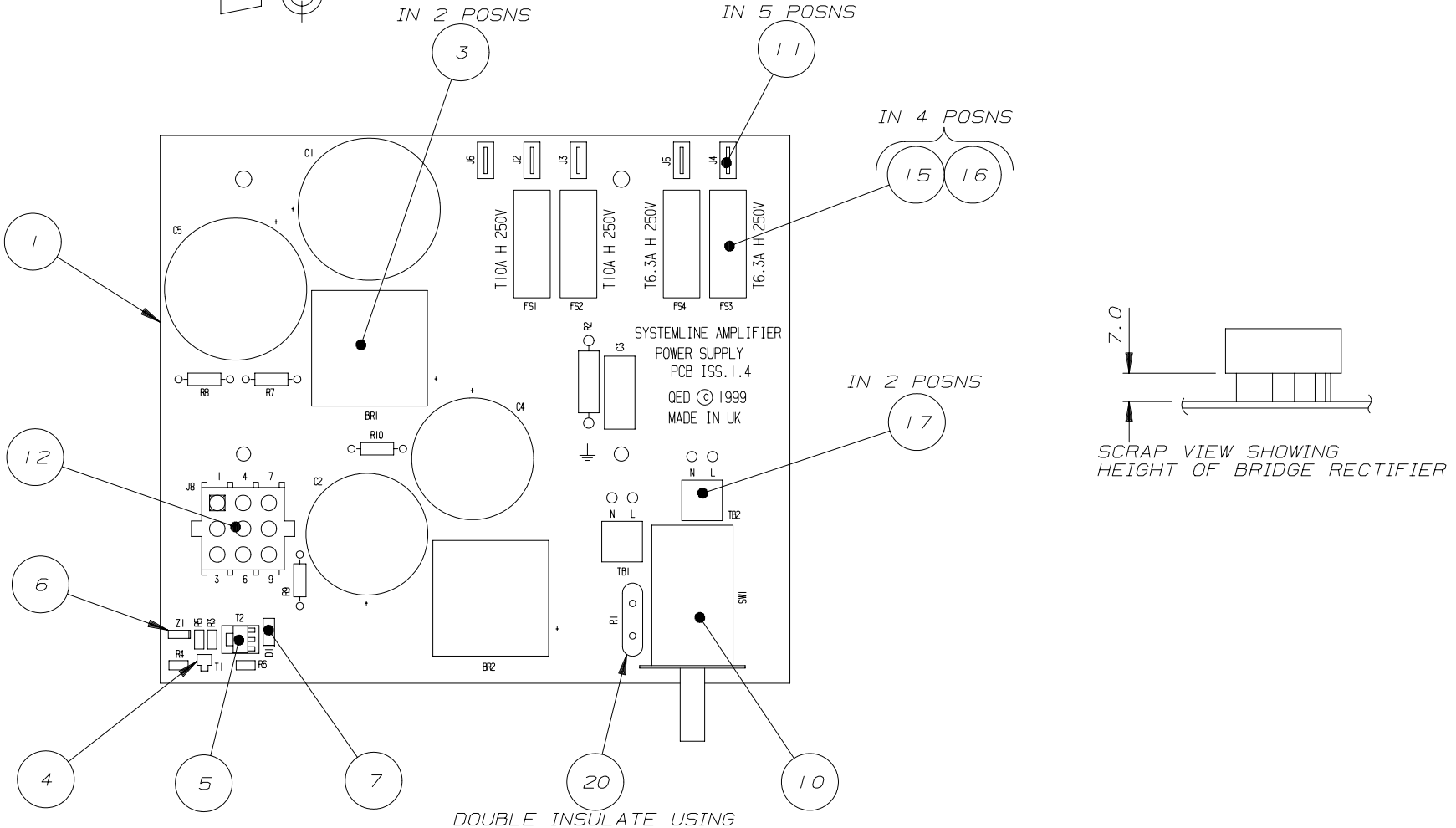
Production Cross Reference:

APPENDIX B

Power Supply PCB

DRAWING NUMBER
Q10179/AS

DO NOT SCALE



SCRAP VIEW SHOWING
HEIGHT OF BRIDGE RECTIFIER

DOUBLE INSULATE USING
HEATSHRINK SKEEVING

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	Change No.		IST PROD					
CH'KD	MATERIAL		FINISH			TOLERANCES: UNLESS OTHERWISE STATED ARE: 1 DP: ±0.4 2 DP: ±0.15 ANG.: ±1.0°		
APP								

QED
Ridgeway House,
Ridgeway Close,
Lightwater,
Surrey, GU18 5XU
TEL: 01276 451166
FAX: 01276 452211

TITLE
SYSTEMLINE POWER AMP
PSU PCB

DRAWING NUMBER
Q10179/AS

Drawing Number: Q10179/IL

Items List for: Q10179/AS
POWER AMP PSU PCB ASSEMBLY

Approved for Production: _____

Issue: 3 **Date:** 12/04/2001 **Change Number:** CR00084

QED

Item No.	Part No.	Description	Manf. Part No.	Qty	Iss	Remarks
A						
B						
C						
1		SYSTEMLINE AMP. POWER SUPPLY PCB		1	2	
2						
3		BRIDGE RECTIFIER KBPC1502		2		BR1, BR2
4		TRANSISTOR BC856B PNP S0T23	RS 287-409	1		T1
5		TRANSISTOR PZTA42 NPN SOT223	FAR 932-917	1		T2
6		ZENER 12V SOD123	RS 234-2952	1		Z1
7		DIODE GF1B DO214BA	FAR 251-471	1		D1
8						
9						
10		MAINS SWITCH 8A 250V	TW - PS-5-P8AV	1		SW1
11		TAG 6.3MM PCB MOUNT	FAR 209-284	5		J2 - J6
12		CONNECTOR AMP PCB HEADER 9 WAY	FAR 285-353	1		J8
13						
14						
15	ZFSE000	FUSE HOLDER 20MM	TREM - FH2540	4		FS1 - FS4
16	ZFSE004	FUSE COVER FOR 20MM HOLDER	TREM - FC-2540	4		FIT ON FS1-FS4
17		TERMINAL BLOCK 2 WAY	FAR 151-794	2		TB1, TB2
18						
19						
20		INRUSH SUPPRESSOR 10R 5A	ANG - JNR15S100M	1		R1 - DOUBLE INSULATE USING HEATSHRINK SLEEVING
21	ZRES004	RES 10R 2.5W 5% WIREWOUND	RS 151-675	1		R2
22	ZYRES6	RES 10K 5% 0.25W 1206	RS 169-159	2		R3, R4

Production Cross Reference:

Drawing Number: Q10179/IL

Items List for: Q10179/AS **Approved for Production:** _____

POWER AMP PSU PCB ASSEMBLY

Issue: 3 **Date:** 12/04/2001 **Change Number:** CR00084

QED

Item No.	Part No.	Description	Manf. Part No.	Qty	Iss	Remarks
23	ZRES016	RES 1K 5% 0.25W 1206	RS 169-109	1		R5
24		RES 47R 1% 0.25W 1206	RS 223-2085	1		R6
25		RES 6K8 5% 0.5W RES40 M/F	RS 132-696	2		R7, R8
26		RES 10K 5% 0.5W RES40 M/F	RS 132-731	2		R9, R10
27						
28						
29						
30		CAP 10,000uF 5.4A RIP. SNAP IN 85oC	RS 118-353	2		C1, C5
31		CAP 6800uF 4.2A RIP. SNAP IN 85oC	RS 118-347	2		C2, C4
32	ZCAP078	0.1uF 250Vac CLASS X 15MM	ANG 098707S	1		C3
33						
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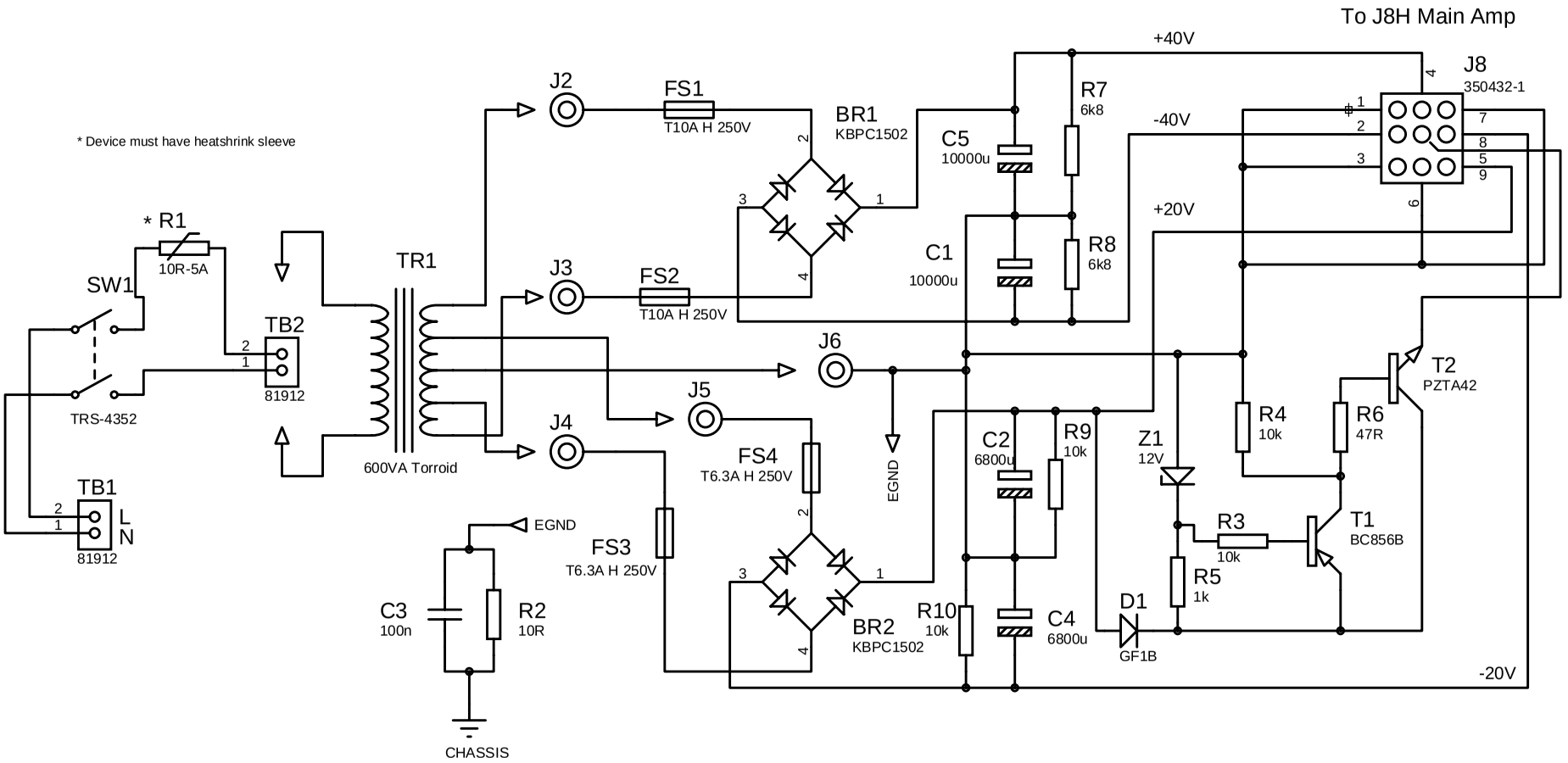
Production Cross Reference:



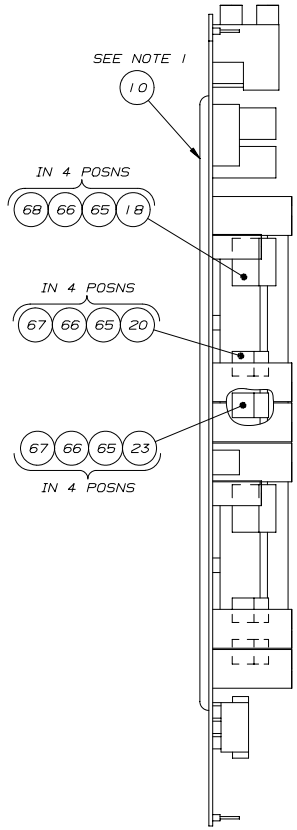
QED Audio Products Ltd Ridgeway House Ridgeway Close Lightwater Surrey GU18 5XU TEL: 01276 451166 FAX: 01276 452211	Systemline Amplifier Power Supply PCB Drawn by: Steve Privett	No: File: Samp PSU Iss 1-41.DSN Rev: 141 Created: 16/04/1987 Modified: 25/01/2000 Page: 1/1

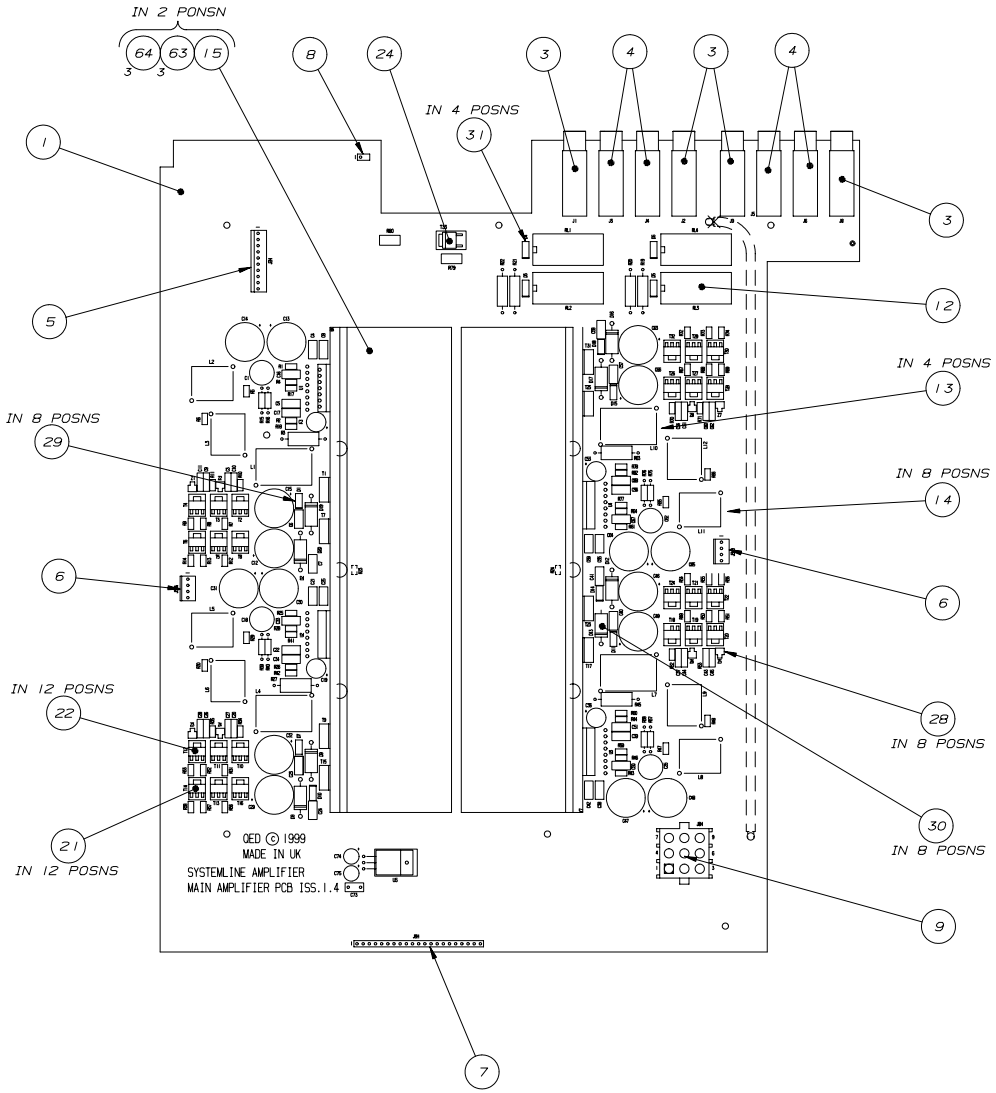
APPENDIX C

Main Amplifier PCB

DRAWING NUMBER
Q10173/AS

DO NOT SCALE





NOTES:

1. CUT QED SPEAKER CABLE TO 275.0 LONG.
   STRIP ENDS BACK 10.0

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PDC	DATE	26-04-99	29-09-99		1 : 1
	Change No.		1ST PROD		
CH'KD	MATERIAL		FINISH		TOLERANCES: UNLESS OTHERWISE STATED. ARE: 1 DP: ±0.4 2 DP: ±0.15 ANG.: ±1.0°
APP					

QED
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Lightwater,
Surrey, GU18 5XU.
TEL: 01276 451166
FAX: 01276 452211

TITLE
QUAD POWER AMP
MAIN PCB ASSEMBLY

DRAWING NUMBER
Q10173/AS

Drawing Number: Q10173/IL

Items List for: Q10173/AS **Approved for Production:** _____

QUAD POWER AMP MAIN PCB ASSEMBLY

Issue: 4 **Date:** 12/04/2001 **Change Number:** CR00084

Item No.	Part No.	Description	Manf. Part No.	Qty	Iss	Remarks
A						
B						
1		SYSTEMLINE AMP. MAIN PCB		1	2	
2						
3		SPEAKER OUTPUT CONNECTOR RED	DELTRON 596-0500	4		J1, J2, J8, J9
4		SPEAKER OUTPUT CONNECTOR BLACK	DELTRON 596-0100	4		J3, J4, J5, J6
5		CONNECTOR 10 WAY HEADER	TOBY 1100-8-110-01	1		J2H
6		CONNECTOR 4 WAY HEADER	TOBY AM254-04S-020	2		J5HA, J5HB
7		CONNECTOR 21 WAY HEADER	TOBY MTSW-121-08-L-S	1		J6H
8	ZPLA029	2 WAY HEADER 0.1"	TOBY 2100-02-PST	1		J7
9		CONNECTOR 9 WAY AMP 350432-1	FAR 285-353	1		J8H
10		QED SPEAKER CABLE (SINGLE STRAND)		0.3M		CUT TO LENGTH SPECIFIED
11						
12	ZRLA002	2PCO 5A MAINS RELAY	G2R-12DC	4		RL1 - RL4
13		INDUCTOR 5uH AXIAL FERRITE 10A	FAR 5085-833	4		L1, L4, L7, L10
14		INDUCTOR 1.0uH 14 x 23 AXIAL	See drawing	8		L2, L3, L5, L6, L8, L9, L11, L12
15		HEATSINK REDPOINT KL/B/200	EBV KL/B/200	2		
16						
17						
18		POWER AMPLIFIER TDA7293V	TDA7293V	4		U1 - U4
19		REGULATOR L78M05CV TO220	RS 648-422	1		U5
20		TRANSISTOR NPN BDX53A TO220	FAR 426-064	4		T1, T9, T17, T25
21		TRANSISTOR NPN PZTA42 SOT223	FAR 932-917	12		T2, T5, T6, T10, T13, T14, T18, T21, T22, T26, T29, T30
22		TRANSISTOR PNP PZTA92 SOT223	FAR 932-929	12		T3, T4, T8, T11, T12, T16, T19, T20, T24, T27, T28, T32

Production Cross Reference:

Drawing Number: Q10173/IL

Items List for: Q10173/AS **Approved for Production:** _____

QUAD POWER AMP MAIN PCB ASSEMBLY

Issue: 4 **Date:** 12/04/2001 **Change Number:** CR00084

Item No.	Part No.	Description	Manf. Part No.	Qty	Iss	Remarks
23		TRANSISTOR PNP BDX54A TO220	FAR 428-118	4		T7, T15, T23, T31
24		TRANSISTOR NPN 2SC5103Q SC-63	RS 246-1974	1		T33
25						
26						
27						
28	ZSCZ001	ZENER BZX84C3V9 SOT23	FAR 251-562	8		Z1 - Z8
29		DIODE LL4148 150mA MINI MELF	FAR 739-182	8		D1,D7, D10, D11, D14, D15, D18, D20
30		DIODE MUR420 4A FAST	FAR 931-070	8		D2, D8, D9, D12, D13, D16, D17, D19
31		DIODE GF1B DO-214BA	FAR 251-471	4		D3 - D6
32						
33						
34						
35	ZYRES38	RES 680R 5% 0.25W 1206	RS 169-092	4		R1, R25, R43, R61
36	ZYRES30	RES 15K 5% 0.25W 1206	RS 136-812	4		R2, R26, R44, R62
37		RES 270R 5% 2.5W RES50 WW	RS 151-849	4		R3, R27, R45, R63
38	ZYRES7	RES 33K 5% 0.25W 1206	RS 169-171	4		R4, R28, R46, R64
39	ZYRES5	RES 270R 5% 0.25W 1206	RS 136-698	24		R5 - R8, R12, R13, R29 - R32, R36, R37, R47 - R50, R54, R55, R65 - R68, R72, R73
40	ZYRES26	RES 22K 5% 0.25W 1206	RS 169-165	4		R9, R33, R51, R69
41	ZYRES42	RES 3K3 5% 0.25W 1206	RS 169-121	8		R10, R11, R34, R35, R52, R53, R70, R71
42	ZYRES21	RES 27K 5% 0.25W 1206	RS 136-834	4		R14, R38, R56, R74
43		RES 2R 5% 0.25W RES40	RS 150-638	8		R15, R16, R39, R40, R57, R58, R75, R76
44	ZRES016	RES 1K 5% 0.25W 1206	RS 169-109	8		R17, R18, R41, R42, R59, R60, R77, R78
45		RES 220R 5% 1W	RS 131-794	4		R19 - R22
46	ZRES026	THERMISTOR 100K NCT 0805	RS 247-7503	2		R23, R24
47						

Production Cross Reference:

Drawing Number: Q10173/IL

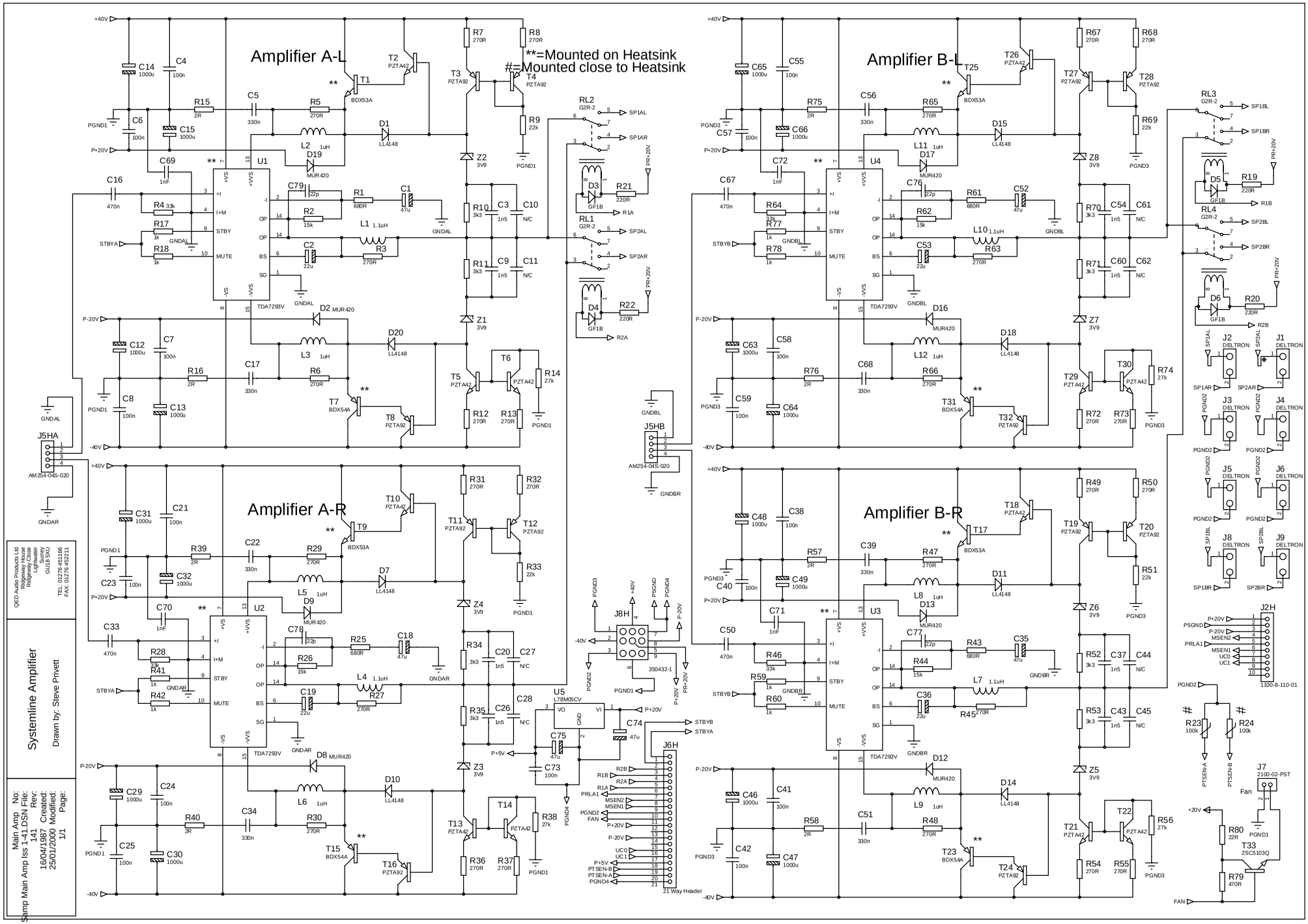
Items List for: Q10173/AS **Approved for Production:** _____

QUAD POWER AMP MAIN PCB ASSEMBLY

Issue: 4 **Date:** 12/04/2001 **Change Number:** CR00084

QED

Item No.	Part No.	Description	Manf. Part No.	Qty	Iss	Remarks
48		RES 470R HIGH POWER 2512	RS 224-0367	1		R79
49		RES 22R HIGH POWER 2512	RS 224-0187	1		R80
50						
51						
52		CAP 22pF 5% 50V 1206	RS 211-2751	4		TO SIT ON RESISTORS R2, R26, R44 & R62
53		CAP BIPOLAR 47uF 20% 50V 85oC RAD40	FAR 218-686	4		C1, C18, C35, C52
54		CAP 22uF 20% 100V 85oC RAD40	FAR 920-939	4		C2, C19, C36, C53
55		CAP 1N5 10% 400V 5MM BOX	FAR 577-777	8		C3, C9, C20, C26, C37, C43, C54, C60
56		CAP 100N 10% 100V 5MM BOX	FAR 304-001	17		C4, C6 - C8, C21, C23 - C25, C38, C40 - C42, C55, C57 - C59, C73
57		CAP 330N 10% 63V 5MM BOX	FAR 303-926	8		C5, C17, C22, C34, C39, C51, C56, C68
58		CAP ELEC 1000UF 20% 63V 105oC	FAR 698-817	16		C12 - C15, C29 - C32, C46 - C49, C63 - C64
59		CAP 470N 10% 63V 5MM BOX	FAR 303-938	4		C16, C33, C50, C67
60	ZYCAP13	1NF 10% 63V 1206	FAR 499-328	4		C69 - C72
61		CAP 47uF 35V 85oC RAD10	RS 224-4268	2		C74, C75
62						
63	ZMIS013	NYLON SPACER	NS03-32	6		Use under Heatsinks
64		SCREW M3 x 12 TAPTITE	FAR 574-399	6		Use to secure Heatsinks
65		SCREW M3 x 8 TAPTITE	FAR 574-387	12		Use to secure Amps etc to Heatsink
66	ZMIS004	TO220 TOP HAT GLAS FILLED BUSH	MEC3-37-11GF	12		
67	ZMIS005	TO220 INSULATION PAD	K177NA353	8		
68		AMP INSULATION PAD		4		

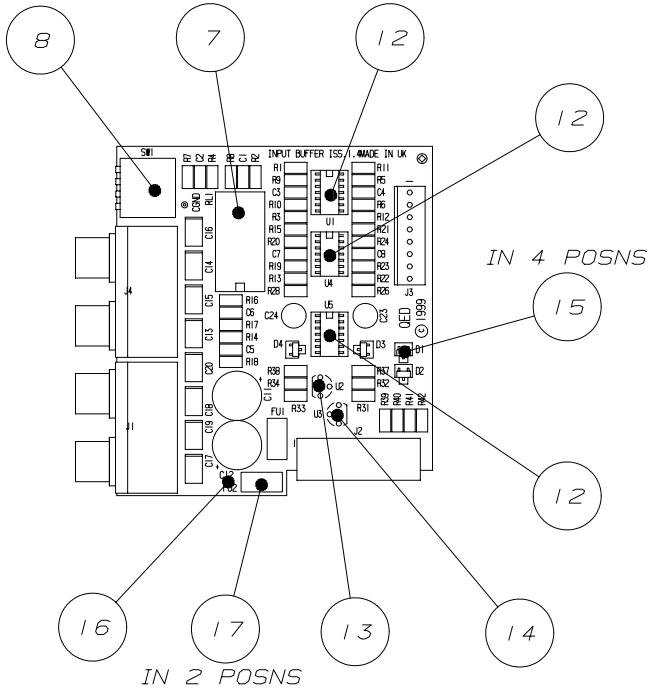

Amplifier A-L
Amplifier A-R
Amplifier B-L
Amplifier B-R
**=Mounted on Heatsink
#=Mounted close to Heatsink
TDA7293V
BDX53A
BDX54A
MUR420
LL4148
PZTA42
PZTA92
GF1B
AM254-04S-020
350432-1
L7805CV
L78M05CV
21 Way Header
2100-02-PST
1100-8-110-01
2SC5103Q
QED Audio Products Ltd
Ridgeway House
Ridgeway Close
Lightwater
Surrey
GU18 5HU
TEL: 01276 451166
FAX: 01276 452211
Systemline Amplifier
Drawn by: Steve Privett
Stamp Main Amp Iss 1-41.DSN
Main Amp No: 141
Rev:
Created: 16/04/1987
Modified: 25/01/2000
Page: 1/1

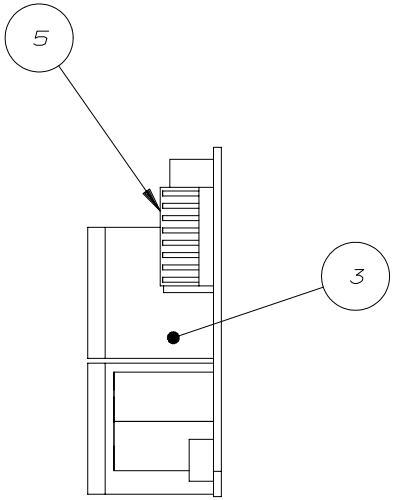
APPENDIX D

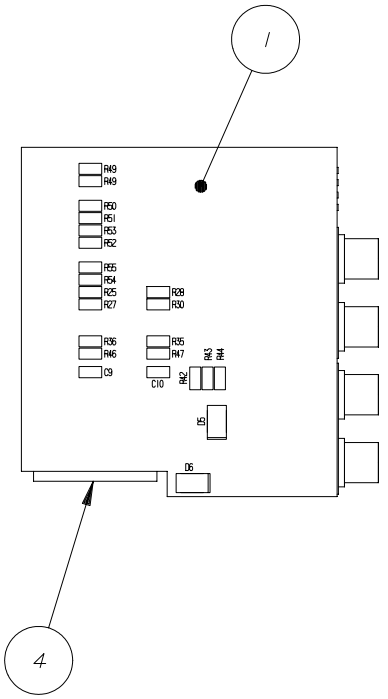
Input Buffer PCB

DRAWING NUMBER
Q10175/AS

DO NOT SCALE







DRN	ISSUE	1	2					SCALE
PDC	DATE	19-04-99	28-09-99					1 : 1
	Change No.		1ST PROD					
CH'KD	MATERIAL		FINISH		TOLERANCES: UNLESS OTHERWISE STATED ARE: 1 DP: ±0.4 2 DP: ±0.15 ANG.: ±1.0°			
APP								

QED
Ridgeway House,
Ridgeway Close,
Lightwater,
Surrey, GU18 5XU
TEL: 01276 451166
FAX: 01276 452211

TITLE
QUAD POWER AMP INPUT PCB ASSEMBLY

DRAWING NUMBER
Q10175/AS

Drawing Number: Q10175/IL

Items List for: Q10175/AS **Approved for Production:** _____

QUAD POWER AMP INPUT PCB ASSEMBLY

Issue: 3 **Date:** 12/04/2001 **Change Number:** CR00084

QED

Item No.	Part No.	Description	Manf. Part No.	Qty	Iss	Remarks
A						
B						
C						
1		SYSTEMLINE AMP. INPUT BUFFER PCB		1	2	
2						
3	ZSKA003	QUAD JALCO GOLD PHONO SOCKET	TREIMIVER PS-3205	2		J1, J4
4		CONNECTOR 10 WAY SOCKET	TOBY 100-110-2103	1		J2
5		CONNECTOR 8 WAY HEADER	TOBY AM254-08S-020	1		J3
6						
7	ZRLA003	TYPE 47 2PDT 12V RELAY	ANG 47W/6	1		RL1
8		SWITCH DIL SM 4 POLE PIANO KEY	ANG SS004	1		SW1
9						
10						
11						
12		OP AMP TLO64SO SURFACE MOUNT	RS 857-884	3		U1, U4, U5
13	ZSCR004	78L15 REGULATOR TO92	HB - L78L15AC2	1		U2
14	ZSCR006	79L15 REGULATOR T092	HB - L79L15AC2	1		U3
15	ZSCD003	DIODE BAS21 SOT23-D7	FAR 743-185	4		D1 - D4
16		DIODE IS1B 1A	ANG IS1B	2		D5, D6
17		FUSE 750mA SMD 451 SERIES	RS 843-368	2		FS1, FS2
18						
19						
20	ZRES028	RES 220R 5% 0.25W 1206	RS 169-064	4		R1, R3, R13, R15
21	ZRES016	RES 1K 5% 0.25W 1206	RS 169-109	16		R2, R4 - R6, R9, R10, R14, R16, R19, R20, R31, R32, R39 - R42
22	ZRES026	RES 100K 5% 0.25W 1206	RS 169-200	4		R7, R8, R17, R18

Production Cross Reference:

Drawing Number: Q10175/IL

Items List for: Q10175/AS **Approved for Production:** _____

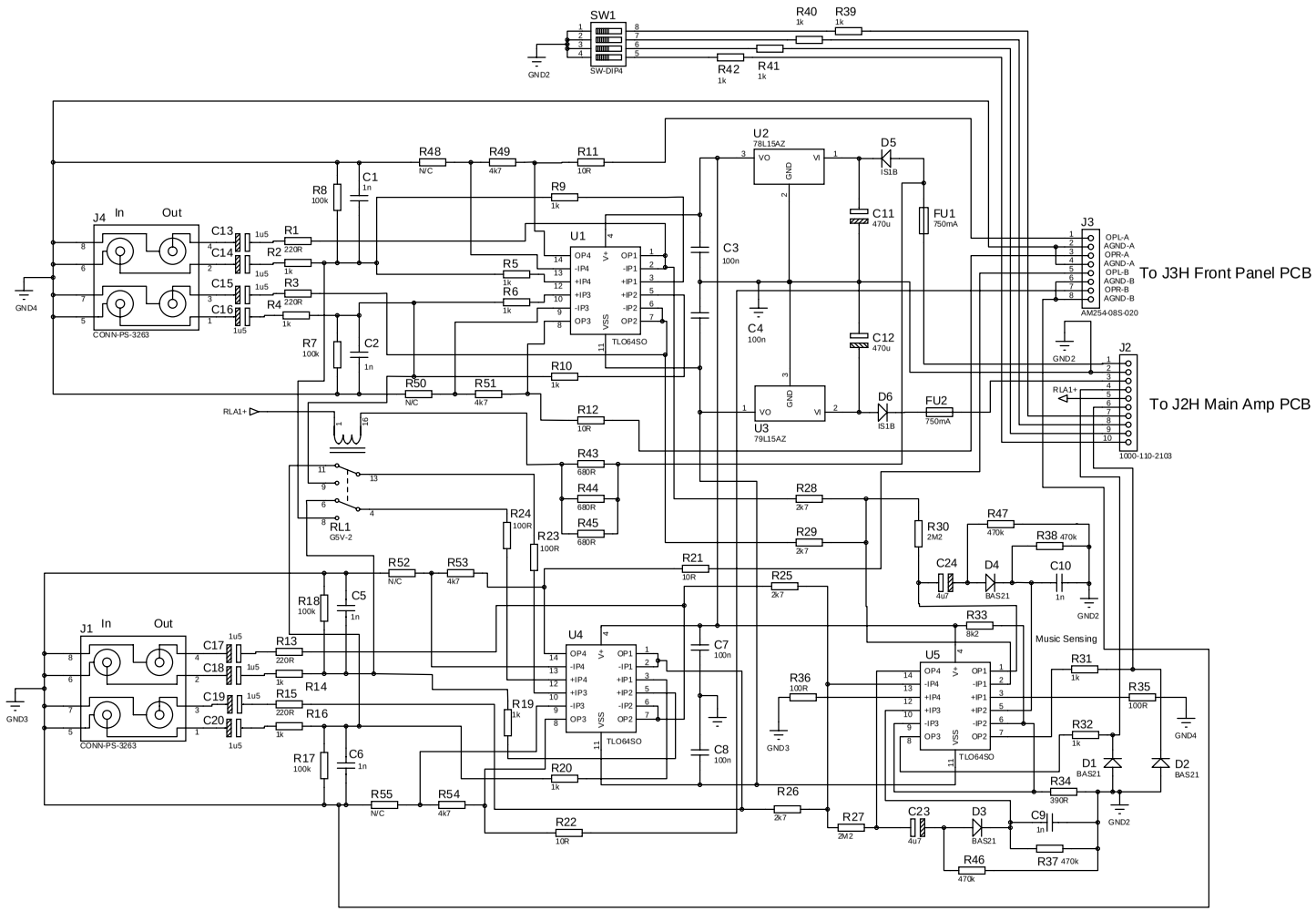
QUAD POWER AMP INPUT PCB ASSEMBLY

Issue: 3 **Date:** 12/04/2001 **Change Number:** CR00084

QED

Item No.	Part No.	Description	Manf. Part No.	Qty	Iss	Remarks
23	ZRES019	RES 10R 5% 0.25W 1206	RS 169-008	4		R11, R12, R21, R22
24	ZRES023	RES 100R 5% 0.25W 1206	RS 169-058	4		R23, R24, R35, R36
25		RES 4K7 5% 0.25W 1206	RS 169-137	8		R25, R26, R28, R29, R49, R51, R53,R54
26		RES 2M2 5% 0.25W 1206	RS 136-941	2		R27, R30
27	ZRES041	RES 8K2 5% 0.25W 1206	RS 136-799	1		R33
28		RES 390R 1% 0.25W 1206	RS 223-2209	1		R34
29		RES 470K 1% 0.25W 1206	RS 223-2619	2		R37, R38
30	ZYRES38	RES 680R 5% 0.25W 1206	RS 169-092	3		R43 - R45
31		RES 470K 5% 0.25W 1206	RS 169-238	2		R46, R47
32						
33						
34						
35	ZYCAP13	1NF 10% 63V 1206	FAR 499-328	6		C1, C2, C5, C6, C9, C10
36	ZYCAP18	100NF 10% 63V 1206	FAR 499-389	4		C3, C4, C7, C8
37		CAP 470uF 10% R.E. 35V 85oC	RS 205-1909	2		C11, C12
38		CAP 1.5uF 25V TANT SURFACE MOUNT	RS 209-7365	8		C13 - C20
39		CAP ELEC NON POLAR 4u7 16V RADIAL	RS 768-453	2		C23, C24
40						
41						
42						
43						
44						
45						
46						
47						

Production Cross Reference:



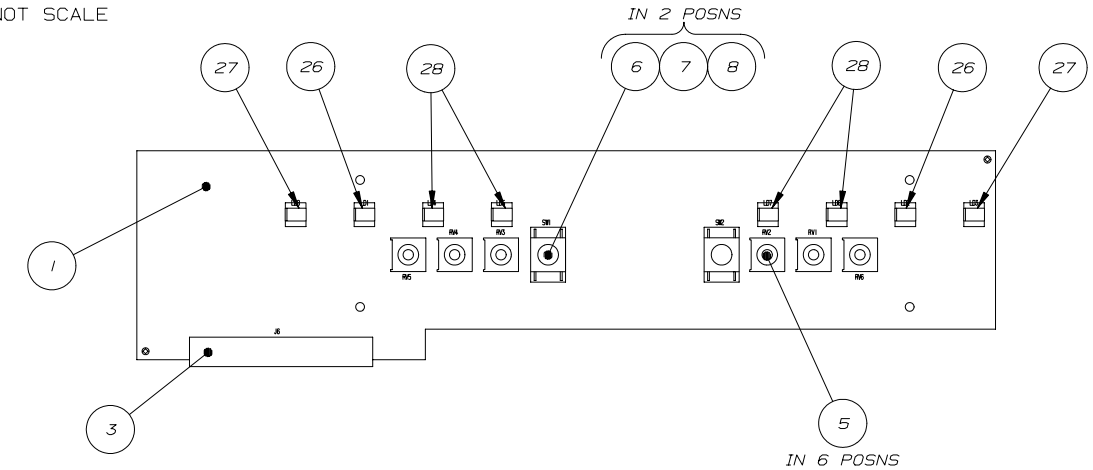
QED Audio Products Ltd Ridgeway House Ridgeway Close Lightwater Surrey GU18 5XU TEL: 01276 451166 FAX: 01276 452211	Systemline Amplifier Input Buffer & Music Sensing Drawn by Steve Privett	No: Input Buffer PCB File: Samp Input Buffer Iss 1-41.DSN Rev: 141 Created: 25/01/2000 Modified: 17/04/2001 Page: 1/1

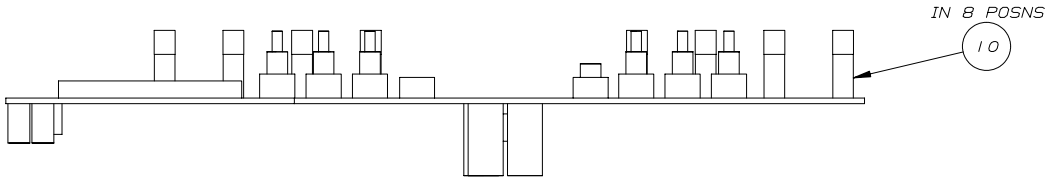
APPENDIX E

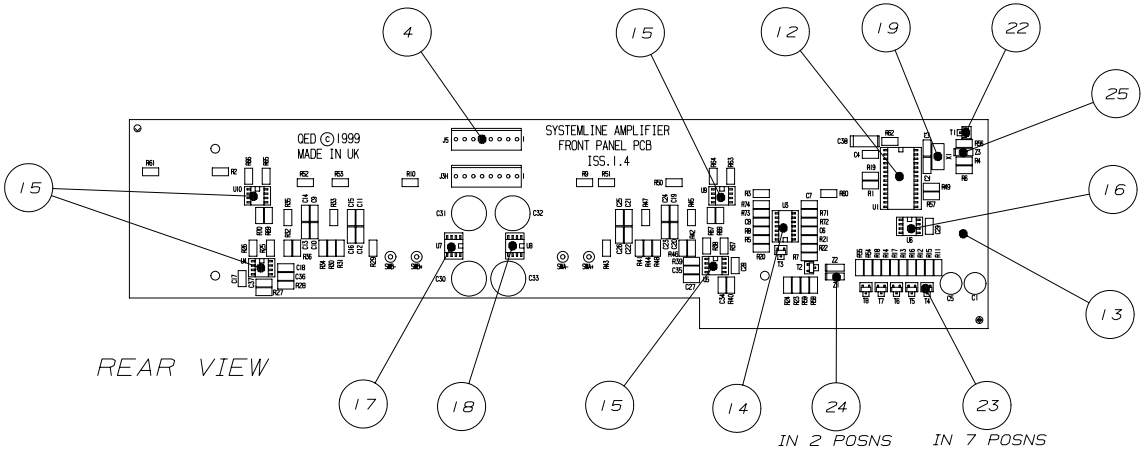
Front Panel PCB

DRAWING NUMBER
Q10174/AS

DO NOT SCALE







DRN	ISSUE	1	2					SCALE
PDC	DATE	21-04-99	28-09-99					1 : 1
	Change No.		1ST PROD					
CH'KD	MATERIAL		FINISH					
APP								

TOLERANCES:
UNLESS OTHERWISE STATED ARE:
1 DP: ±0.4
2 DP: ±0.15
ANG.: ±1.0°

QED
Ridgeway House,
Ridgeway Close,
Lightwater,
Surrey, GU18 5XU
TEL: 01276 451166
FAX: 01276 452211

TITLE
SYSTEMLINE AMP
FRONT PCB

DRAWING NUMBER
Q10174/AS

Drawing Number: Q10174/IL

Items List for: Q10174/AS **Approved for Production:** _____

QUAD POWER AMP FRONT PCB ASSEMBLY

Issue: 2 **Date:** 31/08/1999 **Change Number:**

Item No.	Part No.	Description	Manf. Part No.	Qty	Iss	Remarks
A						
B						
C						
1		SYSTEMLINE AMP. FRONT PCB		1	2	
2						
3	ZSKA052	21 WAY R.A SOCKET	TOBY 1000 121 2103	1		J6
4		CONNECTOR 8 WAY HEADER	TOBY AM254-08S-020	1		J3H, J5
5		POT DUAL GANG 100K	FAR 652-933	6		RV1 - RV6
6		SWITCH 6MM SURFACE MOUNT	MEC 3FSH9	2		SW1, SW2
7		SWITCH EXTENDER	MEC 2S09-10.0	2		FIT ON SW1, SW2
8		SWITCH CAP - BLACK	MEC 1S09-16.0	2		FIT ON SW1, SW2
9						
10		5MM LED SPACER, 12.5 HIGH	RS 205-1189	8		FIT UNDER LD1 - LD8
11						
12						
13		PIC 16C57XT/SO SO28	HB - 16C57XT/SO	1		U1
14		QUAD COMPARATOR LM399D SO14	RS 858-411	1		U3
15		BIFET DUAL OPAMP TLO82C SOIC	RS 857-957	4		U4, U5, U9, U10
16		EE MEMORY 64x16 93C46B/SN SO8	HB - 93C46B/SN	1		U6
17		REGULATOR LM78L15A SOIC	RS 857-042	1		U7
18		REGULATOR LM79L15A SOIC	RS 857-070	1		U8
19	ZSCI106	500kHZ CERAMIC RESONATOR	ANG MUR607250	1		X1
20						
21						
22	ZYSCT1	TRANSISTOR BC856B PNP SOT23	RS 287-409	1		T1

Production Cross Reference:

Drawing Number: Q10174/IL

Items List for: Q10174/AS **Approved for Production:** _____

QUAD POWER AMP FRONT PCB ASSEMBLY

Issue: 2 **Date:** 31/08/1999 **Change Number:**

Item No.	Part No.	Description	Manf. Part No.	Qty	Iss	Remarks
23		TRANSISTOR BC846B NPN SOT23	RS 287-392	7		T2 - T8
24		ZENER 8V2 SOD123	RS 234-2902	2		Z1, Z2
25		ZENER 3V6 SOD123	RS 234-2794	1		Z3
26	ZSCL041	LED YELLOW RECTANGULAR	ANG EUY21D	2		LD1, LD2
27	ZSCL040	LED RED RECTANGULAR	ANG EUR21D	2		LD3, LD8
28	ZSCL042	LED GREEN RECTANGULAR	ANG EUG21D	4		LD4 - LD7
29						
30						
31	ZRES016	RES 1K 5% 0.25W 1206	RS 169-109	1		R6
32	ZRES023	RES 100R 5% 0.25W 1206	RS 169-058	10		R1, R5, R19, R22, R49, R57, R67 - R70
33	ZRES028	RES 220R 5% 0.25W 1206	RS 169-064	2		R2, R3
34	ZYRES31	RES 2K2 5% 0.25W 1206	RS 169-115	6		R4, R15 - R18, R55
35	ZYRES117	RES 4K7 5% 0.25W 1206	RS 169-137	6		R7, R8, R29, R31, R41, R43
36	ZYRES6	RES 10K 5% 0.25W 1206	RS 169-159	20		R9, R10, R20, R21, R30, R32 - R36, R42, R44 - R48, R56, R58, R59, R62
37	ZYRES40	RES 2K7 5% 0.1W 1206	RS 136-761	5		R11 - R14, R54
38	ZRES026	RES 100K 5% 0.25W 1206	RS 169-200	2		R23, R24
39	ZYRES38	RES 680R 5% 0.25W 1206	RS 169-092	4		R25, R26, R37, R38
40	ZYRES21	RES 27K 5% 0.25W 1206	RS 136-834	4		R27, R28, R39, R40
41	ZYRES18	RES 330R 5% 0.25W 1206	RS 169-070	4		R50 - R53
42	ZYRES5	RES 270R 5% 0.25W 1206	RS 136-698	6		R60, R61, R63 - R66
43		RES 56K 1% 0.25W 1206	RS 223-2495	1		R71
44	ZYRES7	RES 33K 1% 0.25W 1206	RS 223-2451	2		R72, R73
45	ZYRES26	RES 22K 1% 0.25W 1206	RS 223-2439	1		R74
46						
47						

Production Cross Reference:

Drawing Number: Q10174/IL

Items List for: Q10174/AS **Approved for Production:** _____

QUAD POWER AMP FRONT PCB ASSEMBLY

Issue: 2 **Date:** 31/08/1999 **Change Number:**

Item No.	Part No.	Description	Manf. Part No.	Qty	Iss	Remarks
48		CAP 47uF 10% R.E. 35V 85oC	RS 224-4268	2		C1, C5
49		CAP 100PF 5% 100V CE 1206	FAR 757-159	2		C2, C3
50	ZYCAP18	100NF 10% 63V 1206	FAR 499-389	5		C4, C6 - C8, C29
51		CAP 68NF 10% 50V 1206	FAR 718-634	8		C9, C10, C13, C14, C19, C20, C23, C24
52	ZYCAP15	CAP 3N3 10% 63/50V 1206	FAR 718-622	8		C11, C12, C15, C16, C21, C22, C25, C26
53	ZYCAP47	220N 25V 10% 1206	FAR 578-241	4		C17, C18, C27, C28
54		CAP 470uF 10% R.E. 35V 85oC	RS 205-1909	4		C30 - C33
55	ZCAP017	2N2 10% 50V CE 1206 SURFACE	RS 264-4090	4		C34 - C37
56	ZCAP051	85oC 10uF DIPPED TANT 16V 5mm	RS 262-4349	1		C38
57						
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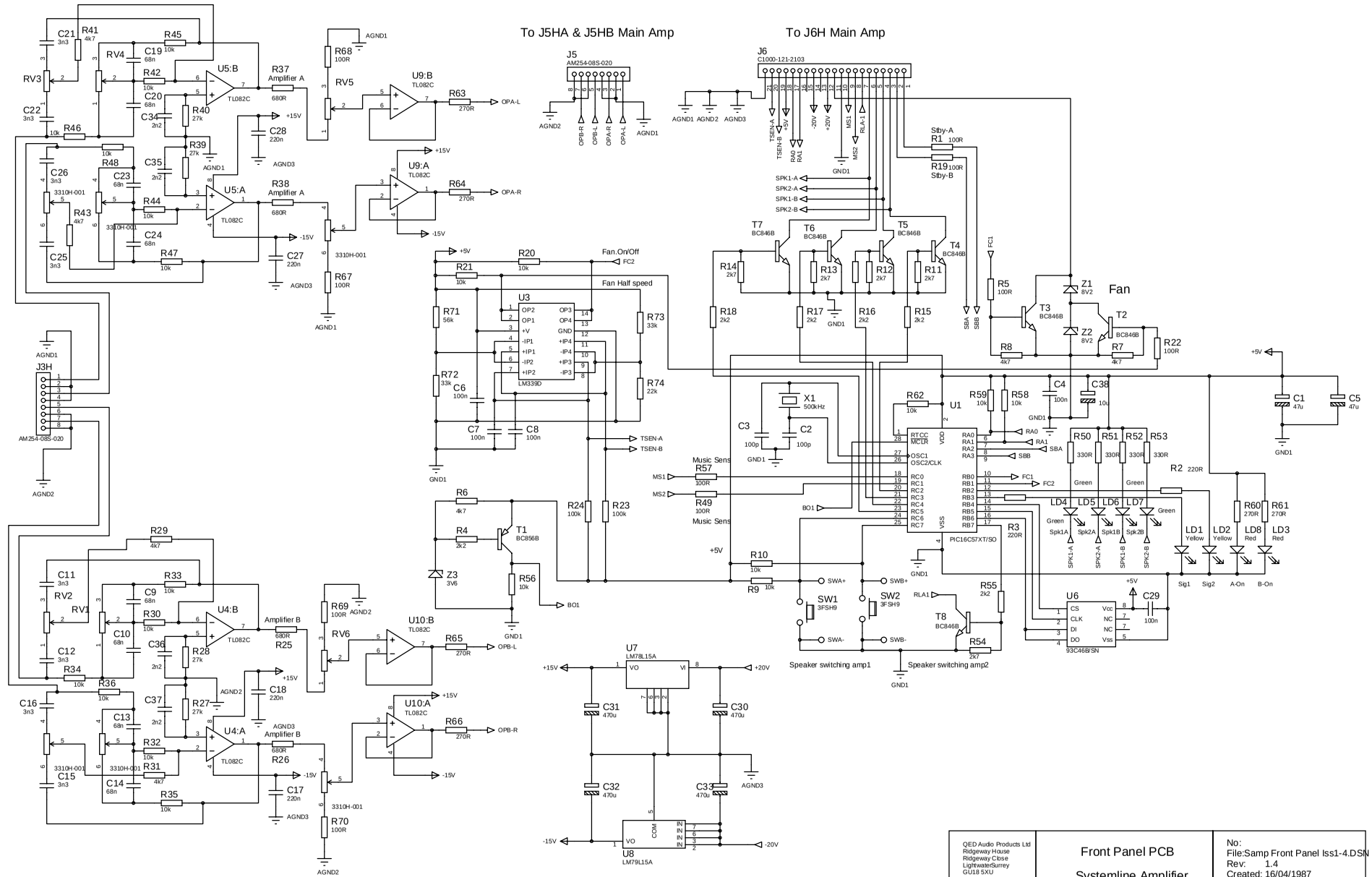
71						

Production Cross Reference:


To J5HA & J5HB Main Amp
To J6H Main Amp
Fan
Fan.On/Off
Fan Half speed
Music Sens
Speaker switching amp1
Speaker switching amp2
Stby-A
Stby-B
QED Audio Products Ltd
Ridgeway House
Ridgeway Close
Lightwater Surrey
GU18 5XU
TEL: 01276 451166
FAX: 01276 452211
Front Panel PCB
Systemline Amplifier
Drawn by:Steve Privett
No:
File:Samp Front Panel Iss1-4.DSN
Rev: 1.4
Created: 16/04/1987
Modified:09/09/1999
Page: