

FMJ

Service Manual

Issue 1.0

P1 Amplifier



ARCAM
Bringing music & movies to life

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Fmj P1 Amplifier circuit description by A.Moore

Product description

The P1 has been designed to provide unsurpassed sound quality, the main design features are as follows.

- **Gain switchable between Arcam gain and THX gain (29dB closed loop) a 0dB signal equates to 100 watts into 8 ohms.**
- **Input switchable between unbalance phono and balance XLR.**
- **The amp is capable of producing >180 watts of sinusoidal output into an 8 ohm load and greater than 300 watts into a 3.2 ohm load (subject to thermal dissipation limits).**
- **Relay coupled for silent on/off operation.**
- **Opto-isolated fault and control lines to the control PCB.**
- **DC coupled signal path with integrating servo to remove residual DC errors.**
- **Instantaneous safe operating area protection.**
- **Exceptionally low harmonic and intermodulation distortion.**
- **Flat frequency response.**
- **Fast and asymmetric slew rate.**
- **High damping factor**
- **Unconditionally stable into loads of upto +/- 90-degree phase.**

Power supply/Control description

The mains input is applied via SKT1. Y capacitors C1 and C2 and X capacitor, C5 provide filtering and EMC suppression R2 provides a discharge path for the capacitors.

SW1 allows the selection of the mains voltage that the unit will operate from, the main standby transformer TX1 and the main transformer TX2 have dual primary windings, these windings are connected in parallel for 115v operation and in series for 230v operation.

TX1 is powered at all times when a mains voltage is applied to the mains input socket the secondary of this transformer is fused by via FS3 and rectified by diode bridge DBR1 and regulated to 5V by low dropout regulator at location REG2 to provide a constant +5v(D) supply for the micro.

Please note: the digital supply ground is connected to the chassis ground via a 100-ohm resistor.

Relay RLY1 provides a means of powering the main transformer for normal operation (as opposed to standby operation where only TX1 is powered) this relay is under the control of the Micro IC1 and SW3 on the control board the relay contacts of RLY1 are suppressed by C3 and C4 these prevent sparking and increase the relay life span.

The circuitry around TR10 functions as a mains present detection circuit A.C is feed into this circuit before the Bridge network at location DBR1 when mains is present the circuit drives HI via opto-coupler TR11.

Relay 2 is the speaker output control relay this is used to prevent clicks and pops at power/power down and to disconnect the speaker output under a fault condition, this relay is controlled by the Micro at location IC1 as the P1 has no manual speaker switching capabilities the micro will automatically initialise the speaker relay 3 seconds after power up, the control line SPKR1 on pin 5 of CON 4 switches high to switch the relay ON via TR9.

The P1 has two trigger inputs these are applied by SKT2 and are wire OR-ed by D5 and D6. The single trigger signal is clamped to 4v7 by DZ1 and fed to the control card by CON4. Applying a 12v trigger signal to either (or both) trigger inputs on the SKT2 instructs the microcontroller to enable or disable the power amplifier. The trigger will be seen as a HI line on Pin 11 of CON 4.

The P1 also provides two 2 triggered outputs. These are current limited 12v D.C levels, which are used to provide trigger signals to other units within the customer's installation. The 12v output is present when transformer TX2 is live i.e. when the unit is not in standby.

TX2 has a Low voltage secondary winding that supplies the trigger outputs only via bridge rectifier DBR4 this is fed into REG1 (7812) regulator, TR1 and TR2 offer a 60mA current limit for both trigger outputs and the entire circuit stage is fused by FS6 (T315mA) in case of overload.

The P1 utilizes a fairly unique **main power amp** power supply configuration these include.

Fig 1. Power amp power supplies.

Power supply	Powers
+/- 67v D.C	VAS stage.
+/- 58v D.C	Output driver stage.

The two sets of supplies are driven from their own secondary windings and bridge rectifier circuits DBR5 and DBR6 Rectify the +/- 58v rails these are smoothed by 20,000uf of capacitance per phase. DBR2 and DBR3 are supplying the +/- 70v rails these are dropped to +/- 67 by the Network of R5, R6, R7, R8 and TR3, TR4, TR5, TR6 this is not a regulated supply as the rails need to track the +/- 58v rails under mains power fluctuations.

Please note: The +/- 70v rails are individually fused by 315mA(T) fuses at locations FS4 and FS5.

The VAS stage is supplied by higher voltage rails than the following output driver stage, this allows the driver stage to fully saturate the output driver stage without the use of a boot strap circuit. This supply is exceptionally quite and is critical to the sound quality of the P1.

Amplifier Stage

The XLR connector at CON100 allows balanced inputs to be applied to the amplifier and CON101 allows for the balanced signal to be daisy chained to a second P1.

The signal from CON100 is driven into IC100 this is a Balanced to single ended converter it supplies a signal-ended output from a single XLR input. The IC derives its power supply rails from the +/- 67v rails these are dropped to +/- 15v by the TR100 and TR114.

The unbalanced inputs signal arrives at SKT100; the selection between the two input options is accomplished by SW100. The selected signal is clamped +/- 5v3 by the series Zeners at location DZ103 and DZ104 this is to prevent damage to the input of op-amp IC200, due to leaky source signal or electrostatic discharges.

SW101 allows for the selection of two gain settings these are 28.3 for "THX" and 37.5 for the Arcam setting. The roll off setting is 340Khz.

The main power amplifier circuit is a classic current feed-back design and can be thought of as a large current feed-back op-amp the topology is a refined high power output variant of the A90/P7 design.

Op-amp IC101 is configured as a non-inverting amplifier with a gain of 2. Its purpose is to provide current outputs (via its own power supply pins) and a current input via its output pin, the Op-amp performs the voltage to current conversion (I-V) and phase splitting necessary to drive the voltage gain stage. The current feed-back occurs because the output of IC101 drives into a 44 ohm load formed by the two 22 ohm resistors R142 and R143 down to ground, the power

supply pin currents are half wave-rectified versions of the drive current of the amplifier. This causes the voltage gain, which is buffered and passed on to the outputs. The feedback from pin 1 of IC101 acts to reduce the gain of the amplifier; when this current is roughly equal to the current required to drive the input signal into 44-ohm's equilibrium is reached and the closed loop gain is defined. The output stage provides the vast majority of the current required to drive the 44-ohm load. The op-amp only needs to provide a very small error current to give the required voltage magnification.

Transistors TR101 and TR116 are common base amplifiers their purpose is to provide the +/- 15v rails necessary to drive the op-amp whilst allowing the power supply currents that are drawn to pass through into the Wilson current mirror stage, this is formed by PNP transistors TR102, TR104 and TR122 the NPN mirror is formed by TR115, TR117 and TR122.

TR103 combines the two current mirrors to provide a very high-gain current to voltage (transresistance) gain stage roughly 80dB at low frequency C114 and C132 with R149, R150 combine to give a open-loop pole at roughly 10Khz and a corresponding open-loop zero around 500Khz. This allows for good time domain performance and clean square wave reproduction with no sign of ringing or overshoot.

Diodes D100 and D101 act to limit the current through TR115 and TR112, if the input current exceeds 14mA the diodes conduct and the transresistance stage becomes a constant current source killing the open loop gain and preventing damage to the transistors.

IC101 forms a D.C intergrating servo. Its purpose is to remove residual D.C errors due to slight device mismatch and component tolerances. It is configured as an inverting intergrator with a time constant of <0.5 seconds. Any D.C offset at the output of the amplifier will cause the output if the op-amp to go negative increasing the current in the negative supply pin and thus pulling the output down to ground (and vice versa). D108 protects the inverting input of the op-amp under fault condition.

TR103 provides a 4.7v bias voltage to allow the following pre-driver stage to operate in Class A.

TR123 and TR125 form a Class A pre-driver emitter follower stage to boost the current gain and isolate the transresistance stage from the output transistors. TR105 and TR118 act as a 30mA current limit and prevent the destruction of TR123 and TR125 under a fault condition.

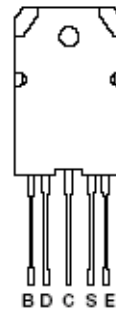
R109, R164, R110 and R165 loosely decouple the emitters of TR123 and TR125 from the output stage.

TR128, TR129 and TR126, TR127 are Sanken SAP 15N and SAP 15P Bi-polar output drivers RV100 is the Bias adjust preset D104 protect the Output drivers from destruction if RV100 goes open circuit.

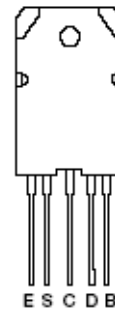
C144 to C147 provide local R.F stability and prevent oscillation. D111 and D112 are catch diodes to reduce the effects of back-EMF from the loudspeaker coils/load.

R164, R183, C150 and L100 form the Zobel network, these components ensure that the amplifier sees a constant load of 4.7 ohms at high at very high frequencies and improve stability – reduce H.F noise. L100 and R183 decouple the load at high frequencies to ensure amplifier stability into capacitive loads.

SAP 15NY



SAP 15PY



S-E 0.22 Ohm

Under output driver failure conditions the **0.22** internal emitter resistor will usually go open, the resistor should be measured between pins S and E.

Protection circuit block

The P1 Power amplifier incorporates 4 modes of protection these are as follows.

- **Instantaneous VI current limiting.**
- **D.C offset protection.**
- **Over-Temperature.**
- **Insulation failure.**

The **VI current** limit circuit is built around TR106 and TR119 they sense the voltage across the 0.22-emitter resistors (hence emitter current) and the collector emitter current or device power dissipation exceeds a preset limit.

The circuit is designed to allow large unrestricted currents into loads of 3 ohms and above but limit the current into a short circuit or very low impedance loads.

C141, C142 and R162, R163 form a 2.2ms time constant, which will allow larger transients of current delivery for a few milliseconds, to ensure that the amplifier has a sufficiently large transient capability to drive “difficult” loudspeaker loads.

TR106 senses positive current surges and TR119 senses negative surges these intern activate TR107 and switch the optocoupler OPTO100A this fault notification is sent to the microcontroller and the output relay is switched off to protect the amplifier/loudspeaker coils.

The **D.C offset** protection is built around TR108 and TR109 a positive D.C offset will switch TR108, a negative D.C offset will switch TR120 this will intern switch TR110 and TR109 on in either case this causes the optocoupler at location OPTO100B to transmit a fault line signal to the micro.

The Thermistor RTH100 provides **Thermal protection** and is connected to the positive supply rails adjacent to the collector leg of the output driver at location TR125 this allow the thermistor to sense the temperature of the output device. The output impedance of

RTH100 is low when the amplifier is cool typically a few hundred ohms, in the event of a thermal overload situation (Above 110 c) RTH100 will go into a high impedance state this will switch TR121 on and intern this will switch TR111 on and cause OPTO 100C to send a fault line flag to the micro.

The remaining protection stage is an **insulation breakdown** detect circuit this is essentially looking for a breakdown of the insulating pad between the output devices and the heatsinks thus +60v path to ground.

The protection is formed around bridge rectifier package DBR100, this will route current through the LED in optocoupler OPTO 100D in the event that the DGND and AGND ground planes move apart by more than 10v. When the transistor in the Opto conducts the thyristor formed by TR112 and TR132 is turned On.

Once the Thyristor conducts it pulls the SHUTDOWN* signal low and turns TR8 (Sheet 2) off thus opening both Speaker relays and the Power relay.

Please note: The unit can only be reset once the mains power supply to the unit has been removed and the Amplifiers own power supplies have been given sufficient time to discharge +30 secs. The standby transformer of course remains active.

TR130 asserts the microprocessor fault line DCPROT so that the micro can indicate the fault via the front panel mounted LED.

Fig 2 Fault line location and operational status.

Please note: Con 4 is the connector between the main board and the display board, use Pin 2 of Con 4 as a reference (DGND).

Fault line	Location	Status
D.C offset	Con 4 Pin 9	LOW (0v)
V/I Prot	Con 4 Pin 8	LOW (0v)
Thermal	Con 4 Pin 7	LOW (0v)

Test Specification

Frequency response. 8-ohm load

Input set to 1v rms

20Hz – 20kHz = +/- 0.5 dB.

Distortion. THD+N 0dB 4-ohm load.

Input set to 1v rms.

20Hz – 20Khz = <0.02%

Maximum output into an 8-ohm load.

Input level set to 1.34 rms 1Khz = 180 watts
distortion should be below 0.05% THD+N

Bias setting notes

The bias of the P1 is set using an Audio precision audio analysis package and we calibrate the power stage for minimum THD the bench set up procedure follows.

- Set the input signal to 150mv rms, frequency to 10kHz. Induce a 4-ohm load at the speaker output.
- Rotate preset RV100 clockwise and observe that the THD falls. Continue to rotate the preset until the THD falls to a minimum level and just starts to clime again.
- Switch input signal off and allow the amplifier the Quiesce +30secs
- Measure the bias level at test point Con 103 (Bias read) and confirm the reading is below the absolute max of 35mV.

Major component identification.

FMMT 497/597

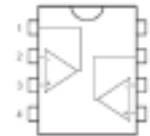


BC849/BC859

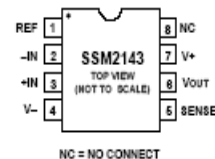


1=Base
2=Emitter
3=Collector

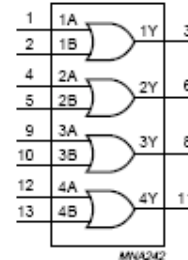
TLO 72

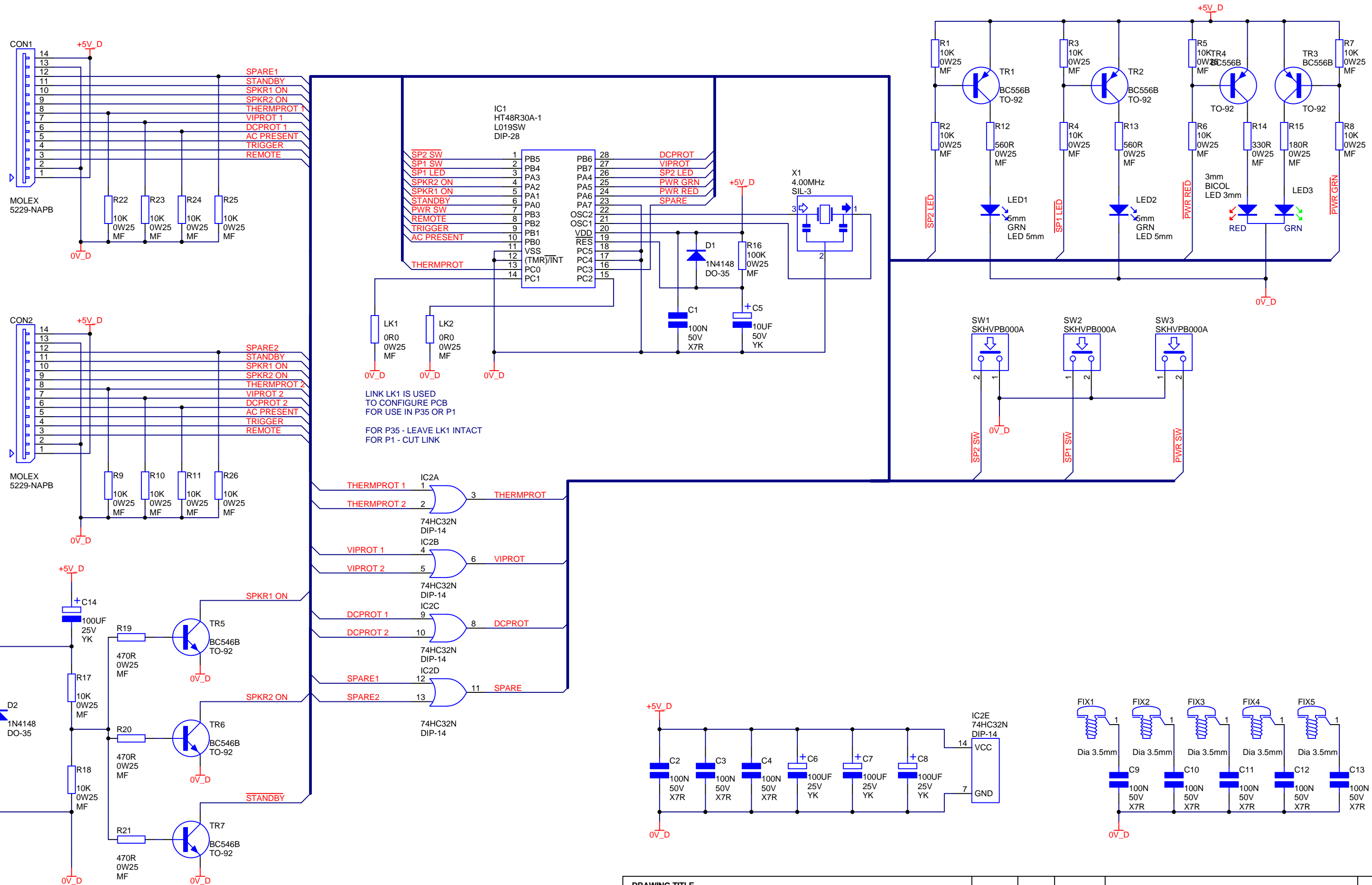


SSM2143

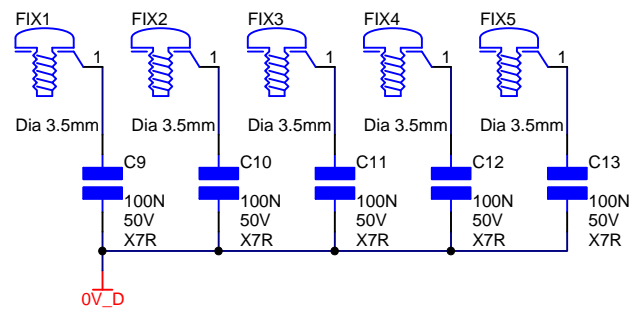
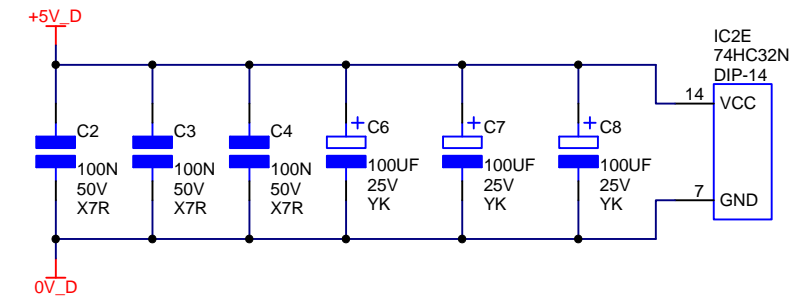


74HC32N



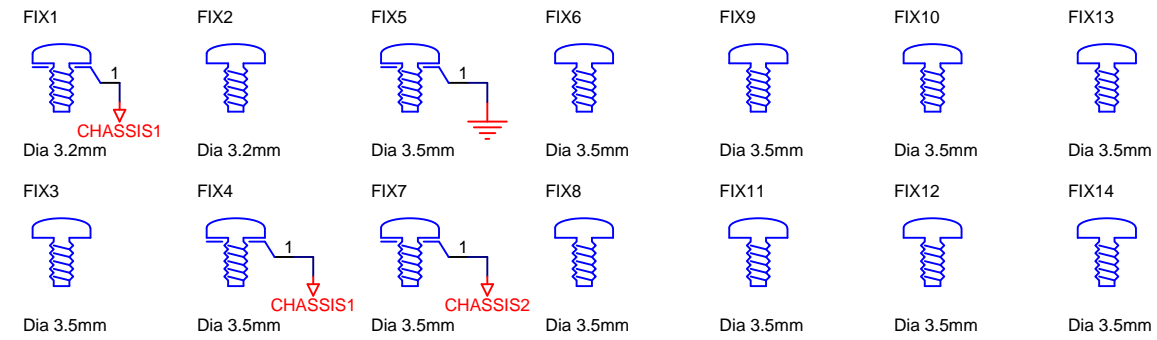
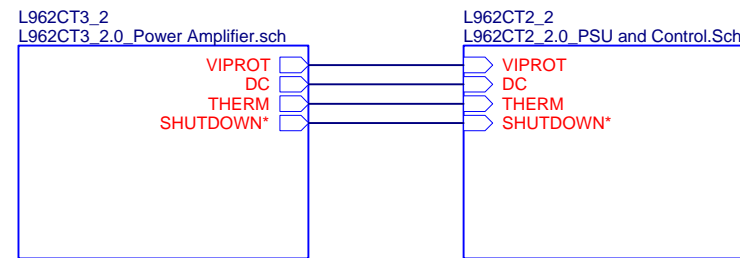


LINK LK1 IS USED TO CONFIGURE PCB FOR USE IN P35 OR P1
FOR P35 - LEAVE LK1 INTACT
FOR P1 - CUT LINK



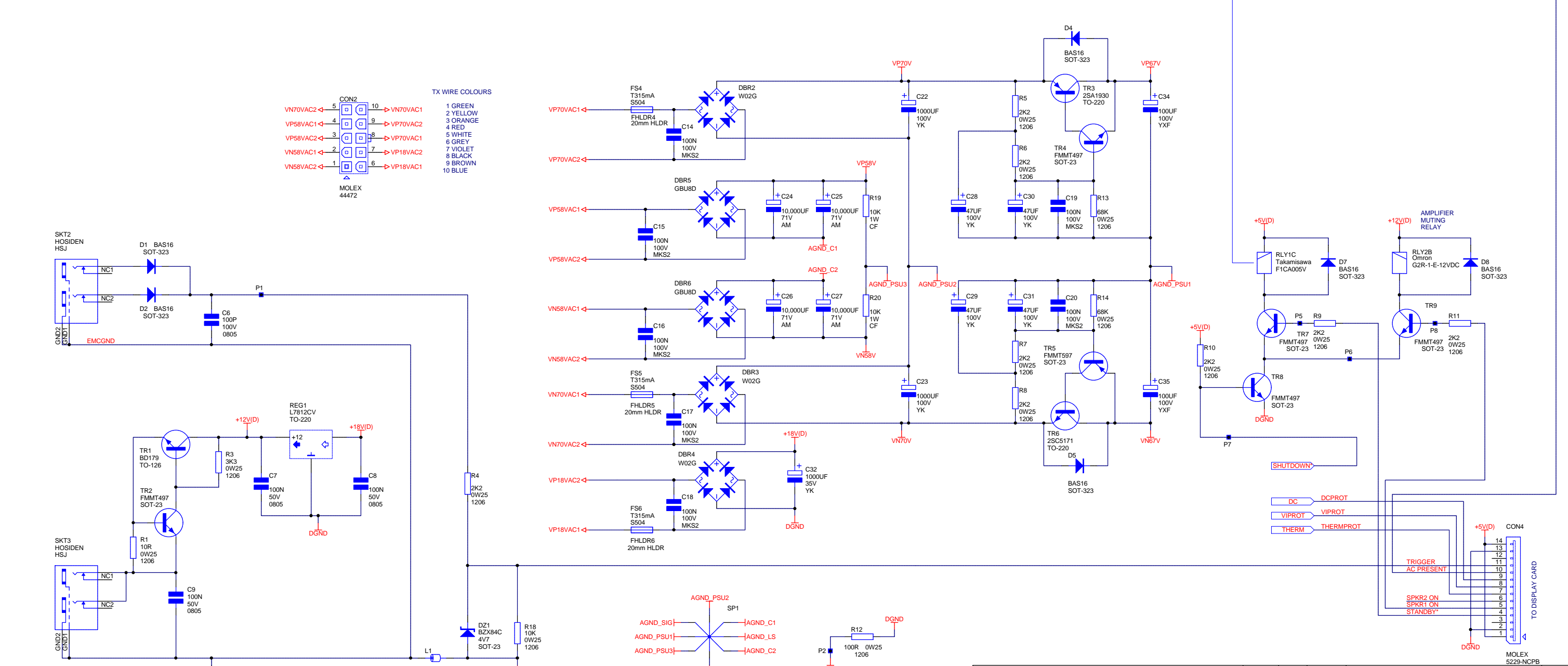
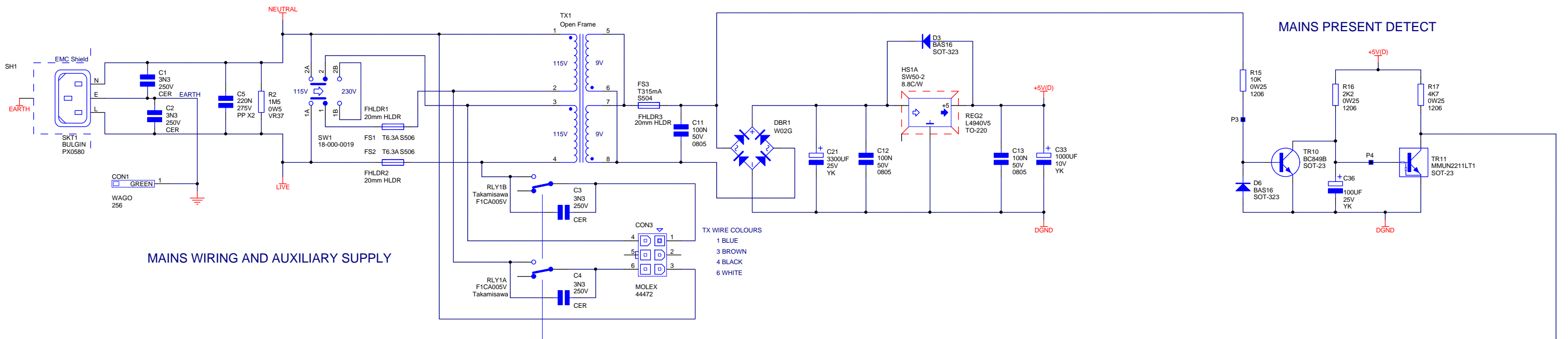
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P35 / P1 Switch PCB								
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	Notes:		03_E001	WAF	2/01/02	HOLTEK, Z1 UPDATED	B.1	
				JR	1/11/01	LEDS TO 5MM AND MAINS SWITCH	B.0	
Contact Engineer:	Kevin Lamb	Contact Tel:	(01223) 203243	Printed:	13-May-2003	Sheet 1 of 1	A3	DRAWING NO. L929CT

ITEM	QTY	PART No.	DESCRIPTION	NOTES
ITEM1	1	F006	Clip For SW Profile Heatsink	Clip for REG1
ITEM2	1	F022	Fuseholder Cover For 20mm Fuseholder	Cover For FHLDR1
ITEM3	1	F022	Fuseholder Cover For 20mm Fuseholder	Cover For FHLDR2
ITEM4	1	F022	Fuseholder Cover For 20mm Fuseholder	Cover For FHLDR3
ITEM5	1	F022	Fuseholder Cover For 20mm Fuseholder	Cover For FHLDR4
ITEM6	1	F022	Fuseholder Cover For 20mm Fuseholder	Cover For FHLDR5
ITEM7	1	F022	Fuseholder Cover For 20mm Fuseholder	Cover For FHLDR6
ITEM8	1	L962PB	Blank PCB P1 Amplifier Main Board	
ITEM9	2	E802AP	Pad Damping 15x6x3MM Sorbothane	See Assy Drawing for location
ITEM10	3	E826AP	Pad Damping 7.5x6x3 Sorbothane	See Assy Drawing for location
ITEM11	1	8M101	Earth Lead Assy 75MM	

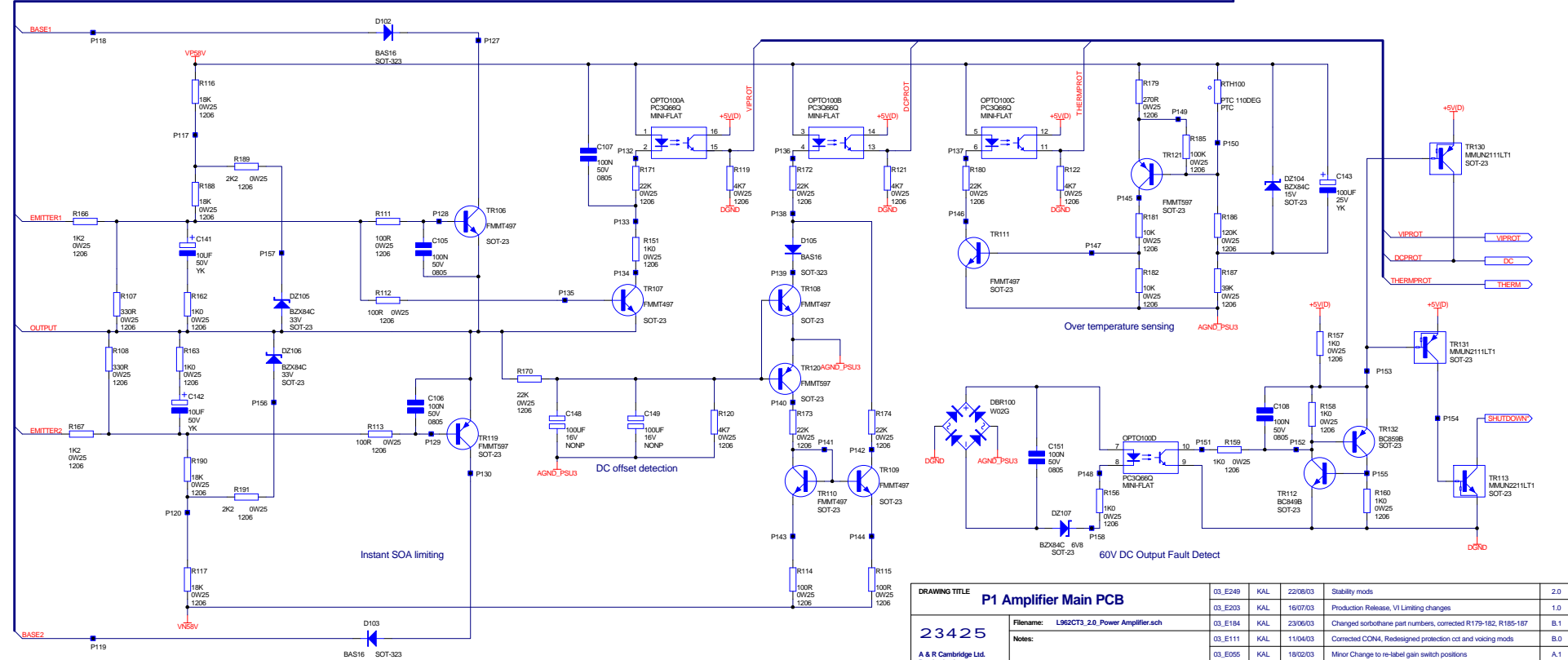
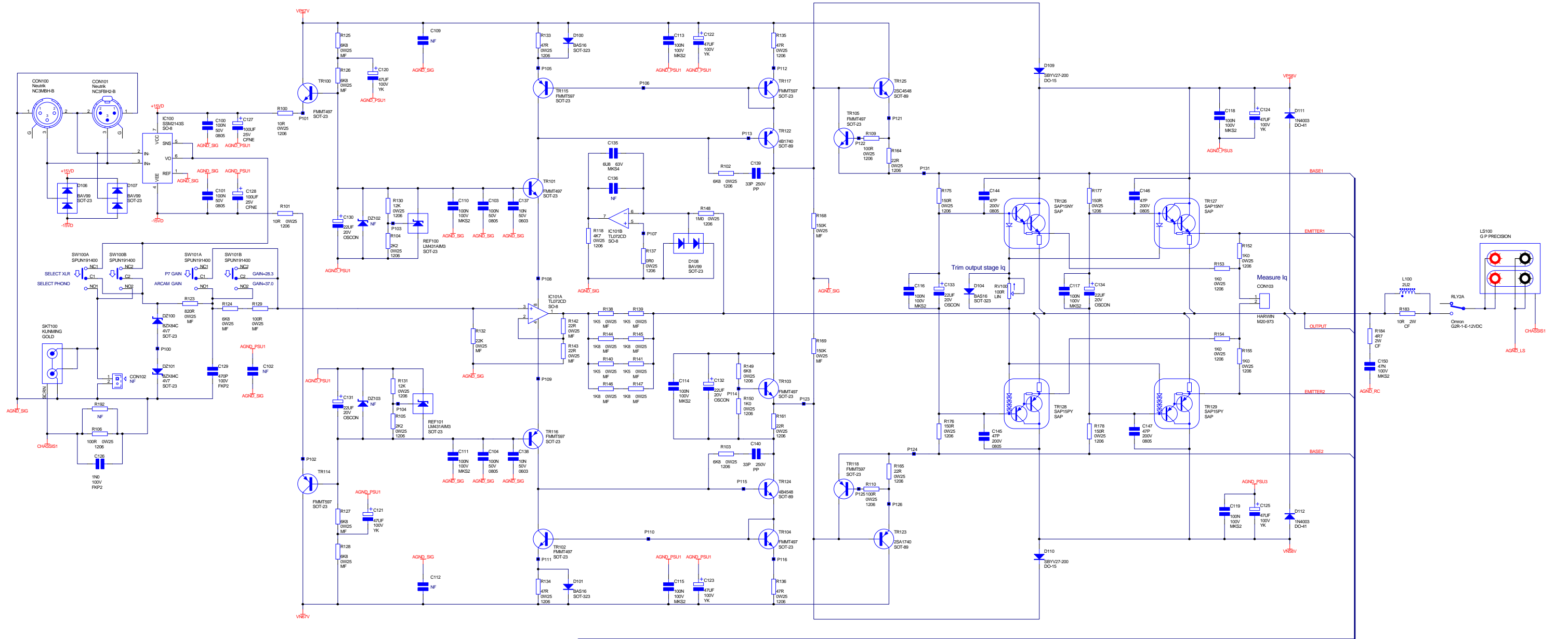


- FD1
- FD2
- FD3
- FD4
- TOOL1
- TOOL2
- TOOL3
- TOOL4

DRAWING TITLE		ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
P1 Amplifier Main PCB 23425 A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB		03_E249	KAL	22/08/03	Stability mods	2.0
		03_E203	KAL	16/07/03	Production Release, VI Limiting changes	1.0
		03_E184	KAL	23/06/03	Changed sorbothane part numbers, corrected R179-182, R185-187	B.1
		03_E111	KAL	11/04/03	Corrected CON4, Redesigned protection cct and voicing mods	B.0
		03_E055	KAL	18/02/03	Minor Change to re-label gain switch positions	A.1
Filename: L962CT1_2.0.Sch	Contact Engineer: Kevin Lamb	Contact Tel: (01223) 203243	Printed: 22-Aug-2003	Sheet 1 of 1	DRAWING NO. L962CT1	



DRAWING TITLE		03_E249	KAL	22/08/03	Stability mods	2.0
P1 Amplifier Main PCB		03_E203	KAL	16/07/03	Production Release, VI Limiting changes	1.0
23425		03_E184	KAL	23/06/03	Changed sorbothane part numbers, corrected R179-182, R185-187	B.1
A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB		03_E111	KAL	11/04/03	Corrected CON4, Redesigned protection cct and voicing mods	B.0
Contact Engineer: Kevin Lamb		03_E055	KAL	18/02/03	Minor Change to re-label gain switch positions	A.1
Contact Tel: (01223) 203243		ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
Printed: 22-Aug-2003		Sheet 2 of 3		DRAWING NO. L962CT1		



DRAWING TITLE		03_E249		22/08/03		Stability mods		2.0	
23425		03_E203		16/07/03		Production Release, VI Limiting changes		1.0	
A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB		03_E184		23/06/03		Changed software part numbers, corrected R179-182, R185-187		B.1	
Contact Engineer: Kevin Lamb		03_E111		11/04/03		Corrected CON4. Redesigned protection opt and wicking mods		B.0	
Contact Tel: (01223 203343)		03_E055		18/02/03		Minor Change to re-label gain switch positions		A.1	
Printed: 20-Aug-2003		EQU No: 019145		DATE		DESCRIPTION OF CHANGE		55/06	
Sheet 3 of 3		DRAWING NO.		L962CT					

Transformer Specification For 115/230V P1 transformer

Arcam Part Number L926TX

Material Safety Specification

1. Winding Wire to be Grade 2 (130C rating) to BS 60317-4 1995
2. Mylar Polyester Insulator 130C Rated
3. Potting Compound PC3502 E135297(M) or equivalent.

Mechanical Specification

1. Centre of transformer to be potted (as shown).
2. Primary windings connect to 6 way MOLEX connector 39-01-2065. Secondary windings connect to 10 way molex connector 39-01-2105. Use MOLEX pin 44476-3112. MOLEX connectors have pin numbers indicated on them. Connectors to be UL94V0 rated.

Note Molex UL94V0 receptacles may be long lead time items.

Equivalent Conexcon 6740 Series UL94V0 parts may be used.
6 Way receptacle 6740-1060
10 Way receptacle 6740-1100

3. Primary wires are enclosed in a common sleeve. Secondary wires are enclosed in a common sleeve. Use UL rated sleeving.

4. All wire lengths in mm. Lengths are +5.0, -0

5. Please adhere rubber insulating pad to bottom of transformer as shown.

Electrical Specification

1. Transformer to have dual 115V primaries to allow parallel operation for 115V input and series operation with 230V input.

2. Transformer input voltage range

115V -18% +14% (97.5V to 132.5V)
230V -18% +14% (195V to 265V)

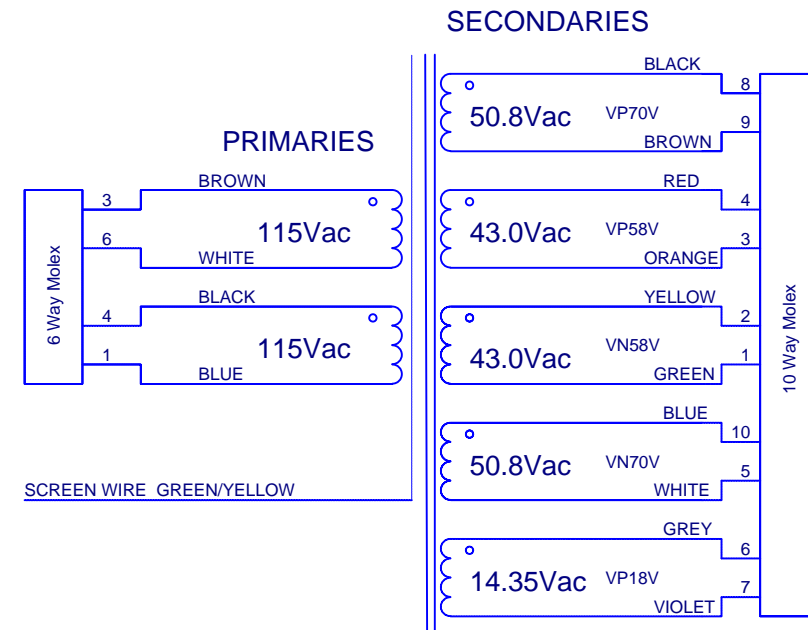
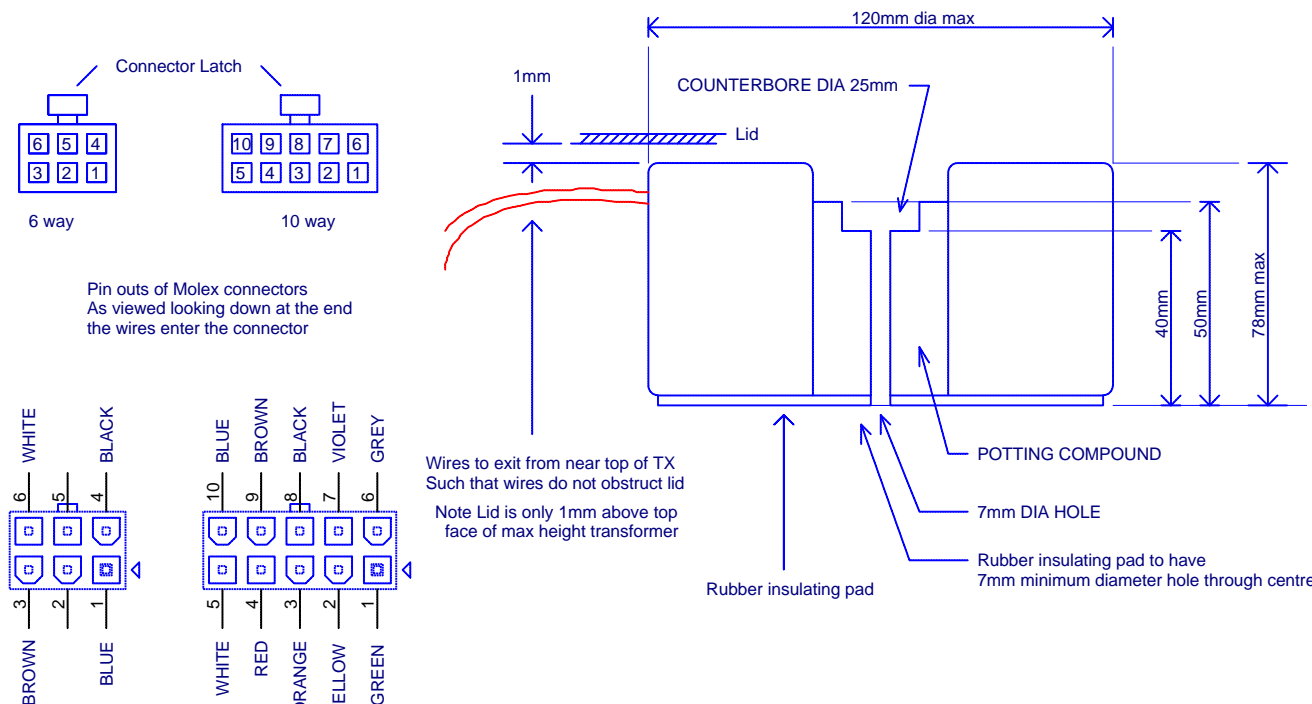
3. Transformer to have 5 secondary windings as show in the adjacent drawing.

4. Loaded DC voltages specified at 230V AC in (with transformer primaries in series)
5. Each secondary winding to have a full wave (4diode) bridge to produce a single DC rail. (AS shown in diagram)

6. Output Capacitance to be as specified per rail.

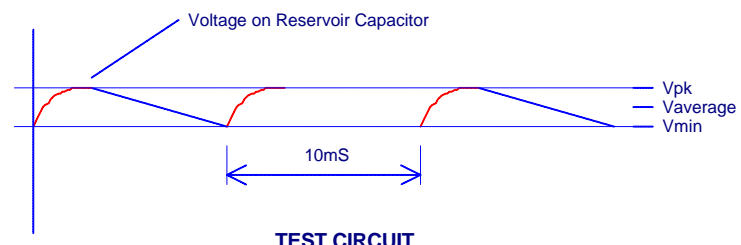
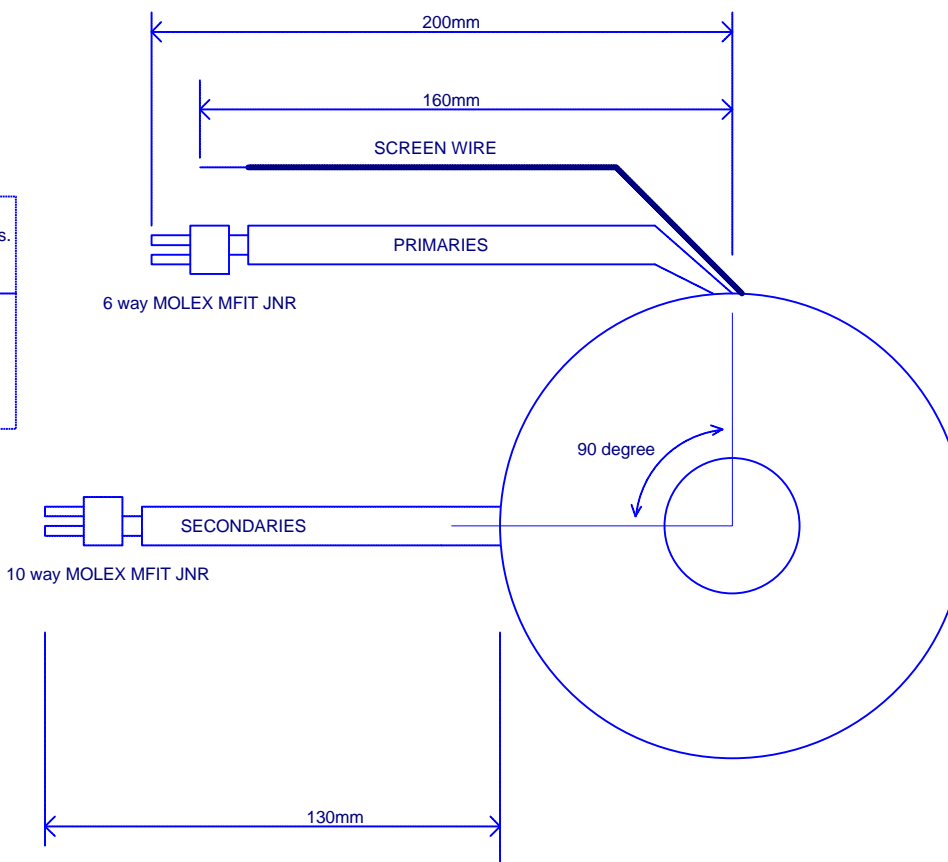
7. Output voltages to be as specified in table and as shown in diagram.

8. Note. Transformer to be used in a power amplifier. The specified load currents on the high power rails (VP58V, VN58V) represent the effective current drawn when the amplifier is loaded to full rated power (200W) into an 8ohm load and operated continuously. This load current is not typical of normal operation which is considered to be 1/8th of full rated power.

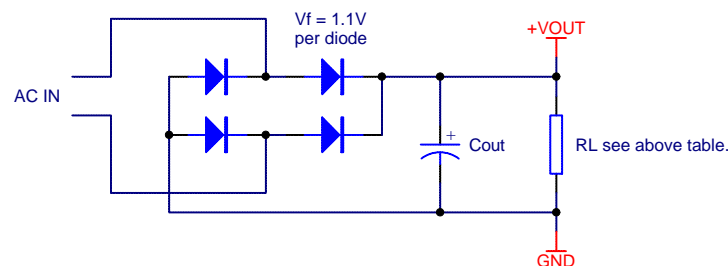


Secondary Winding Voltage and Current Specs
Bridge Rectifier Vf diode = 1.1V per leg = 2.2V Total
(ideal TX assumed)

AC Winding Label	Capacitor Cout (uF)	Effective DC Load Current (mA)	Secondary Voltage (V r.m.s.)	Capacitor Peak Voltage Vpk (Volt)	Capacitor Min Voltage Vmin (Volt)	Capacitor Average Voltage (Volt)	Load Resistor to simulate Load RL (Ohm)	Secondary Winding r.m.s. Current (A r.m.s.)
VP70V	1000	50	50.8	70.2	69.8	70.0	1400	0.25
VP58V	20,000	2250	43.0	58.8	57.8	58.3	25.6	8.0
VN58V	20,000	2250	43.0	58.8	57.8	58.3	25.6	8.0
VN70V	1000	50	50.8	70.2	69.8	70.0	1400	0.25
VP18V	1000	175	14.35	18.75	17.25	18.0	102.8	0.52



TEST CIRCUIT



DRAWING TITLE		POWER TX FOR P1 115/230V		03_E240	KAL	Reduced VP58V, VN58V to 43.0Vac	1.0
ARCAM A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB		Filename:	L926TX_1.0.sch	03_E193	SLS	'UL rated sleeving' was 'UL94-V0'	B.3
		Notes:		03_E192	KAL	Added note about UL94-V0 sleeving	B.2
				03_E158	KAL	Corrected Schematic Symbol pin numbers	B.1
				03_E141	KAL	Changed Pri wire colours, VP58 and VN58 +1V, lead out forms	B.0
		ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE	
Contact Engineer:	Kevin Lamb	Contact Tel:	(01223) 203243	Printed:	7-Aug-2003	Sheet 1 of 1	A3 DRAWING NO. L926TX

Transformer Specification For 100V P1 transformer

Arcam Part Number L927TX

Material Safety Specification

1. Winding Wire to be Grade 2 (130C rating) to BS 60317-4 1995
2. Mylar Polyester Insulator 130C Rated
3. Potting Compound PC3502 E135297(M) or equivalent.

Mechanical Specification

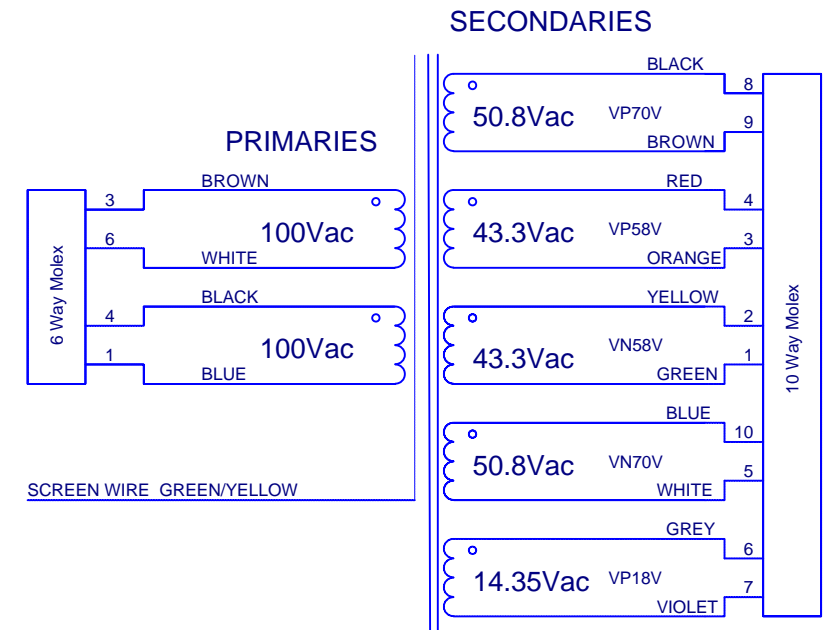
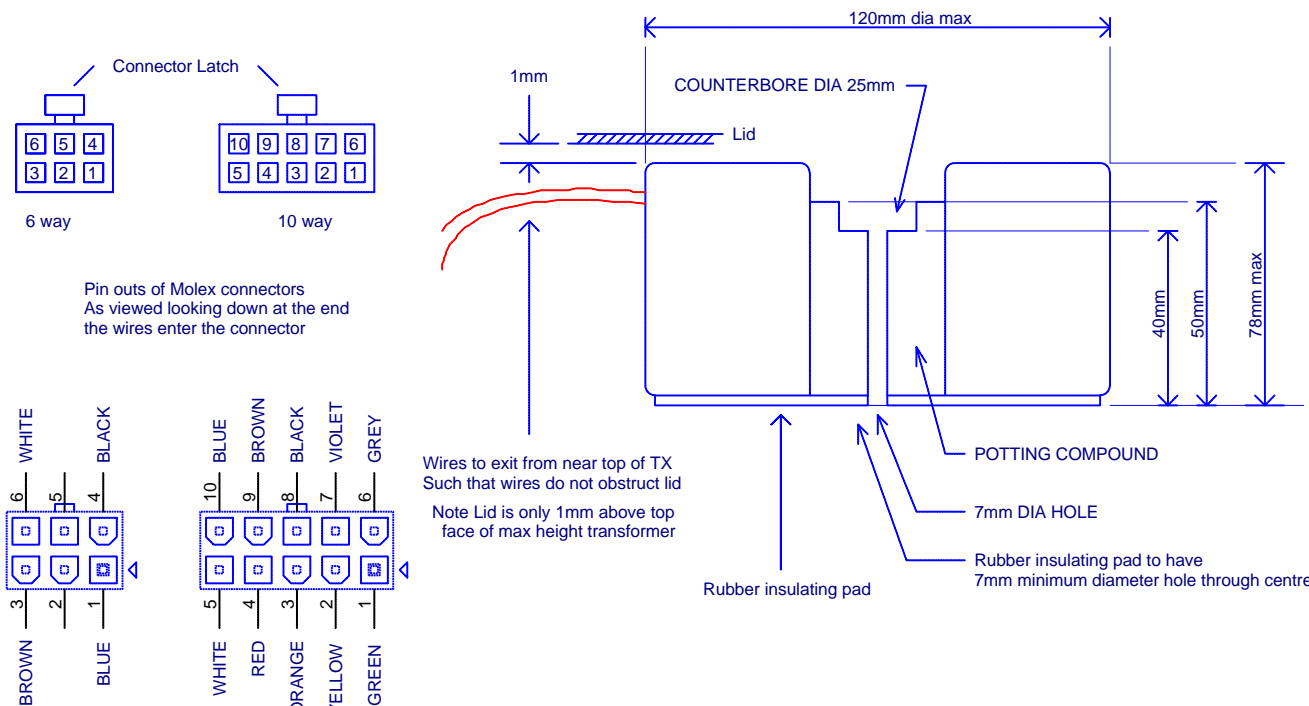
1. Centre of transformer to be potted (as shown).
 2. Primary windings connect to 6 way MOLEX connector 39-01-2065. Secondary windings connect to 10 way molex connector 39-01-2105. Use MOLEX pin 44476-3112. MOLEX connectors have pin numbers indicated on them. Connectors to be UL94V0 rated.
- Note Molex UL94V0 receptacles may be long lead time items.
- Equivalent Conexcon 6740 Series UL94V0 parts may be used.
6 Way receptacle 6740-1060
10 Way receptacle 6740-1100

3. Primary wires are enclosed in a common sleeve. Secondary wires are enclosed in a common sleeve.

4. All wire lengths in mm. Lengths are +5.0, -0
5. Please adhere rubber insulating pad to bottom of transformer as shown.

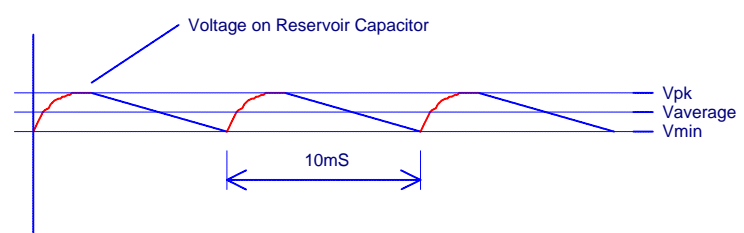
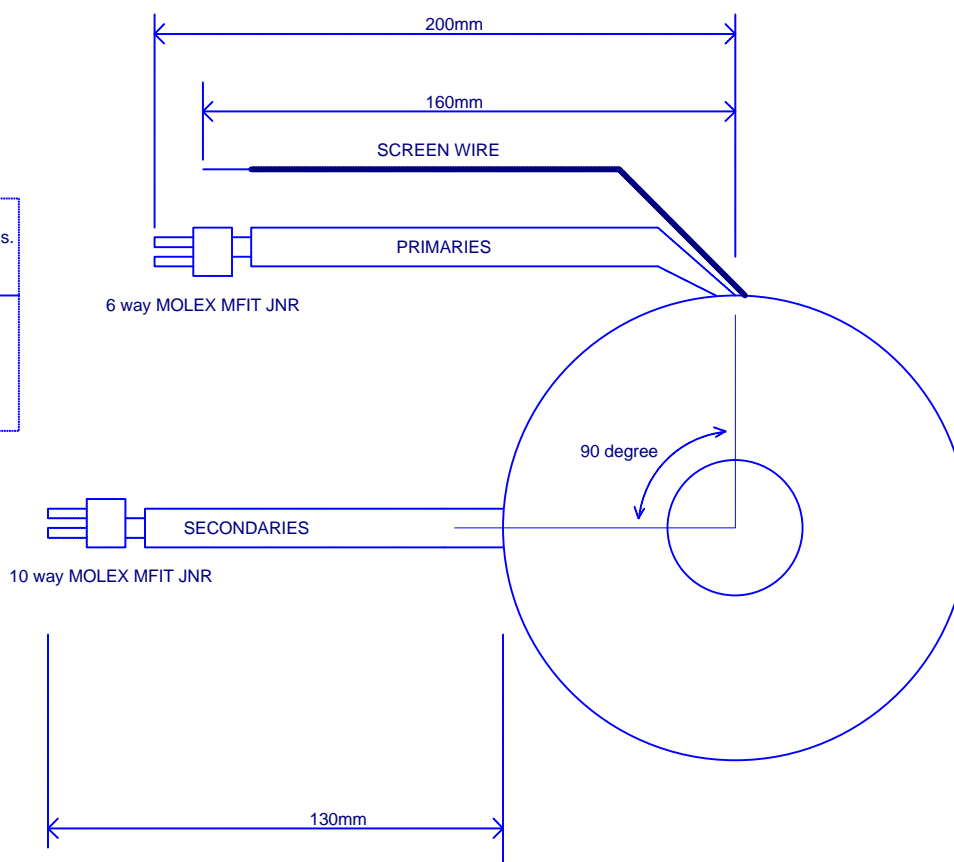
Electrical Specification

1. Transformer to have dual 100V primaries to allow parallel operation for 100V input.
2. Transformer input voltage range
100V -15% +15% (85V to 115V)
3. Transformer to have 5 secondary windings as show in the adjacent drawing.
4. Loaded DC voltages specified at 100V AC in (with transformer primaries in parrallel)
5. Each secondary winding to have a full wave (4diode) bridge to produce a single DC rail.
(AS shown in diagram)
6. Output Capacitance to be as specified per rail.
7. Output voltages to be as specified in table and as shown in diagram.
8. Note. Transformer to be used in a power amplifier. The specified load currents on the high power rails (VP58V, VN58V) represent the effective current drawn when the amplifier is loaded to full rated power (200W) into an 8ohm load and operated continuously. This load current is not typical of normal operation which is considered to be 1/8th of full rated power.

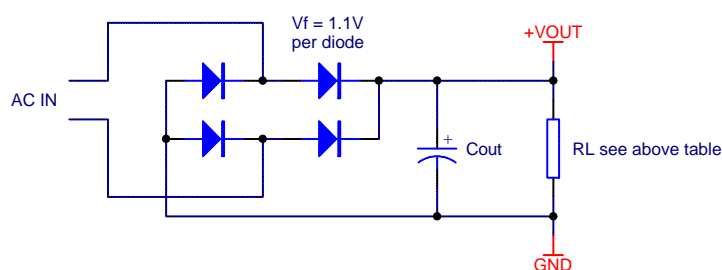


**Secondary Winding Voltage and Current Specs
Bridge Rectifier Vf diode = 1.1V per leg = 2.2V Total
(ideal TX assumed)**

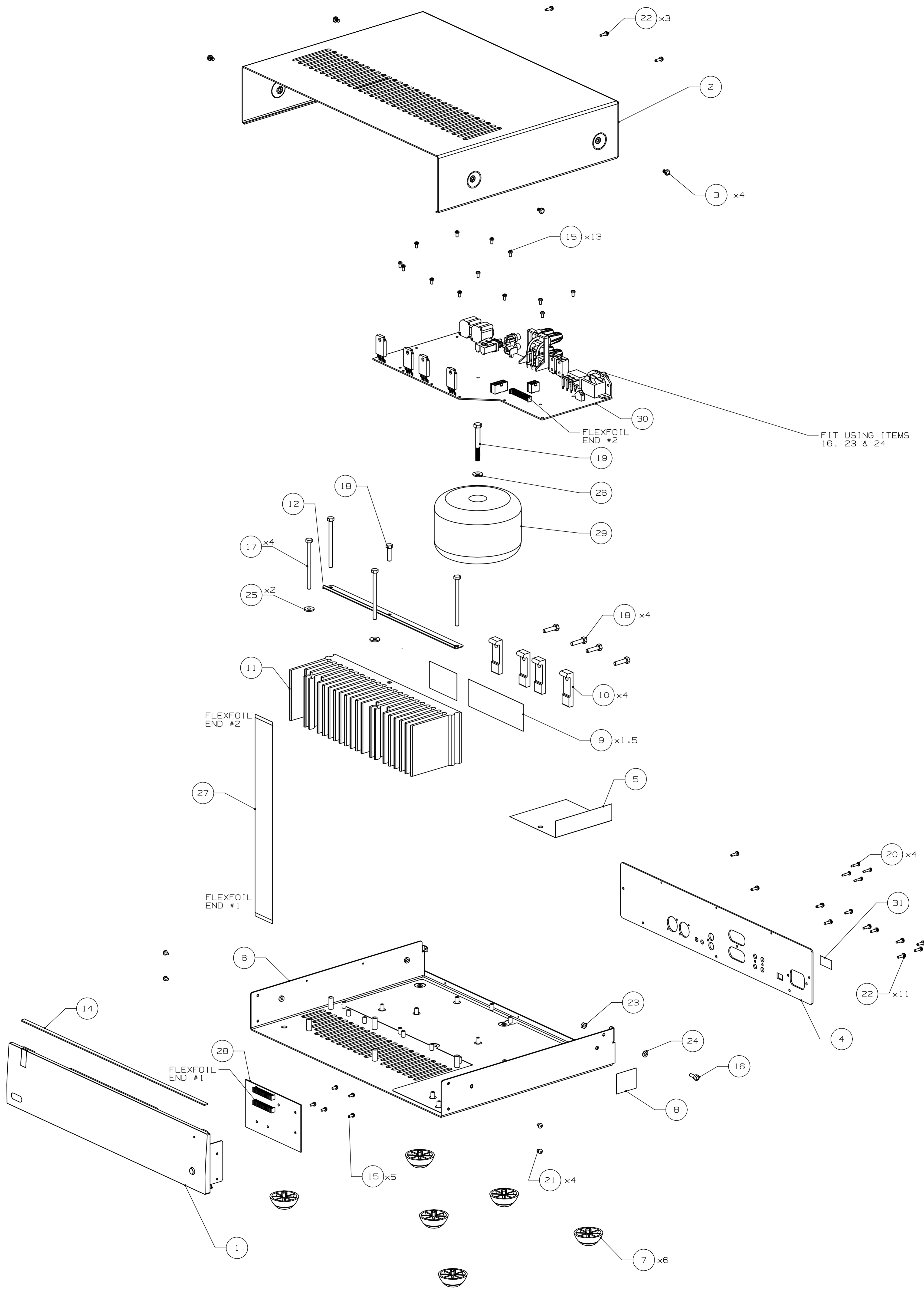
AC Winding Label	Capacitor Cout (uF)	Effective DC Load Current (mA)	Secondary Voltage (V r.m.s.)	Capacitor Peak Voltage Vpk (Volt)	Capacitor Min Voltage Vmin (Volt)	Capacitor Average Voltage (Volt)	Load Resistor to simulate Load RL (Ohm)	Secondary Winding r.m.s. Current (A r.m.s.)
VP70V	1000	50	50.8	70.2	69.8	70.0	1400	0.25
VP58V	20,000	2250	43.0	58.8	57.8	58.3	25.6	8.0
VN58V	20,000	2250	43.0	58.8	57.8	58.3	25.6	8.0
VN70V	1000	50	50.8	70.2	69.8	70.0	1400	0.25
VP18V	1000	175	14.35	18.75	17.25	18.0	102.8	0.52



TEST CIRCUIT

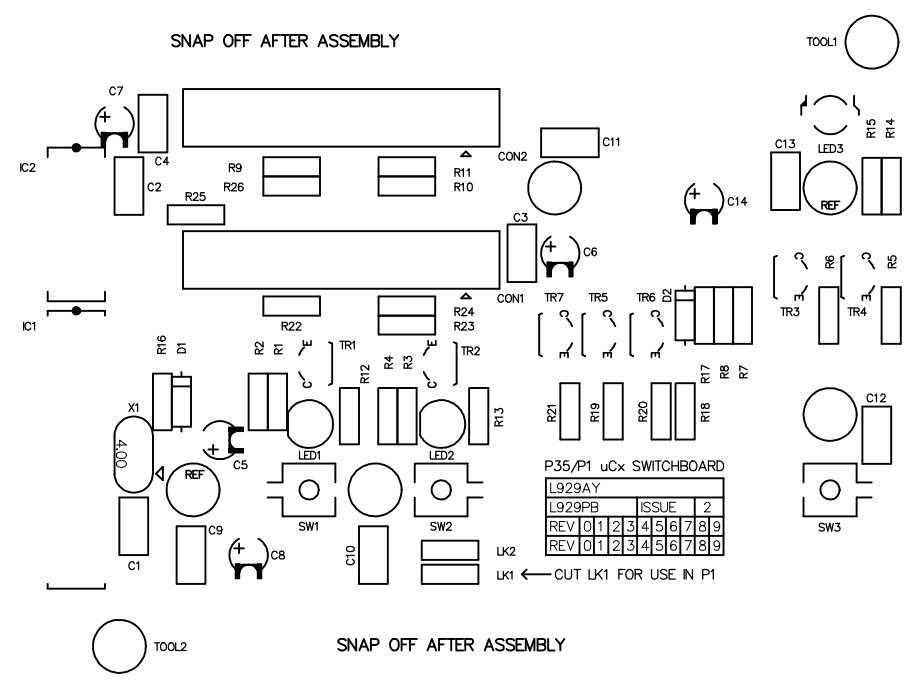
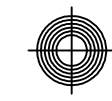


DRAWING TITLE		POWER TX FOR P1 100V					
ARCAM A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB	Filename:	L927TX_1.0.sch	03_E240	KAL	Reduced VP58V, VN58V to 43.0Vac		1.0
	Notes:		03_E193	SLS	'100V' text was '115/230V', 'UL rated sleeving' was 'UL94-V0'		B.1
			03_E192	KAL	Changed voltages as per L926TX, sleeving to be UL94-V0		B.0
			03_E006	KAL	Prototype Release		A.0
	ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE			ISSUE
Contact Engineer:	Kevin Lamb	Contact Tel:	(01223) 203243	Printed:	7-Aug-2003	Sheet 1 of 1	A3 DRAWING NO. L927TX



P1 Mechanical and packing parts list

Part No	Item no	Description
		GENERAL MECHANICAL PARTS
E200AY	4	Rear Panel Assembly FMJ P1
E212AY	6	FMJ A32 Chassis Assembly
E822PM1	7	Foot Black Alpha
E907MC	9	Koolpad O/P Device Diva A85
E912MC	10	Clamp 85 Amp Transistor
E918HK	11	Heatsink FMJ P1
E921MC	12	Clamp Heatsink Diva P85 3RD Channel
HA3V06A	15	M Screw Torx P/H M3x6MM ST ZP
HA4A12B	16	M Screw Pan Supa M4x12MM ST BLK
HA5K70A	17	Bolt Hex HD M5x70MM ST ZP
HA5L20B	18	M/C Hex HD. Bolt M5-0.8X20MM Steel - Zinc Black Passivate
HA6K50A	19	Bolt Hex HD M6x50MM Mczp
HB25V12B	20	Screw Taptite M2.5X12MM Pan Torx(T8) Steel Zinc Plate Black
HE6V06B	21	Screw Sftp Torx No.6x6MM BLK
HF4V09B	22	Screw Self-Tapping-Sems NO.4 X 9MM Pan Torx-Slot Steel Zinc-Plate BLK
HJ4A00A	23	Nut M4 Full ST ZP
HL4SB	24	Washer M4 Int Shakeproof BLK
HL5CA	25	Bright Washer M5 (Form C) to BS 4320
HL6MA	26	Bright Washer M6 (Mudguard O.D. 20mm)
L915CA	27	Cable FFC 0.1" 14WAY A85 Disp - Pwr
L929AY	28	P35/P1 FMJ Amp Microcontroller Board Assembly
L926TX	29	115/230 VAC Toroid transformer
L927TX	29	100 VAC only Toroid transformer
		BLACK CASE PARTS
E210AYB	2	FMJ P1/P35-3 Black Cover Assembly
HA4V06B	3	M Screw Torx M4x6MM Stainless Steel Black
E189AYB	1	FMJ Black P1 Fascia Complete Assembly
		Made up of the following parts :-
8Q006		8Q006 FMJ Tact Button Spring
E083AY		FMJ A32 Sub-Panel Assy
E199AYB		Front Panel Assembly Black FMJ P1
E830MC		Badge Metal Arcam FMJ
E847PM		Lightpipe FMJ
E894PMB		Button Power FMJ A32 Black
HL25AB		HL25AB FMJ Tact Button Fastener
E933AY		FMJ I/R Window Assy (STD. SCREENED)
HA3A04A		M/C Pan Supa M3X4 Stzp
		SILVER CASE PARTS
E210AY	2	FMJ P1/P35-3 Silver Cover Assembly
HA4V06S	3	M Screw Torx M4x6MM Stainless Steel Silver
E189AY	1	FMJ Silver P1 Fascia Complete Assembly
		Made up of the following parts :-
8Q006		8Q006 FMJ Tact Button Spring
E083AY		FMJ A32 Sub-Panel Assy
E199AY		Front Panel Assembly Silver FMJ P1
E830MC		Badge Metal Arcam FMJ
E847PM		Lightpipe FMJ
E894PM		Button Power FMJ A32 Silver
HL25AB		HL25AB FMJ Tact Button Fastener
E933AY		FMJ I/R Window Assy (STD. SCREENED)
HA3A04A		M/C Pan Supa M3X4 Stzp
		PACKAGING MATERIAL
E827PK		Carton Printed FMJ
E828PK		End Caps Pair FMJ A22 / P25 / DT26
E826PK		Carton Plain FMJ
E967SL		FMJ P1 Carton Label
SH139		Handbook FMJ C30/P35/P1 Multi
E888PM		Blanking Plug For 4MM Binding Post



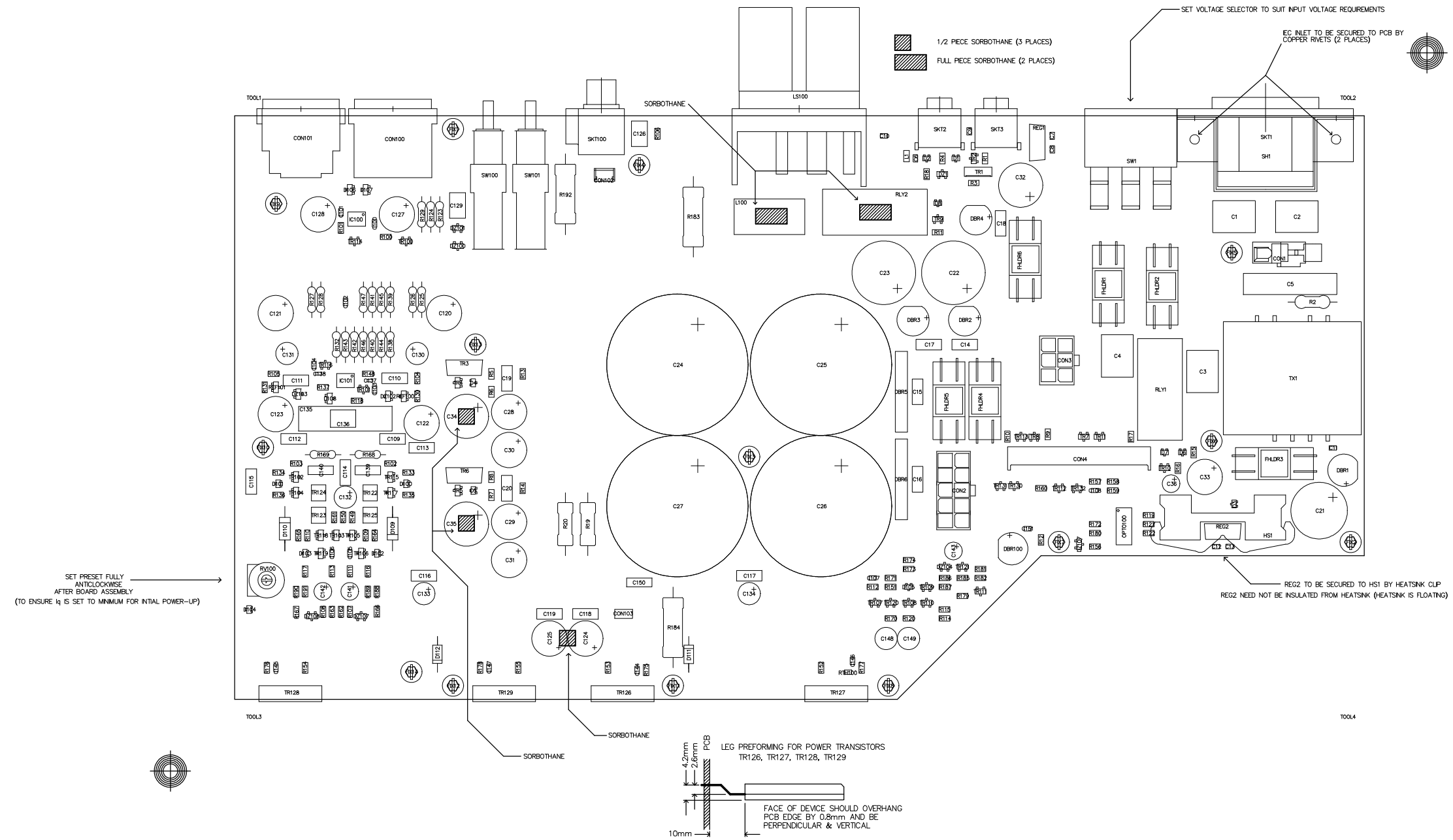
MECHANICAL DATA	
LAYER STACKUP	
L929PB_2.GTO	Top Overlay

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

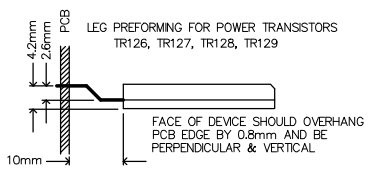
DRAWING TITLE		P35/P1 SWITCH BOARD				
Top Overlay		---	---	---	---	
ARCAM A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB	Filename: L929PB_2.PCB	03_E241	KAL	7/08/03	Removed Spare1,2 from CON1,2 to fix 50V logic error	2
	DRAWING NO.	---	JR	2/11/01	SW3 CHANGED + GROUND PLANES	B
	L929PB	---	CL	24/09/01	INITIAL PROTOTYPE	A
	E.C.O. No.	INITIALS	DATE	DESCRIPTION OF CHANGE		ISSUE
	Contact Engineer:	Kevin Lamb	Contact Tel:	+44 (0) 1223 203200	Printed:	8-Aug-2003

P1 Amplifier display cct board L929AY issue 2.0

Designator	Part	Description
C1	2A410	Capacitor Ceramic 5mm Pitch 50V 10% 100nF
C2	2A410	Capacitor Ceramic 5mm Pitch 50V 10% 100nF
C3	2A410	Capacitor Ceramic 5mm Pitch 50V 10% 100nF
C4	2A410	Capacitor Ceramic 5mm Pitch 50V 10% 100nF
C5	2N610	Capacitor Radial Electrolytic Dia 5mm Pitch 5mm 10UF 50V
C6	2N710	Capacitor Radial Electrolytic Dia 5mm Pitch 5mm 100UF 25V
C7	2N710	Capacitor Radial Electrolytic Dia 5mm Pitch 5mm 100UF 25V
C8	2N710	Capacitor Radial Electrolytic Dia 5mm Pitch 5mm 100UF 25V
C9	2A410	Capacitor Ceramic 5mm Pitch 50V 10% 100nF
C10	2A410	Capacitor Ceramic 5mm Pitch 50V 10% 100nF
C11	2A410	Capacitor Ceramic 5mm Pitch 50V 10% 100nF
C12	2A410	Capacitor Ceramic 5mm Pitch 50V 10% 100nF
C13	2A410	Capacitor Ceramic 5mm Pitch 50V 10% 100nF
C14	2N710	Capacitor Radial Electrolytic Dia 5mm Pitch 5mm 100UF 25V
CON1	8K7014A	Con Series 2.54MM Horiz FFC 14WAY
CON2	8K7014A	Con Series 2.54MM Horiz FFC 14WAY
D1	3A4148	Diode Small Signal 1N4148 DO-35 Package
D2	3A4148	Diode Small Signal 1N4148 DO-35 Package
IC1	L019AY	Programmed HT48R30A-1 With Software For P35
IC2	5J7432	IC Quad 2 Input OR Gate 74HC32N
ITEM1-1	L929PB	Blank PCB P35/P1 FMJ Amp Microcontroller Board
ITEM2-1	8S028N	IC Skt 28PIN 0.3IN
LED1	3D001	LED 5mm Green SLR-56MGT32
LED2	3D001	LED 5mm Green SLR-56MGT32
LED3	3D006	LED 3mm Red/Green Tri-Colour L-93WEGW
LK1	1H000	Resistor Metal Film 0.25W 0R0
LK2	1H000	Resistor Metal Film 0.25W 0R0
R1	1H310	Resistor Metal Film 0.25W 1% 10K
R2	1H310	Resistor Metal Film 0.25W 1% 10K
R3	1H310	Resistor Metal Film 0.25W 1% 10K
R4	1H310	Resistor Metal Film 0.25W 1% 10K
R5	1H310	Resistor Metal Film 0.25W 1% 10K
R6	1H310	Resistor Metal Film 0.25W 1% 10K
R7	1H310	Resistor Metal Film 0.25W 1% 10K
R8	1H310	Resistor Metal Film 0.25W 1% 10K
R9	1H310	Resistor Metal Film 0.25W 1% 10K
R10	1H310	Resistor Metal Film 0.25W 1% 10K
R11	1H310	Resistor Metal Film 0.25W 1% 10K
R12	1H156	Resistor Metal Film 0.25W 1% 560R
R13	1H156	Resistor Metal Film 0.25W 1% 560R
R14	1H133	Resistor Metal Film 0.25W 1% 330R
R15	1H118	Resistor Metal Film 0.25W 1% 180R
R16	1H410	Resistor Metal Film 0.25W 1% 100K
R17	1H310	Resistor Metal Film 0.25W 1% 10K
R18	1H310	Resistor Metal Film 0.25W 1% 10K
R19	1H147	Resistor Metal Film 0.25W 1% 470R
R20	1H147	Resistor Metal Film 0.25W 1% 470R
R21	1H147	Resistor Metal Film 0.25W 1% 470R
R22	1H310	Resistor Metal Film 0.25W 1% 10K
R23	1H310	Resistor Metal Film 0.25W 1% 10K
R24	1H310	Resistor Metal Film 0.25W 1% 10K
R25	1H310	Resistor Metal Film 0.25W 1% 10K
R26	1H310	Resistor Metal Film 0.25W 1% 10K
SW1	A1504	Switch Tact 2-PIN Low Prof With Gnd Pin
SW2	A1504	Switch Tact 2-PIN Low Prof With Gnd Pin
SW3	A1504	Switch Tact 2-PIN Low Prof With Gnd Pin
TR1	4A556	Transistor BC556B TO92 Package
TR2	4A556	Transistor BC556B TO92 Package
TR3	4A556	Transistor BC556B TO92 Package
TR4	4A556	Transistor BC556B TO92 Package
TR5	4A546	Transistor BC546B TO92 Package
TR6	4A546	Transistor BC546B TO92 Package
TR7	4A546	Transistor BC546B TO92 Package
X1	7W005	Ceramic Resonator 4.00MHz



SET PRESET FULLY ANTICLOCKWISE AFTER BOARD ASSEMBLY (TO ENSURE Iq IS SET TO MINIMUM FOR INTAL POWER-UP)



MECHANICAL DATA	
L962PB_2.dwg	Assembly Drawing
LAYER STACKUP	

MATERIAL	FR4, 1.6MM THICK	NOTES:-
COPPER WEIGHT	2oz FINISHED	1/ Manufacture in accordance with IPC-A-600F Class 1.
HOLE SIZES	FINISHED (SEE NOTE 2)	2/ Always use NC drill file as reference. NO undersized finished holes.
ROUTING	SEE NOTE 3	3/ Routed slots are denoted thus: slot width denoted by line width.
COPPER LAYERS	TWO	4/ Component pad slot width and plating requirements are indicated by hole size and plating specification of pad in centre of slot.
MINIMUM WIDTH	10 ML	5/ Mark month/year of manufacture on ident layer.
MINIMUM GAP	10 ML	6/ Scoring denoted by >>>> on drill drawing.
RESIST	GREEN	
DENT	WHITE	GENERAL TOLERANCES
VENDOR CODES	SEE NOTE 5	PCB Dims. +/- 0.2mm
FINISH	SILVER	Routing +/- 0.1mm
SCORING	SEE NOTE 6	All holes +0.1/-0mm
		ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED

DRAWING TITLE P1 Power Amplifier Main PCB		---	---	---	---	---
Mechanical		03_E249	KAL	22/08/03	Text change on switch position diag.	2
DRAWING NO. L962PB_2		03_E203	KAL	16/07/03	Production Release	1
		03_E111	KAL	16/05/03	Prototype Release	B
		03_E006	KAL	27/01/03	Prototype Release	A
E.C.O. No.		INITIALS	DATE	DESCRIPTION OF CHANGE		ISSUE
Contact Engineer: Kevin Lamb				Contact Tel: +44 (0) 1223 203243		Printed: 26-Aug-2003 Sheet 6 of 10

P1 Amplifier main cct board L962AY issue 2.1

Designator	Part	Description
C1	2K233	Capacitor X1 Y2 Rated Ceramic 7.5mm Pitch 3N3 250V
C2	2K233	Capacitor X1 Y2 Rated Ceramic 7.5mm Pitch 3N3 250V
C3	2K233	Capacitor X1 Y2 Rated Ceramic 7.5mm Pitch 3N3 250V
C4	2K233	Capacitor X1 Y2 Rated Ceramic 7.5mm Pitch 3N3 250V
C5	2D422	Capacitor X2 Boxed Polypropylene 22.5mm Pitch 275V 220NF
C6	2L110	Capacitor SM 0805 NPO Ceramic 5% 100V 100P
C7	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C8	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C9	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C10	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C11	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C12	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C13	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C14	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C15	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C16	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C17	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C18	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C19	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C20	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C21	2N833	Capacitor Radial Electrolytic Dia 16mm Pitch 7.5mm 3300UF 25V
C22	2N810D	Capacitor Radial Electrolytic Dia 18mm Pitch 7.5mm 1000UF 100V
C23	2N810D	Capacitor Radial Electrolytic Dia 18mm Pitch 7.5mm 1000UF 100V
C24	2P910AM	Capacitor Radial Electrolytic Dia 40mm PCB Mount 10,000uF 71V
C25	2P910AM	Capacitor Radial Electrolytic Dia 40mm PCB Mount 10,000uF 71V
C26	2P910AM	Capacitor Radial Electrolytic Dia 40mm PCB Mount 10,000uF 71V
C27	2P910AM	Capacitor Radial Electrolytic Dia 40mm PCB Mount 10,000uF 71V
C28	2N647B	Capacitor Radial Electrolytic Dia 10mm Pitch 5mm 47UF 100V
C29	2N647B	Capacitor Radial Electrolytic Dia 10mm Pitch 5mm 47UF 100V
C30	2N647B	Capacitor Radial Electrolytic Dia 10mm Pitch 5mm 47UF 100V
C31	2N647B	Capacitor Radial Electrolytic Dia 10mm Pitch 5mm 47UF 100V
C32	2N810C	Capacitor Radial Electrolytic Dia 12.5mm Pitch 5mm 1000UF 35V
C33	2N810A	Capacitor Radial Electrolytic Dia 10mm Pitch 5mm 1000UF 10V
C34	2Z710F	Capacitor Low Impedance Radial Electrolytic Dia 12.5mm Pitch 5mm 100UF 100V
C35	2Z710F	Capacitor Low Impedance Radial Electrolytic Dia 12.5mm Pitch 5mm 100UF 100V
C36	2N710	Capacitor Radial Electrolytic Dia 5mm Pitch 5mm 100UF 25V
C100	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C101	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C102	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C103	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C104	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C105	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C106	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C107	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C108	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
C109	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C110	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C111	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C112	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C113	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C114	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C115	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C116	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C117	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C118	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C119	2KA410	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 100N
C120	2N647B	Capacitor Radial Electrolytic Dia 10mm Pitch 5mm 47UF 100V
C121	2N647B	Capacitor Radial Electrolytic Dia 10mm Pitch 5mm 47UF 100V
C122	2N647B	Capacitor Radial Electrolytic Dia 10mm Pitch 5mm 47UF 100V
C123	2N647B	Capacitor Radial Electrolytic Dia 10mm Pitch 5mm 47UF 100V
C124	2N647B	Capacitor Radial Electrolytic Dia 10mm Pitch 5mm 47UF 100V

P1 Amplifier main cct board L962AY issue 2.1

Designator	Part	Description
C125	2N647B	Capacitor Radial Electrolytic Dia 10mm Pitch 5mm 47UF 100V
C126	2DA210	Capacitor Boxed Polypropylene 5mm Pitch 100V 5% 1N0
C127	2P710AC	Capacitor Radial Electrolytic Elna ROA Series 100UF 25V
C128	2P710AC	Capacitor Radial Electrolytic Elna ROA Series 100UF 25V
C129	2DA147	Capacitor Boxed Polypropylene 5mm Pitch 100V 5% 470P
C130	2P622P	Capacitor Radial Electrolytic Oscon SP 22UF 20V
C131	2P622P	Capacitor Radial Electrolytic Oscon SP 22UF 20V
C132	2P622P	Capacitor Radial Electrolytic Oscon SP 22UF 20V
C133	2P622P	Capacitor Radial Electrolytic Oscon SP 22UF 20V
C134	2P622P	Capacitor Radial Electrolytic Oscon SP 22UF 20V
C135	2KB568	Capacitor Boxed Polyester 22.5mm Pitch 10% 63V 6U8
C136	2KA447	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 470N
C137	2JC310	Capacitor SM 0603 X7R Ceramic 10% 50V 10N
C138	2JC310	Capacitor SM 0603 X7R Ceramic 10% 50V 10N
C139	2D033W2	Capacitor Boxed Polyprop 5mm Pitch 250V 5% 33P
C140	2D033W2	Capacitor Boxed Polyprop 5mm Pitch 250V 5% 33P
C141	2N610	Capacitor Radial Electrolytic Dia 5mm Pitch 5mm 10UF 50V
C142	2N610	Capacitor Radial Electrolytic Dia 5mm Pitch 5mm 10UF 50V
C143	2N710	Capacitor Radial Electrolytic Dia 5mm Pitch 5mm 100UF 25V
C144	2C047B	Capacitor SM 0805 NPO Ceramic 200V 5% 47PF
C145	2C047B	Capacitor SM 0805 NPO Ceramic 200V 5% 47PF
C146	2C047B	Capacitor SM 0805 NPO Ceramic 200V 5% 47PF
C147	2C047B	Capacitor SM 0805 NPO Ceramic 200V 5% 47PF
C148	2V710	Capacitor Non-Polar Radial Electrolytic 100UF 16V
C149	2V710	Capacitor Non-Polar Radial Electrolytic 100UF 16V
C150	2KA347	Capacitor Boxed Polyester 5mm Pitch 5% 100VDC 47N
C151	2J410	Capacitor SM 0805 X7R Ceramic 10% 50V 100N
CON1	8Q003	Con Cage Clamp 1WAY
CON2	8K2310	Con Minifit HCS 10WAY
CON3	8K2306	Con Minifit HCS 6WAY
CON4	8K7014	Con 2.54MM Vertical FFC 14WAY
CON100	8K3101	XLR PCB Male Neutrik NC3MBH-B
CON101	8K3001	XLR PCB Female Neutrik NC3FBH2-B
CON102	8K2402	Con CT Series Vertical 2WAY
CON103	8K6201	Con Single ROW Hdr 0.1IN Vertical 2WAY
D1	3AS16W	Diode Surface Mount Small Signal BAS16W SOT-23 Package
D2	3AS16W	Diode Surface Mount Small Signal BAS16W SOT-23 Package
D3	3AS16W	Diode Surface Mount Small Signal BAS16W SOT-23 Package
D4	3AS16W	Diode Surface Mount Small Signal BAS16W SOT-23 Package
D5	3AS16W	Diode Surface Mount Small Signal BAS16W SOT-23 Package
D6	3AS16W	Diode Surface Mount Small Signal BAS16W SOT-23 Package
D7	3AS16W	Diode Surface Mount Small Signal BAS16W SOT-23 Package
D8	3AS16W	Diode Surface Mount Small Signal BAS16W SOT-23 Package
D100	3AS16W	Diode Surface Mount Small Signal BAS16W SOT-23 Package
D101	3AS16W	Diode Surface Mount Small Signal BAS16W SOT-23 Package
D102	3AS16W	Diode Surface Mount Small Signal BAS16W SOT-23 Package
D103	3AS16W	Diode Surface Mount Small Signal BAS16W SOT-23 Package
D104	3AS16W	Diode Surface Mount Small Signal BAS16W SOT-23 Package
D105	3AS16W	Diode Surface Mount Small Signal BAS16W SOT-23 Package
D106	3AV99W	Diode Dual Surface Mount Small Signal BAV99 SOT-23 Package
D107	3AV99W	Diode Dual Surface Mount Small Signal BAV99 SOT-23 Package
D108	3AV99W	Diode Dual Surface Mount Small Signal BAV99 SOT-23 Package
D109	3BYV27	Diode SBYV27-200 DO-15 Package
D110	3BYV27	Diode SBYV27-200 DO-15 Package
D111	3B4003	Diode 1N4003 DO-41 Package
D112	3B4003	Diode 1N4003 DO-41 Package
DBR1	3BW02	Diode Bridge Rectifier W02G Plastic Package
DBR2	3BW02	Diode Bridge Rectifier W02G Plastic Package
DBR3	3BW02	Diode Bridge Rectifier W02G Plastic Package
DBR4	3BW02	Diode Bridge Rectifier W02G Plastic Package
DBR5	3BGBU8D	Diode Bridge Rectifier GBU8D Plastic Package 8A 200V

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Designator	Part	Description
DBR6	3BGBU8D	Diode Bridge Rectifier GBU8D Plastic Package 8A 200V
DBR100	3BW02	Diode Bridge Rectifier W02G Plastic Package
DZ1	3CW34V7	Zener Diode 0.25W Surface Mount BZX84C4V7 SOT-23 Package
DZ100	3CW34V7	Zener Diode 0.25W Surface Mount BZX84C4V7 SOT-23 Package
DZ101	3CW34V7	Zener Diode 0.25W Surface Mount BZX84C4V7 SOT-23 Package
DZ102	3CW315V	Zener Diode 0.25W Surface Mount BZX84C15V SOT-23 Package
DZ103	3CW315V	Zener Diode 0.25W Surface Mount BZX84C15V SOT-23 Package
DZ104	3CW315V	Zener Diode 0.25W Surface Mount BZX84C15V SOT-23 Package
DZ105	3CW333V	Zener Diode 0.25W Surface Mount BZX84C33V SOT-23 Package
DZ106	3CW333V	Zener Diode 0.25W Surface Mount BZX84C33V SOT-23 Package
DZ107	3CW310V	Zener Diode 0.25W Surface Mount BZX84C10V SOT-23 Package
FHLDR1	8S004	Fuseholder 20MM PCB
FHLDR2	8S004	Fuseholder 20MM PCB
FHLDR3	8S004	Fuseholder 20MM PCB
FHLDR4	8S004	Fuseholder 20MM PCB
FHLDR5	8S004	Fuseholder 20MM PCB
FHLDR6	8S004	Fuseholder 20MM PCB
FS1	C56263	Fuse Busmann S506 T6.3A
FS2	C56263	Fuse Busmann S506 T6.3A
FS3	C54132	Fuse Busmann S504 T315mA
FS4	C54132	Fuse Busmann S504 T315mA
FS5	C54132	Fuse Busmann S504 T315mA
FS6	C54132	Fuse Busmann S504 T315mA
HS1	F008	Heatsink TO-220 SW50-2 8.8 Deg C/W
IC100	5A2143	IC Balanced Line Receiver AD SSM2143S SO-8 Package
IC101	5B072D	Opamp TL072CD SO-8 Package
ITEM1-1	F006	Clip For SW Profile Heatsink
ITEM2-1	F022	Fuseholder Cover For 20mm Fuseholder
ITEM3-1	F022	Fuseholder Cover For 20mm Fuseholder
ITEM4-1	F022	Fuseholder Cover For 20mm Fuseholder
ITEM5-1	F022	Fuseholder Cover For 20mm Fuseholder
ITEM6-1	F022	Fuseholder Cover For 20mm Fuseholder
ITEM7-1	F022	Fuseholder Cover For 20mm Fuseholder
ITEM8-1	L962PB	Blank PCB P1 Amplifier Main Board
ITEM9-1	E802AP	Pad Damping 15x6x3MM Sorbothane
ITEM9-2	E802AP	Pad Damping 15x6x3MM Sorbothane
ITEM10-1	E826AP	Pad Damping 7.5x6x3 Sorbothane
ITEM10-2	E826AP	Pad Damping 7.5x6x3 Sorbothane
ITEM10-3	E826AP	Pad Damping 7.5x6x3 Sorbothane
ITEM11-1	8M101	Earth Lead Assy 75MM
L1	7F004	Ferrite Bead SM1206 70R@100MHZ
L100	7D002C	Inductor AC 2u2 Self Bonded
LS100	8D420G	Connector 4mm 4 Way Vertical
OPTO100	5T3Q66	Opto Isolator Quad PC3Q66Q
R1	1A010	Resistor 1206 Surface Mount 0.25W 1% 10R
R2	1KA515	Resistor Metal Glazed 0.5W 5% 1M5
R3	1A233	Resistor 1206 Surface Mount 0.25W 1% 3K3
R4	1A222	Resistor 1206 Surface Mount 0.25W 1% 2K2
R5	1A222	Resistor 1206 Surface Mount 0.25W 1% 2K2
R6	1A222	Resistor 1206 Surface Mount 0.25W 1% 2K2
R7	1A222	Resistor 1206 Surface Mount 0.25W 1% 2K2
R8	1A222	Resistor 1206 Surface Mount 0.25W 1% 2K2
R9	1A222	Resistor 1206 Surface Mount 0.25W 1% 2K2
R10	1A222	Resistor 1206 Surface Mount 0.25W 1% 2K2
R11	1A222	Resistor 1206 Surface Mount 0.25W 1% 2K2
R12	1A110	Resistor 1206 Surface Mount 0.25W 1% 100R
R13	1A368	Resistor 1206 Surface Mount 0.25W 1% 68K
R14	1A368	Resistor 1206 Surface Mount 0.25W 1% 68K
R15	1A310	Resistor 1206 Surface Mount 0.25W 1% 10K
R16	1A222	Resistor 1206 Surface Mount 0.25W 1% 2K2
R17	1A247	Resistor 1206 Surface Mount 0.25W 1% 4K7

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Designator	Part	Description
R18	1A310	Resistor 1206 Surface Mount 0.25W 1% 10K
R19	1E310	Resistor Carbon Film 1W 5% 10K
R20	1E310	Resistor Carbon Film 1W 5% 10K
R100	1A010	Resistor 1206 Surface Mount 0.25W 1% 10R
R101	1A010	Resistor 1206 Surface Mount 0.25W 1% 10R
R102	1A268	Resistor 1206 Surface Mount 0.25W 1% 6K8
R103	1A268	Resistor 1206 Surface Mount 0.25W 1% 6K8
R104	1A222	Resistor 1206 Surface Mount 0.25W 1% 2K2
R105	1A222	Resistor 1206 Surface Mount 0.25W 1% 2K2
R106	1A110	Resistor 1206 Surface Mount 0.25W 1% 100R
R107	1A133	Resistor 1206 Surface Mount 0.25W 1% 330R
R108	1A133	Resistor 1206 Surface Mount 0.25W 1% 330R
R109	1A110	Resistor 1206 Surface Mount 0.25W 1% 100R
R110	1A110	Resistor 1206 Surface Mount 0.25W 1% 100R
R111	1A110	Resistor 1206 Surface Mount 0.25W 1% 100R
R112	1A110	Resistor 1206 Surface Mount 0.25W 1% 100R
R113	1A110	Resistor 1206 Surface Mount 0.25W 1% 100R
R114	1A110	Resistor 1206 Surface Mount 0.25W 1% 100R
R115	1A110	Resistor 1206 Surface Mount 0.25W 1% 100R
R116	1A318	Resistor 1206 Surface Mount 0.25W 1% 18K
R117	1A318	Resistor 1206 Surface Mount 0.25W 1% 18K
R118	1A247	Resistor 1206 Surface Mount 0.25W 1% 4K7
R119	1A247	Resistor 1206 Surface Mount 0.25W 1% 4K7
R120	1A247	Resistor 1206 Surface Mount 0.25W 1% 4K7
R121	1A247	Resistor 1206 Surface Mount 0.25W 1% 4K7
R122	1A247	Resistor 1206 Surface Mount 0.25W 1% 4K7
R123	1H182	Resistor Metal Film 0.25W 1% 820R
R124	1H268	Resistor Metal Film 0.25W 1% 6K8
R125	1H268	Resistor Metal Film 0.25W 1% 6K8
R126	1H268	Resistor Metal Film 0.25W 1% 6K8
R127	1H268	Resistor Metal Film 0.25W 1% 6K8
R128	1H268	Resistor Metal Film 0.25W 1% 6K8
R129	1H110	Resistor Metal Film 0.25W 1% 100R
R130	1A312	Resistor 1206 Surface Mount 0.25W 1% 12K
R131	1A312	Resistor 1206 Surface Mount 0.25W 1% 12K
R132	1H322	Resistor Metal Film 0.25W 1% 22K
R133	1A047	Resistor 1206 Surface Mount 0.25W 1% 47R
R134	1A047	Resistor 1206 Surface Mount 0.25W 1% 47R
R135	1A047	Resistor 1206 Surface Mount 0.25W 1% 47R
R136	1A047	Resistor 1206 Surface Mount 0.25W 1% 47R
R137	1A000	Resistor 1206 Surface Mount 0.25W 1% 0R0
R138	1H215	Resistor Metal Film 0.25W 1% 1K5
R139	1H215	Resistor Metal Film 0.25W 1% 1K5
R140	1H215	Resistor Metal Film 0.25W 1% 1K5
R141	1H215	Resistor Metal Film 0.25W 1% 1K5
R142	1H022	Resistor Metal Film 0.25W 1% 22R
R143	1H022	Resistor Metal Film 0.25W 1% 22R
R144	1H218	Resistor Metal Film 0.25W 1% 1K8
R145	1H218	Resistor Metal Film 0.25W 1% 1K8
R146	1H218	Resistor Metal Film 0.25W 1% 1K8
R147	1H218	Resistor Metal Film 0.25W 1% 1K8
R148	1A510	Resistor 1206 Surface Mount 0.25W 1% 1M0
R149	1A268	Resistor 1206 Surface Mount 0.25W 1% 6K8
R150	1A210	Resistor 1206 Surface Mount 0.25W 1% 1K0
R151	1A210	Resistor 1206 Surface Mount 0.25W 1% 1K0
R152	1A210	Resistor 1206 Surface Mount 0.25W 1% 1K0
R153	1A210	Resistor 1206 Surface Mount 0.25W 1% 1K0
R154	1A210	Resistor 1206 Surface Mount 0.25W 1% 1K0
R155	1A210	Resistor 1206 Surface Mount 0.25W 1% 1K0
R156	1A210	Resistor 1206 Surface Mount 0.25W 1% 1K0
R157	1A210	Resistor 1206 Surface Mount 0.25W 1% 1K0

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Designator	Part	Description
R158	1A210	Resistor 1206 Surface Mount 0.25W 1% 1K0
R159	1A210	Resistor 1206 Surface Mount 0.25W 1% 1K0
R160	1A210	Resistor 1206 Surface Mount 0.25W 1% 1K0
R161	1A022	Resistor 1206 Surface Mount 0.25W 1% 22R
R162	1A210	Resistor 1206 Surface Mount 0.25W 1% 1K0
R163	1A210	Resistor 1206 Surface Mount 0.25W 1% 1K0
R164	1A022	Resistor 1206 Surface Mount 0.25W 1% 22R
R165	1A022	Resistor 1206 Surface Mount 0.25W 1% 22R
R166	1A212	Resistor 1206 Surface Mount 0.25W 1% 1K2
R167	1A212	Resistor 1206 Surface Mount 0.25W 1% 1K2
R168	1H415	Resistor Metal Film 0.25W 1% 150K
R169	1H415	Resistor Metal Film 0.25W 1% 150K
R170	1A322	Resistor 1206 Surface Mount 0.25W 1% 22K
R171	1A322	Resistor 1206 Surface Mount 0.25W 1% 22K
R172	1A322	Resistor 1206 Surface Mount 0.25W 1% 22K
R173	1A322	Resistor 1206 Surface Mount 0.25W 1% 22K
R174	1A322	Resistor 1206 Surface Mount 0.25W 1% 22K
R175	1A115	Resistor 1206 Surface Mount 0.25W 1% 150R
R176	1A115	Resistor 1206 Surface Mount 0.25W 1% 150R
R177	1A115	Resistor 1206 Surface Mount 0.25W 1% 150R
R178	1A115	Resistor 1206 Surface Mount 0.25W 1% 150R
R179	1A127	Resistor 1206 Surface Mount 0.25W 1% 270R
R180	1A322	Resistor 1206 Surface Mount 0.25W 1% 22K
R181	1A310	Resistor 1206 Surface Mount 0.25W 1% 10K
R182	1A310	Resistor 1206 Surface Mount 0.25W 1% 10K
R183	1C010	Resistor Carbon Film 2W 5% 10R
R184	1C847	Resistor Carbon Film 2W 5% 4R7
R185	1A410	Resistor 1206 Surface Mount 0.25W 1% 100K
R186	1A412	Resistor 1206 Surface Mount 0.25W 1% 120K
R187	1A339	Resistor 1206 Surface Mount 0.25W 1% 39K
R188	1A318	Resistor 1206 Surface Mount 0.25W 1% 18K
R189	1A222	Resistor 1206 Surface Mount 0.25W 1% 2K2
R190	1A318	Resistor 1206 Surface Mount 0.25W 1% 18K
R191	1A222	Resistor 1206 Surface Mount 0.25W 1% 2K2
R192	1C047	Resistor Carbon Film 2W 5% 47R
REF100	5D431SM	Voltage Reference Adjustable Zener Shunt LM431AIM3 SOT-23 Package
REF101	5D431SM	Voltage Reference Adjustable Zener Shunt LM431AIM3 SOT-23 Package
REG1	5D7812	IC Voltage Regulator +12V L7812CV TO-220 Package
REG2	5D4940V5	IC Voltage Regulator +5V L4940V5 TO-220 Package LDO
RLY1	A219	Relay 2P2T 5V
RLY2	A222	Relay 1P2T 12V
RTH100	1T007	Thermistor Ptc SM 110 Degrees C
RV100	6F110	Preset H Mounting 100R Lin
SH1	E5402	Shield EMC IEC Inlet Mains
SKT1	8A001	Mains IEC Inlet 3PIN PCB Ins
SKT2	8D302	Con Jack 3.5mm Dual Mono
SKT3	8D302	Con Jack 3.5mm Dual Mono
SKT100	8D226	Phono Skt 2-WAY Vert Gold
SW1	A1404	Switch Slide Volt Sel
SW100	A1008	SW Push 2PCO Alps
SW101	A1008	SW Push 2PCO Alps
TR1	4B179	Transistor BD179 TO126 Package
TR2	4AFMMT497	Transistor FMMT497 SOT23 Package
TR3	4B1930	Transistor 2SA1930 TO220 Package
TR4	4AFMMT497	Transistor FMMT497 SOT23 Package
TR5	4AFMMT597	Transistor FMMT597 SOT23 Package
TR6	4B5171	Transistor 2SC5171 TO220 Package
TR7	4AFMMT497	Transistor FMMT497 SOT23 Package
TR8	4AFMMT497	Transistor FMMT497 SOT23 Package
TR9	4AFMMT497	Transistor FMMT497 SOT23 Package
TR10	4A849B	Transistor BC849B SOT23 Package

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Designator	Part	Description
TR11	4D10KN	Digital Transistor MMUN2211LT1 SOT23 Package
TR100	4AFMMT497	Transistor FMMT497 SOT23 Package
TR101	4AFMMT497	Transistor FMMT497 SOT23 Package
TR102	4AFMMT497	Transistor FMMT497 SOT23 Package
TR103	4AFMMT497	Transistor FMMT497 SOT23 Package
TR104	4AFMMT497	Transistor FMMT497 SOT23 Package
TR105	4AFMMT497	Transistor FMMT497 SOT23 Package
TR106	4AFMMT497	Transistor FMMT497 SOT23 Package
TR107	4AFMMT497	Transistor FMMT497 SOT23 Package
TR108	4AFMMT497	Transistor FMMT497 SOT23 Package
TR109	4AFMMT497	Transistor FMMT497 SOT23 Package
TR110	4AFMMT497	Transistor FMMT497 SOT23 Package
TR111	4AFMMT497	Transistor FMMT497 SOT23 Package
TR112	4A849B	Transistor BC849B SOT23 Package
TR113	4D10KN	Digital Transistor MMUN2211LT1 SOT23 Package
TR114	4AFMMT597	Transistor FMMT597 SOT23 Package
TR115	4AFMMT597	Transistor FMMT597 SOT23 Package
TR116	4AFMMT597	Transistor FMMT597 SOT23 Package
TR117	4AFMMT597	Transistor FMMT597 SOT23 Package
TR118	4AFMMT597	Transistor FMMT597 SOT23 Package
TR119	4AFMMT597	Transistor FMMT597 SOT23 Package
TR120	4AFMMT597	Transistor FMMT597 SOT23 Package
TR121	4AFMMT597	Transistor FMMT597 SOT23 Package
TR122	4B1740	Transistor 2SA1740 SOT-89 Package
TR123	4B1740	Transistor 2SA1740 SOT-89 Package
TR124	4B4548	Transistor 2SC4548 SOT-89
TR125	4B4548	Transistor 2SC4548 SOT-89
TR126	4CSAP15N	Transistor SAP15NY
TR127	4CSAP15N	Transistor SAP15NY
TR128	4CSAP15P	Transistor SAP15PY
TR129	4CSAP15P	Transistor SAP15PY
TR130	4D10KP	Digital Transistor MMUN2111LT1 SOT23 Package
TR131	4D10KP	Digital Transistor MMUN2111LT1 SOT23 Package
TR132	4A859B	Transistor BC859B SOT23 Package
TX1	7A9301	115/230 vac only transformer 9V + 9V 3VA
TX1	L907TX	100 vac only transformer 9V + 9V 3VA

ARCAM

All parts can be ordered via spares@arcam.co.uk

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