

Service Manual

A85

Issue 2.0

DiVA A85, P85 & P85/3 Amplifiers



ARCAM

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Pre-amplifier circuit description

The A85 preamplifier is a high-performance, DC coupled design with microprocessor control of input select, two independent tape loops, electronic volume control, tone bypass and electronic tone control.

It features a discrete power supply and low-noise linear circuitry to obtain very good distortion and noise performance, suitable for high quality source material such as CD or DVD-A.

Input switching

Each of the inputs has a pair of diodes to the $\pm 15V$ rails to prevent static spikes from causing damage to the CMOS multiplexers. In addition, there is a simple resistor-capacitor filter with a corner frequency of approximately 340kHz to remove any unwanted high frequency interference from the signal. This uses high-quality polypropylene capacitors for best performance.

Z104 and Z105 are the main input select multiplexers, which are configured in a 'virtual earth' unity gain arrangement with Z115 and Z116. This arrangement is slightly lower distortion than the 'normal' one, at the cost of a slightly higher noise floor. It is an inverting configuration, which is restored to correct polarity by the inverting electronic volume control which follows.

Z115B and Z116B are integrating servos, which take out any DC from the input signal before the following stages. The servos are 2-pole, with a passive 2nd pole being formed by R180 and C147 (for the left channel) to remove broadband noise from the output of the servo and improve speed of response.

Z100 thru Z103 are the input selectors for the 2 tape loops. These are normal non-inverting selectors which are buffered before being passed on to the phono sockets.

Z109A output is decoupled by R108 which is included in the feedback path. Local high frequency feedback occurs around C108 to allow the tape loop output to be very low impedance, whilst being stable into a capacitive load such as may be presented by a screened interconnect cable. This is the same for all tape outputs.

Z106 is configured as a double pole changeover switch, used to select the tone controls. The tone controls are bypassed when not required so that the noise and distortion can be minimised.

Tone control circuit

The tone control circuit is a non-inverting one, using a gyrated 'bell' filter for the bass and a simple shelving filter for the treble.

Left channel description

The input is attenuated by 6dB and biased to a voltage of +2.5V DC by C111, R113, R112, R110, R111 and C110. This is so the signals fall within the 0 - 5VDC required by the digital potentiometer Z108.

Z111B and its associated components form an active equivalent of a series resonant LCR circuit. This has an impedance minimum of 5.4k Ω at around 80Hz with Q=0.7. The reason the bass is done as a band-boost filter rather than a shelving filter is so that you can boost the 'real' bass without causing lots of sub-audio loudspeaker cone excursion which wastes power and may damage the drive units.

The digital pots Z108D and Z108A control the bass and treble respectively. This is done by moving the wiper connected to the frequency-sensitive impedance between the non-inverting and inverting terminals of Z112A, effectively changing the ratio of feedback boost and feed-forward attenuation of the circuit at the desired frequencies, thus providing a EQ gain control that is symmetrical on a logarithmic scale, with the use of a linear pot.

Z112B provides the 6dB of gain necessary to bring the nominal signal level back to unity. C116 and C117 remove the 2.5VDC offset from the output, to prevent clunks when the tone controls are activated.

Z108 is controlled by a simple 3-wire serial interface from the microprocessor. Each of the digital lines has its own ground return to minimise electromagnetic interference. They are connected together only at the GND pin of the IC.

Volume control

Z107 is a VSDVC electronic volume control IC. It works, in conjunction with an external op-amp, by varying the feed-forward and feedback resistors in an inverting gain configuration. In this way, it can allow output signal swings of up to 22Vpp whilst operating from a single +5VDC power supply. Also, it allows the user the choice of external circuitry to fine-tune the performance. The gain is controlled from the microprocessor via a 3-wire serial interface. The analogue supply rail is derived from the local +5V via R185 and C156 // C157.

Z117 is the output op-amp. Its outputs are decoupled via R186, R187, C158 and C159 so that it has a low output impedance but can drive cable capacitance without oscillation. R186 and R187 are included in the audio frequency feedback loop to reduce output impedance when driving 'difficult' cables.

RLY100 is a mute relay which shunts the preamp output to ground. This is to prevent thumps and squeals when the units is powered up or down.

Power supply

The transformer winding is connected to SK300. The voltage is rectified and smoothed by D300, D301, D306, D307 and C300, C310. The unregulated voltage should be around $\pm 27VDC$. F300 and F301 are secondary fuses, as the low power preamp winding would not blow the primary fuses if short circuited.

The voltage regulators are discrete compound emitter followers. I will describe the +15V supply as the negative is essentially an exact mirror image.

Q300 and R300 act as a constant current source, supplying around 7mA into D310. C302 and C314 reduce ripple and broadband noise on the zener diode. Q305 and Q306 form a complementary Darlington NPN transistor which is configured as an emitter follower, producing the +15VDC at its output. C303 is to provide bulk charge storage and to reduce the AC output impedance of the power supply. D302 prevents reverse bias of the supply during power down.

Z301 is a conventional LM317 type circuit to drop the +15V rail down to +5V for the tone and volume control circuits.

Star point SP300 explicitly connects the differently named ground nets together at one point, to minimise hum.

Amplifier & PSU Circuit Description

L882PB is the printed circuit board that provides the power supply and output stage amplifiers for the A85 integrated and power amplifiers.

Its function is to:

1. Drive the loudspeakers(!)
2. Provide an (always on) auxiliary 5VDC supply for the micro controller and display interface
3. Receive logic signals from the micro controller to turn on the main amplifier supply relay (mains) and connect either pair of speaker output sockets
4. Send logic signals to the micro controller pertaining to the state of the amplifiers (short circuit protection, DC offset protection, thermal protection)
5. Receive and demodulate RC5 remote style control codes via the rear panel jack and transmit them to the micro controller
6. Send a 12V trigger output via the rear panel jack for control of an auxiliary power amp when the unit is on
7. Receive a 12V trigger input from the rear jack (for use in the power amp only version)
8. Drive a pair of headphones via attenuating resistor networks

The power amplifier is a symmetrical, class B, bipolar junction transistor output, current-feedback design (of which more later) with DC-coupled signal and feedback paths, featuring an active integrating voltage servo to control DC offsets.

It features 'instantaneous' safe operating area protection in addition to sending a signal to the micro to turn off the output relays in the event of user or thermal overload. Since it is a DC-coupled design, the unit senses DC at the output and triggers the micro to turn off the loudspeaker relays in the event of excessive levels (possibly due to a faulty source component or short circuit output transistor).

The output stage uses Sanken specialised 'audio amplifier' power bipolar Darlington transistors which are optimised for use with this type of topology. Consequently the unit has excellent measured performance in terms of noise, slew rate, output impedance and distortion (harmonic and intermodulated) and is essentially load invariant (to a first order the measured performance is independent of the load impedance).

L882 Circuit Sheet 1

The audio input to the amplifier is connected to SK102 (which connects to the output of the preamp PCB). This signal is passed on via SK104A which forms the preamp out connection to the outside world.

SK104B provides the power amp input connection, with switch SW100 selecting between pre / power and integrated modes. The unit is wired as a preamp / power amp combination with the switch depressed, allowing the user to insert a processor or other function (e.g. graphic EQ) between the output of the preamp and the input of the power amp. With the switch in the 'out' position the power amp input socket is ignored and the input to the power amp is connected internally to the output of the preamp. PL100 and PL101 are 'handbag' links fitted to the power amp only version to connect both pairs of phono sockets in parallel for daisy chaining (as there is no preamp output on a power amp).

Relays RLY100 and RLY101 switch the two pairs of loudspeaker output sockets and are controlled by the micro lines described above. Transistors TR100 and TR101 operate in 'constant current sink' mode which allow relay current to be approximately constant although the main power supply rails will vary with mains input and load conditions. The current is around 20mA per relay.

Star point SP100 is the ground 'mecca' for the entire amplifier (comprising all three PCBs within the unit). All of the separately named grounds are joined explicitly at this point. Different named grounds are used to ensure that no two 'different' grounds share copper, which could compromise the noise, distortion or crosstalk performance of the amplifier.

The loudspeaker output signals are passed to socket SK106 which connects to SK107 and onto the headphone output via the attenuation resistors R103 thru R106.

The hierarchy containing the other sheets is self explanatory. Each of the port names shown on the top sheet connects to the port of the same name on the lower sheets.

L882 Circuit Sheet 2

This sheet contains the power supplies, the rear panel jack socket trigger circuits, the standby relay control and the 'interface' circuits between the output signals of the power amplifiers and the inputs expected by the micro processor.

The mains input enters the unit at SK203, with capacitors C205 and C206 acting as conducted RF suppression. The earth connection is passed on to the chassis (for safety reasons the chassis metalwork remains connected to mains power earth at all times). Switch SW200 is the voltage selector switch, allowing the unit to be operated in 230V or 115V mains countries by switching the dual-primary mains transformers between series and parallel winding. Varistors VR200 and VR201 act to prevent over-voltage surges from damaging the unit. If the user selects 115V operation and then connects the unit to a 230V supply, the varistors will go to a low impedance and blow the primary fuses. Any very high voltage line transients will also be suppressed, helping to eliminate transformer isolation breakdown.

Relay RLY200 switches the primary side of the mains transformer, allowing the micro to control the on / off status of the amplifier. Its contacts are snubbed by capacitors C207 and C208 (to eliminate switching spark transients and prolong relay lifespan). The primary windings of the toroidal mains transformer connect to SK204.

PCB mounted transformer TX200 is powered all the time that mains is present on SK203, irrespective of the on / off status of the amplifier. This is to ensure that the micro processor is always operational and can thus control the mains switching for the main amplifier. Secondary fuse F202 limits the current in the event of a failure mode, as the short circuit primary current of TX200 would be insufficient to blow the mains fuses.

Diodes D200 thru D203, C227 and IC201 provide the 5VDC supply which powers the micro and display PCB and the relay coils. C224 is to reduce diode noise being transmitted back through the leakage capacitance of TX200.

The mains transformer secondary winding is connected to SK200. This is a centre tapped winding, and is used with full bridge rectifier BR200 to produce the main positive and negative supplies for the power amp. C209 and C210 are the large reservoir capacitors, with C211 and C212 acting as high frequency decouplers. The main power supply rails and ground are accessible on SK205 for future module expansion.

The circuitry around SK201A and IC200 is to receive and demodulate remote control commands sent in via the rear panel jack socket. This is for multi-room applications. L200 and C200 form a parallel resonant circuit at approximately 37kHz. The output from this bandpass filter is passed into IC200A where it is 'chopped' and fed to IC200B to provide the output signal.

SK201B is a 13VDC signal trigger output which is active whenever the amplifier is powered up. R218 and DZ207 / C223 provide a reference voltage which is buffered by TR200. TR201 and R217 act as a current limit and prevent damage due to a short circuit on the output of SK201B. The maximum current is approximately 65mA.

TR203 and TR202 are a complementary Darlington pair which turn on mains relay RLY200 when activated by a signal from the microprocessor.

TR204 and its associated components are to detect whenever AC mains is present at the IEC socket. This is to notify the microprocessor if the user has unplugged the mains cord, so that it can take the necessary action (muting all the outputs and switching off the mains relay). The reservoir capacitors should last at least 4 mains cycles which gives the microprocessor plenty of time for a controlled shutdown.

TR204 forms a monostable circuit. Each cycle of AC turns on TR204 via R211. TR204 then 'shunts' C229 ensuring that it is kept at a low potential. If more than one mains cycle is missing, then R219 charges up C229 sufficiently to trigger Schmitt inverter IC202E thus passing on a logic signal to the microprocessor. The use of a Schmitt inverter for IC202 is to ensure that the micro receives 'clean' logic levels - the hysteresis voltage (about 0.5V) is sufficient to prevent circuit noise from producing a string of 'ghost' signals when analogue levels are near the threshold point.

TH200 is a positive tempco thermistor placed adjacent to the heatsink on which the output transistors are mounted. When the temperature of the thermistor exceeds 90 degrees Celsius the thermistor goes to a high impedance and so the input to IC202F goes low. This triggers a HIGH output to the micro indicating thermal overload.

The VI protection signals from the left and right channels pass into IC202A and IC202B respectively, to be 'cleaned up' via the Schmitt trigger. They are then NOR'd using TR205 which sends a HIGH signal to the micro in the event of either channel suffering a short circuit or current overload. Exactly the same approach is used for the DC fault lines using IC202C and IC202D.

L882 Circuit Sheet 3

This is the main audio power amplifier circuit. The amplifier is a class B design, which uses SAP 'audio' transistors in a symmetrical current feedback configuration. Input and feedback paths are DC coupled and there is an active integrating servo to remove DC offsets from the output.

The basic principle of operation is follows:

The input signal is amplified by a factor of 2 in IC300A. This drives a 44 Ω impedance to ground causing the supply pin currents to change with the signal level. These changing supply pin currents are then 'reflected' by a pair of complementary Wilson mirrors and passed on to a series of buffer transistors before being connected to the load. The 'feedback current' flows back from the output terminal via R331 and R332 and attempts to provide the current necessary to allow IC300A to swing its output without drawing excessive current from its supply pins, thus making the change in supply current very small indeed. This is why the term 'current feedback' is used - it is the current flowing in the feedback resistors that sets the overall gain of the amplifier.

IC300B acts as an inverting integrator and its purpose is to remove DC from the loudspeaker output. Any positive DC offset will cause the output of IC300B to go negative, thus increasing the current in its negative supply pin and pulling the output voltage back towards zero. R330 and C317 set the time constant of this integrator (0.47 seconds) so that audio frequency components are ignored and only DC and subsonic frequencies are removed.

The input to the amplifier is limited to $\pm 5.4V$ via back-to-back zener diodes DZ302 and DZ303. This is to prevent the user from grossly overdriving the input to the amplifier and possibly causing damage. The diodes appear before series resistor R324 so that their variable capacitance does not introduce high frequency harmonic distortion.

R324, R327 and C316 act as an input filter - this is a first order low pass filter with a corner frequency of around 340kHz to prevent RF signals from being injected into the front end of the amplifier. The corner frequency was chosen such that the phase shift introduced is less than 5° at 20kHz (considered by the AES to be the minimum perceptible relative amount by the human ear). The input impedance of the amplifier is 23k Ω at DC, falling to around 14k Ω at 20kHz.

Operational amplifier IC300A is acting as a non-inverting gain of 2, driving the input signal into a 44 Ω impedance to ground via R322 and R337. Its output voltage will be an accurate amplification of its input voltage (i.e. the signal on pin 1 should look identical to that on pin 3 but at twice the amplitude). The op-amp is used in a slightly unusual configuration here, in that its power supply pins are used as a (current) output, and its output pin is used as a (current) feedback.

Transistors TR311 and TR303 supply the $\pm 15V$ rails to the op-amp, and act as cascades to pass its supply pin currents through to the current mirrors, which sit at a potential too high for the op-amp to be connected directly.

TR300, TR301 and TR321 form a PNP Wilson current mirror, which reflects the current sunk by the positive supply pin of IC300. Likewise TR314, TR315 and TR320 form an NPN Wilson current mirror, which reflects the current sourced by the negative supply pin of IC300.

R315 thru R318 provide emitter degeneration of approximately 300mV for the current mirrors (as they pass about 3mA DC in quiescent conditions), to ensure accurate operation independent of the small variations between the transistors in the current mirrors. They also ensure that the current passing down the next stage is reasonably constant as the internal temperature of the amplifier changes, swamping out small thermal variations in the V_{BE} of the mirror transistors.

R319 and R320 slightly decouple the rails to the current mirrors from the main power rails of the amplifier, to allow the bootstrap circuit to operate. The bootstrap consists of C302 and C306 with metal film power resistors R352 and R353. The bootstrap is provided to allow the power supply rails of the current mirrors to go up and down slightly with the output signal into the loudspeaker. This enables the driver stage to fully saturate the output transistors and thus give the greatest power output and best thermal efficiency for any given power rail voltage. The voltage on the 'inside' end of R319 and R320 will vary by about 12 volts peak to peak at full output power, rising above the main power rails during signal peaks.

C307 and C308 with R333 and R335 provide the compensation necessary to ensure stability when the loop is closed. They are Miller capacitors which dramatically reduce the transimpedance (i.e. current to voltage gain) of the current mirrors at high frequencies. The present value of 47pF provides for a unity gain open loop bandwidth of around 75MHz, whilst ensuring a closed loop gain margin of around 6dB (note that gain margin in a current feedback design is not dependent on system bandwidth to a first order approximation). R333 and R335 provide a 'zero' in the open loop frequency response which is tailored to give the best time domain performance (i.e. to make high frequency square waves look square with minimal ringing or overshoot).

DZ304 and C311 provide a fixed 4.7V bias voltage to allow the following stages to operate correctly. C311 is there to ensure that

both halves of the following stage receive an equal AC signal component at high frequency.

TR310 and TR307 are the 'pre-driver' transistors, which act to buffer the outputs from the preceding stage and drive the Darlington output power transistors. TR309 and R321 act as a current limit, to ensure that the emitter current of TR310 does not exceed 30mA in a fault condition. TR306 and R323 provide the same function for TR307.

R338 and R339 are to loosely couple the outputs of the pre-driver stage to the inputs of the Darlington power output devices. This is so that the inbuilt temperature sensing diodes of the output transistors can accurately control the quiescent current of the output stage as the junction temperature of the power devices varies. C312 and C318 ensure that both halves of the output stage receive an equal AC signal component.

The output transistors are TR318 and TR319. These are Sanken SAP15N and SAP15P devices respectively. They are specially designed for audio power amplifier use. In addition to high current gain (Darlington with a typical h_{FE} of 20,000) they provide an inbuilt emitter resistor (thick film power resistor of 0W22) and temperature sensing diodes which closely and rapidly track the V_{BE} versus temperature characteristic of the power transistors, allowing for easy, fast-responding and reasonably accurate control of quiescent current (one of the major headaches of class B amplifier design!)

RV300 is for fine trimming of the quiescent current. PL300 provides a convenient measuring point for this, which is short-circuit protected in the event of a slip with the multimeter probe! All of the remaining circuitry to the right of TR318 and TR319 is essentially for output stage protection...

Transistors TR312 and TR304, along with the network of resistors and capacitors to which they are connected, provide instantaneous overload protection of the output stage. This is a conventional single slope VI protection scheme, which allows much greater current to be delivered into a rated load than into a short circuit. The values allow for 18A peak delivery (at clip) into a purely resistive load, 7A peak (at clip) into a purely capacitive load and around 4A peak into a short circuit. R345, C303, R346 and C304 allow these values to be doubled for short transient bursts (approximately 2.7 milliseconds) so that impulsive musical transients can be delivered cleanly with minimal risk of damaging the output transistors.

TR313, TR302 and their associated components send a signal to the microprocessor when the instantaneous protection circuits are having to work 'hard' to prevent amplifier overload. This instructs the micro that the user is severely abusing the amplifier and will switch off the loudspeaker relays to prevent possible permanent damage. In reality, if you short circuit the outputs at any appreciable volume level, this circuit will trigger and the microprocessor will turn off the loudspeaker relays and send a signal to the user.

R308, R314 and C320 form a low pass filter from which the DC detection circuits can sense excessive DC at the loudspeaker outputs. If there is any positive DC present, then TR316 will turn on, which turns on TR305 and thus activates the DC protection line to the micro, turning off the loudspeaker relays.

If there is any negative DC present, then TR308 will turn on, which turns on TR317 which then turns on TR305 in turn, causing the same effect.

R350 and C319 are the Zobel network which is provided to ensure the amplifier 'sees' a constant and resistive load at very high frequencies, to aid stability, although the amplifier will be stable without the Zobel fitted.

C313 locally couples the 'high frequency' and loudspeaker ground returns together at the output to overcome the effects of track inductance back to the star point. C309 couples the 'high frequency' and signal grounds together at the input for the same reason.

D303 and D304 are 'flyback' diodes to protect the output transistors from reverse bias when the amplifier is heavily clipped into an inductive load (such as a loudspeaker voice coil!)

Sheet 4 is an identical copy of sheet 3 so I will not describe it separately.

L870 Phono Circuit Description

The Phono board is a simple single stage RIAA amplifier. It consists of two channels of high gain amplification, and switching between moving magnet (MM) and moving coil (MC) settings.

PSU

The unit derives its $\pm 15V$ regulated rails from the unit it is fitted into with only local decoupling capacitors on board.

Interface

The unit connects to the host unit via a 8 way connector:

Amplifier

The left channel has designators beginning with 100, and the right with 200. For the purposes of this description the left channel will be described, as the right channel the same in all respects.

The amplifier is a small signal class A voltage feedback amplifier with switchable gain. The input consists of an actively loaded differential pair of very low noise PNP transistors (TR106,107). These transistors are very specific and should only be replaced with identical parts with the E grade high gain. TR100 & TR101 form a current source for the pair, which sets the quiescent current for the entire amplifier. The active load consists of TR110 & TR111, which forms part of a differential current mirror with TR112,113 & 114. This differential stage also has an active load (TR102 & TR103) to keep gain to a maximum.

Both of these differential stages are designed to have as much gain as possible to enable the single stage design. The RIAA response is achieved in the feedback network: C101,110,111,112,119,120,&R115,112. C115 is used to correct between MM & MC gains as the amplifier is non-inverting.

SW100 switches between MM & MC. Two poles of the switch change between the different loading required for each type of cartridge: R108 & C109 for MM, and added in parallel for MC R104 & C108. The other two poles change the feedback resistor value to alter the gain. MM: R105 and in parallel for MC R123.

The DC offset is controlled by a non-inverting servo built around IC100. The amount of servo current is different for each gain setting via R111 (MM) & R124(MC) so that the low frequency high pass point remains the same for both settings. However the high pass point for the circuit is set by C113. This gives a warp filter, stops DC startup thumps from upsetting DC coupled circuitry and an approximation of the RIAA/IEC curve (-2dB @ 20Hz).

The output is class A buffered by a dual mirror follower (TR104,105,108,109). The quiescent current is set up by D100 and R118,119.

Closed loop stability is achieved with C116,117, giving symmetrical slewing capability.

SK103 connects to the micro controller and display PCB.

The 14 pin connector is numbered as follows:

No	Name	Type	Description
1	+5V_D	O/P	5 volt digital supply (for micro)
2	0V_D	O/P	Digital ground
3	+49V	O/P	Main power supply for VFD (via fusible resistor)
4	STANDBY	I/P	Mains relay control signal (HIGH = ON)
5	SPKR1 ON	I/P	Speaker 1 relay control signal (HIGH = ON)
6	SPKR2 ON	I/P	Speaker 2 relay control signal (HIGH = ON)
7	THERMPROT	O/P	Over temperature protect (HIGH = FAULT)
8	VIPROT	O/P	Short circuit protect (HIGH = FAULT)
9	DCPROT	O/P	DC offset protect (HIGH = FAULT)
10	AC PRESENT	O/P	Indicates AC mains is plugged in (HIGH = ON)
11	TRIGGER	O/P	12V DC trigger input (HIGH = ON)
12	REMOTE	O/P	Demodulated RC5 remote input from rear panel
13	0V_D	O/P	Spare digital ground pin
14	+5V_D	O/P	Spare 5 volt digital supply pin

The ground naming convention is as follows:

Name	Description
0V_D	Digital ground (used for micro processor circuitry, display and interface)
0V_LS_R	Right channel loudspeaker ground return
0V_SIG	Signal ground (this is the 'clean' precision reference ground)
0V_PSU	Power supply ground (high current pulses for the large reservoir caps)
0V_TRIG	Ground return for the jack socket trigger and remote control circuit
0V_HF_R	Decoupling 'noisy' ground for the right channel power amp
0V_LS_L	Left channel loudspeaker ground return
0V_HF_L	Decoupling 'noisy' ground for the left channel power amp

A85, P85, P85/3 Service Guide

Build History

ECO Number	Date	Description of Change
00_1089	02/10/00	A85 – Fascia position changed to prevent display buttons sticking
00_1129	01/11/00	A85, P85, P85/3 – Improved stability under heavy clipping of amplifier R345, R346, R445, R446 changed from 100R to 0R link C307, C308, C407, C408 changed from 47P to 100P capacitors
00_1138	27/11/00	A85, P85, P85/3 – C303, C304, C403 changed from 10uF to 100uf capacitors – this prevents protection circuit from operating when driving a 4 ohm load at low frequency
01_1030	23/02/01	A85, P85, P85/3 – RV300, RV400 changed to 220R presets to make it easier to adjust the bias settings
01_1068	11/04/01	A85, P85, P85/3 – New output device clamp fitted to heatsink
01_1101	04/06/01	A85, P85, P85/3 – Sensitivity of DC offset detection circuit reduced – Power amp cct R308, R408 changed to 22K - R314, R414 changed to 10K PSU surface mount fuse F202 up rated from 500mA to 750mA
01_1142	22/08/01	A85 – Preamp board upgraded from L866 to L937
01_1178	12/10/01	A85, P85, P85/3 – Speaker terminals changed from Camcon to 4mm binding post
01_E014	28/11/01	A85 – Preamp board fuses F300, F301 up rated to 2A surface mount
02_E033	31/01/02	A85 – Extra pad F038 fitted under TX to stop TX coming loose in transit
02_E035	04/02/02	A85, P85, P85/3 – Main 20mm fuse rating changed to 4AT

Software History

ECO Number	Date	Version	Description of Change
01_1072	18/04/01	1.1	Remote standby action changed from turning unit completely off to putting unit into standby
01_1095	21/05/01	1.2	Delay added to start H8 start up routine (volume control chip)
01_1167	12/09/01	1.3	Volume chip read/write protocol changed
01_1179	26/10/01	2.0	Added the processor mode option
01_E011	23/11/01	2.1	Corrected the welcome message saving fault. This fault was introduced with version 2.0 software
02_E048	15/02/02	2.2	Corrected the processor loop volume jump when v/c adjusted

Current Fuse Ratings (20/02/02)

Fuse Position	Fuse Rating
Main Supply fuses - A85, P85, P85/3	2 x 4AT 20mm (Arcam part number C12406)
PSU fuse F202 - A85, P85, P85/3	750mA surface mount (Arcam part number C3751)
Preamp fuses F300, F301 – A85	2A surface mount (Arcam part number C3202)

Quiescent Current Setting

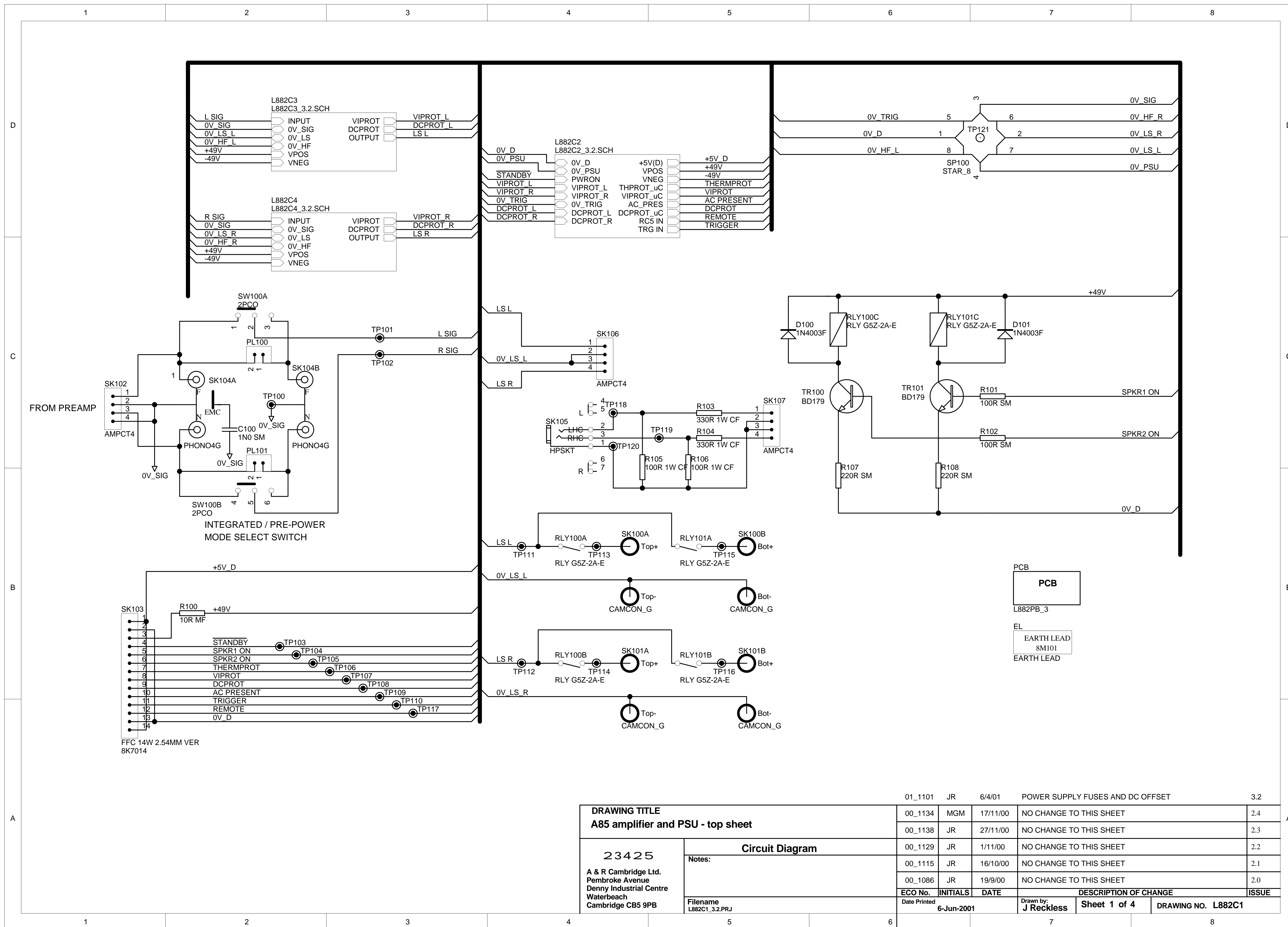
Left channel	Measure points indicated on PCB - Adjust RV300 for 8.5mV cold or 12 mV when warm
Right channel	Measure points indicated on PCB - Adjust RV400 for 8.5mV cold or 12 mV when warm

Fault Diagnostics

Fault	Action
No power	Check fuses Check power supply rails
Unit functions ok but no audio	Check preamp fuses Check RL100A (volume control mute relay) Check +5V supply rail Check mute signal line
Volume control locks up	Check software version is 2.0 or higher
DC offset	Check equipment connected to amp for DC on the audio leads Check alterations as per ECO 01_1101 have been fitted
Unit fails to respond to commands	Check ribbon cable from display to main board Check ribbon cable from display to preamp board
Unit gets very hot	Check power stage IQ settings

Hints & Tips

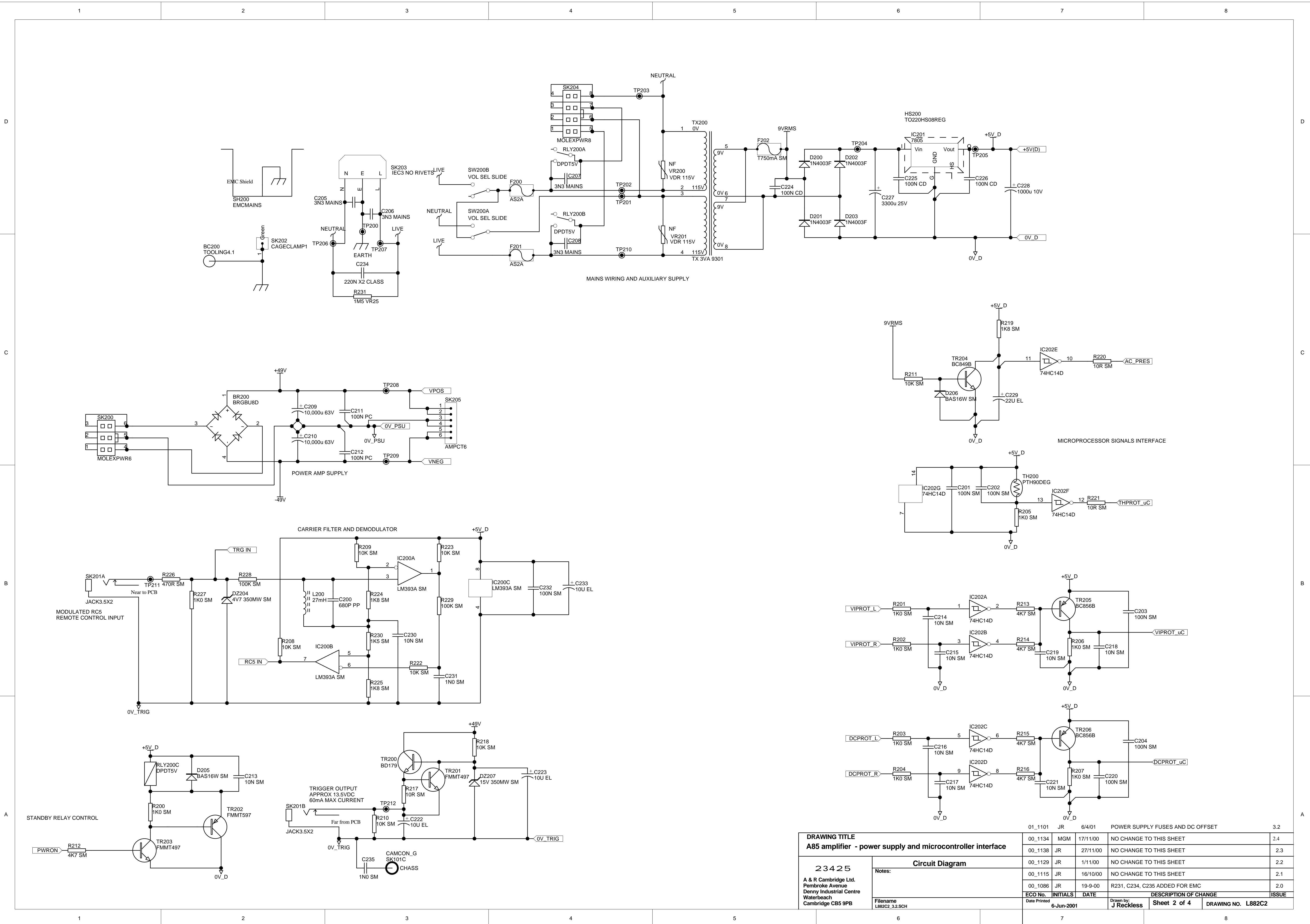
- To check software version press PHONO, TUNER, DVD buttons on the front panel simultaneously.
- On issue 2 phono boards only, fit Kapton insulation tape to the phono stage PCB (rear panel end) to prevent track shorting to chassis.
- Check all fuses are the correct rating.
- Check DC offset alterations are fitted as per ECO 01_1101
- To isolate a fault between the pre or power amp section press the **PRE/PWR** button on the rear panel to separate the two sections.
- Check R100 on amp/psu board is not shorting to the track underneath (through plated via).



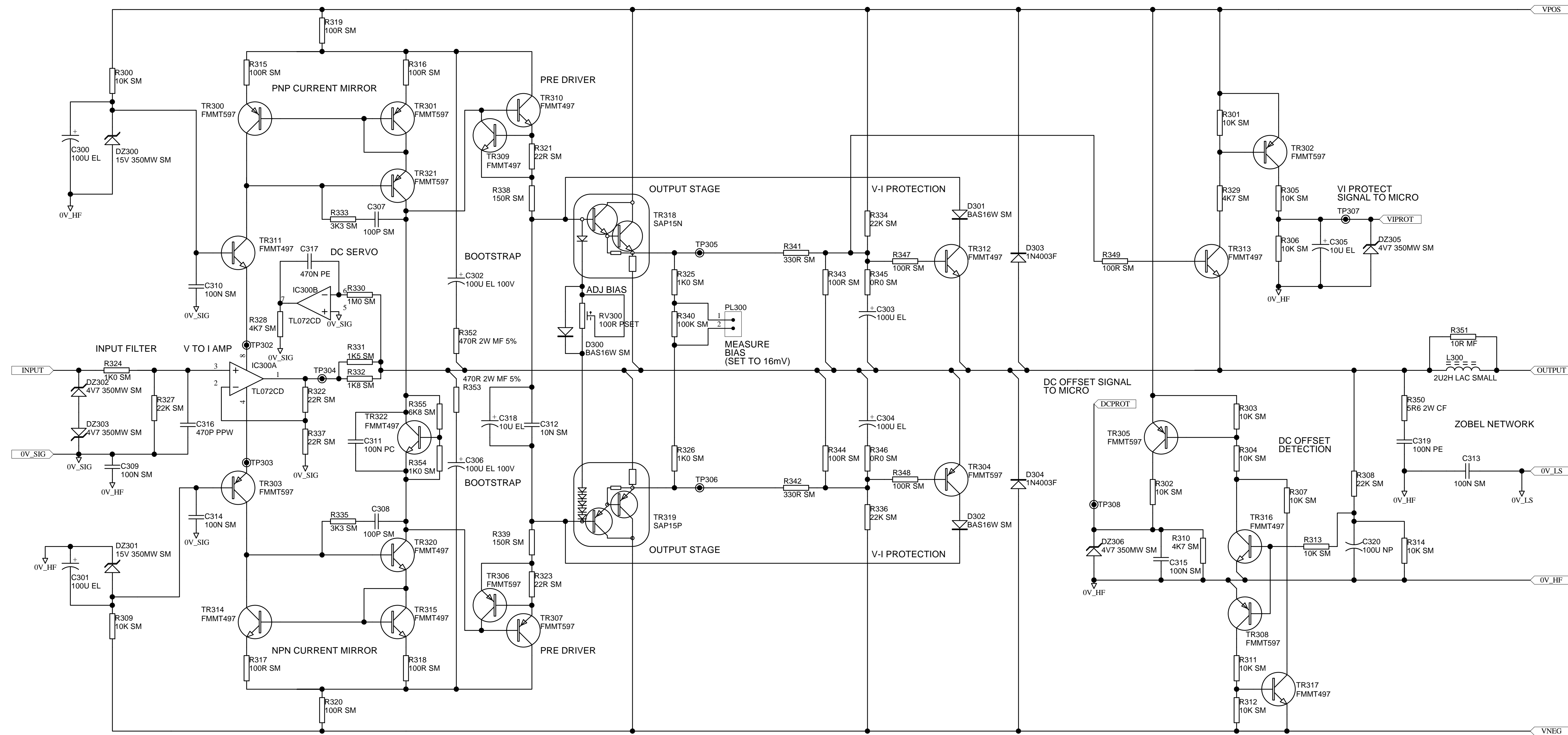
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PCB
L882PB_3
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8M101
EARTH LEAD

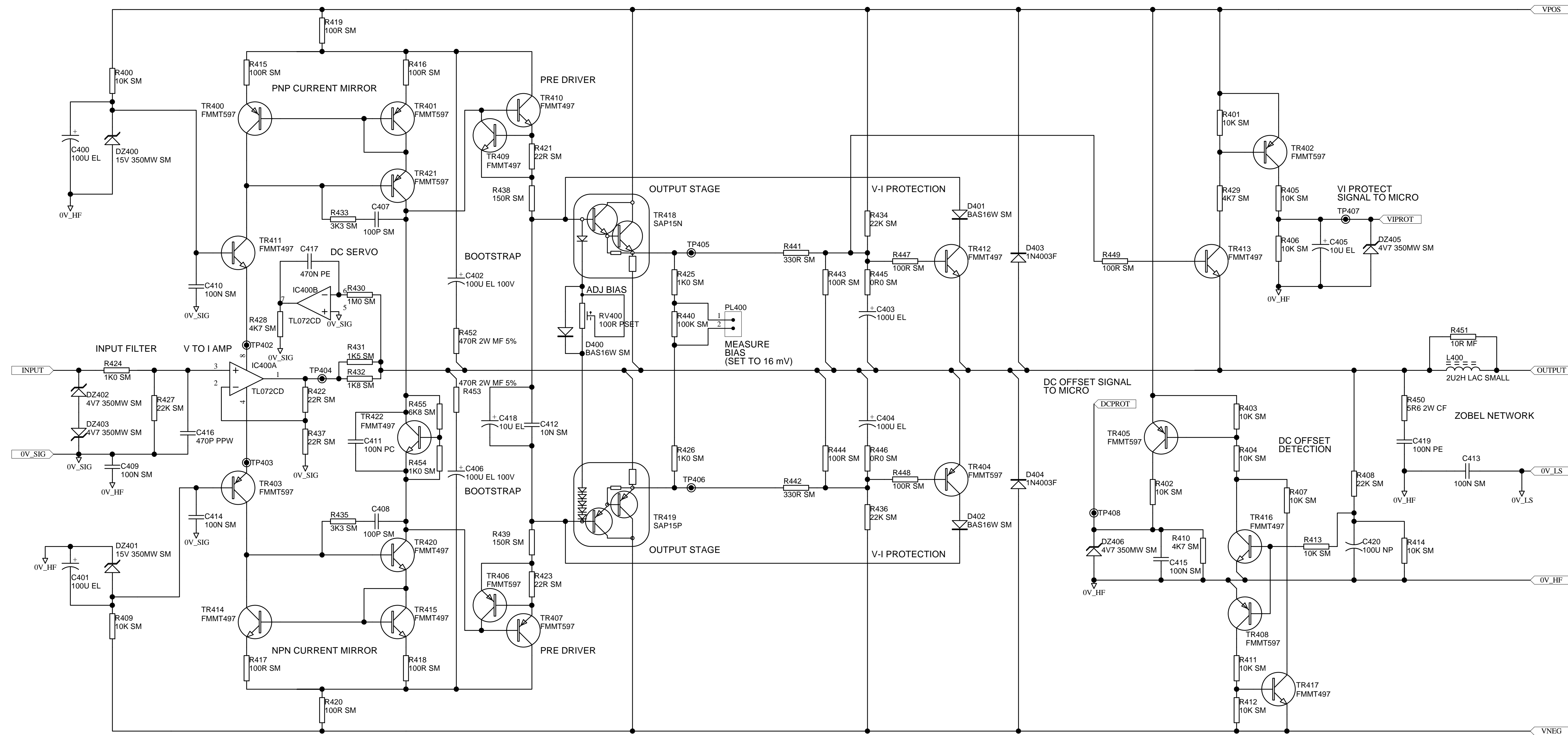
DRAWING TITLE		ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
A85 amplifier and PSU - top sheet 23425 A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB		00_1101	JR	6/4/01	POWER SUPPLY FUSES AND DC OFFSET	3.2
		00_1134	MGM	17/11/00	NO CHANGE TO THIS SHEET	2.4
		00_1138	JR	27/11/00	NO CHANGE TO THIS SHEET	2.3
		00_1129	JR	1/11/00	NO CHANGE TO THIS SHEET	2.2
		00_1115	JR	16/10/00	NO CHANGE TO THIS SHEET	2.1
Notes:		00_1086	JR	19/9/00	NO CHANGE TO THIS SHEET	2.0
Filename: L882C1_3.2.PRJ		Date Printed: 6-Jun-2001		Drawn by: J Reckless	Sheet 1 of 4	DRAWING NO. L882C1



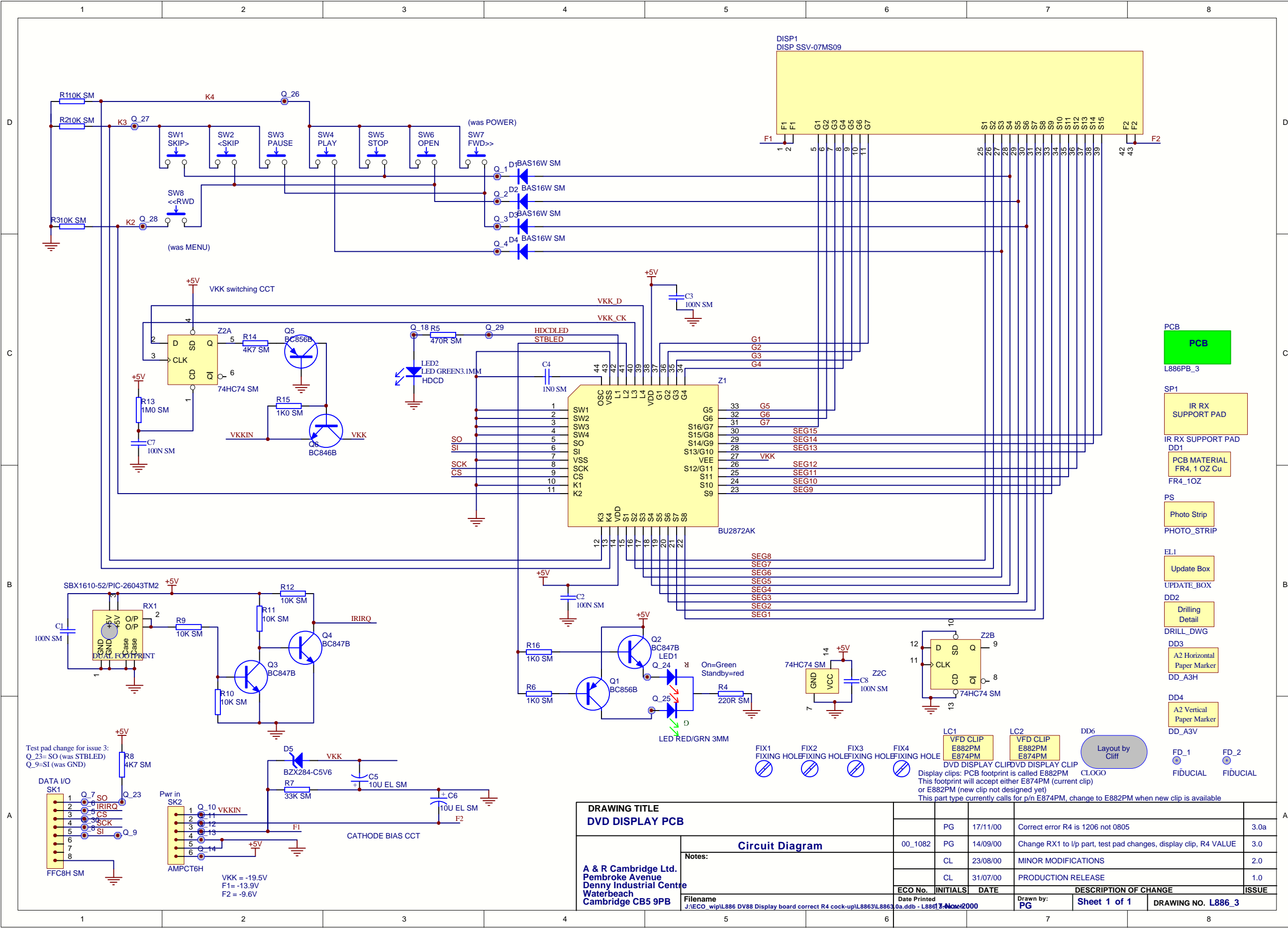
DRAWING TITLE		01_1101 JR 6/4/01 POWER SUPPLY FUSES AND DC OFFSET 3.2				
A85 amplifier - power supply and microcontroller interface		00_1134	MGM 17/11/00 NO CHANGE TO THIS SHEET 2.4			
		00_1138	JR 27/11/00 NO CHANGE TO THIS SHEET 2.3			
		00_1129	JR 1/11/00 NO CHANGE TO THIS SHEET 2.2			
		00_1115	JR 16/10/00 NO CHANGE TO THIS SHEET 2.1			
		00_1086	JR 19-9-00 R231, C234, C235 ADDED FOR EMC 2.0			
23425 A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB		ECO No. L882C2_3.2.SCH	INITIALS JR	DATE 6-Jun-2001	DESCRIPTION OF CHANGE Sheet 2 of 4	ISSUE DRAWING NO. L882C2



DRAWING TITLE		01_1101	JR	6/4/01	POWER SUPPLY FUSES AND DC OFFSET	3.2
A85 amplifier - power output stage left		00_1134	MGM	17/11/00	NO CHANGE TO THIS SHEET	2.4
		00_1138	JR	27/11/00	C303 C304 FROM 10U TO 100U	2.3
		00_1129	JR	1/11/00	R345 R346 C307 C308 VALUE CHANGES	2.2
		00_1115	JR	16/10/00	R338 R339 CHANGED TO 150R	2.1
		00_1086	JR	19/9/00	NO CHANGE TO THIS SHEET	2.0
23425		ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB		Filename	Date Printed		Drawn by	Sheet 3 of 4
		L882C3_3.2SCH	6-Jun-2001		J Reckless	DRAWING NO. L882C3



DRAWING TITLE		01_1101	JR	6/4/01	POWER SUPPLY FUSES AND DC OFFSET	3.2
A85 amplifier - power output stage right		00_1134	MGM	17/11/00	L300 L400 CHANGED TO 7D002C	2.4
		00_1138	JR	27/11/00	C403 C404 FROM 10U TO 100U	2.3
		00_1129	JR	1/11/00	R435 R436 C407 C408 VALUE CHANGES	2.2
		00_1115	JR	16/10/00	R438 R439 CHANGED TO 150R	2.1
		00_1086	JR	19/9/00	NO CHANGE TO THIS SHEET	2.0
23425		ECO No.		INITIALS	DATE	DESCRIPTION OF CHANGE
A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB		Date Printed		6-Jun-2001	Drawn by J Reckless	Sheet 4 of 4 DRAWING NO. L882C4
Filename L882C4_3.2.sch						



- PCB
- L886PB_3
- SP1
- IR RX SUPPORT PAD
- IR RX SUPPORT PAD DD1
- PCB MATERIAL FR4, 1 OZ Cu
- FR4_1OZ
- PS
- Photo Strip
- PHOTO_STRIP
- EL1
- Update Box
- UPDATE_BOX
- DD2
- Drilling Detail
- DRILL_DWG
- DD3
- A2 Horizontal Paper Marker
- DD_A3H
- DD4
- A2 Vertical Paper Marker
- DD_A3V
- FD_1
- FIDUCIAL
- FD_2
- FIDUCIAL

DRAWING TITLE				
DVD DISPLAY PCB				
Circuit Diagram				
Notes:				
PG	17/11/00	Correct error R4 is 1206 not 0805		3.0a
00_1082	PG	14/09/00	Change RX1 to l/p part, test pad changes, display clip, R4 VALUE	3.0
CL	23/08/00	MINOR MODIFICATIONS		2.0
CL	31/07/00	PRODUCTION RELEASE		1.0
ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	
Date Printed			Drawn by:	ISSUE
J:\ECO_wip\L886 DV88 Display board correct R4 cock-up\L8863L8863.0a.ddb - L8863		17-Nov-2000	PG	Sheet 1 of 1
			DRAWING NO. L886_3	

1

2

3

4

D

D

C

C

B

B

Main signal path
L937C2_1.1.SCH



Power supply
L937C3_1.1.SCH



USE EXCLUDE NF WHEN USING RUNOUT SHEET PROGRAM

PCB1
PCB
L937PB_1

A

A

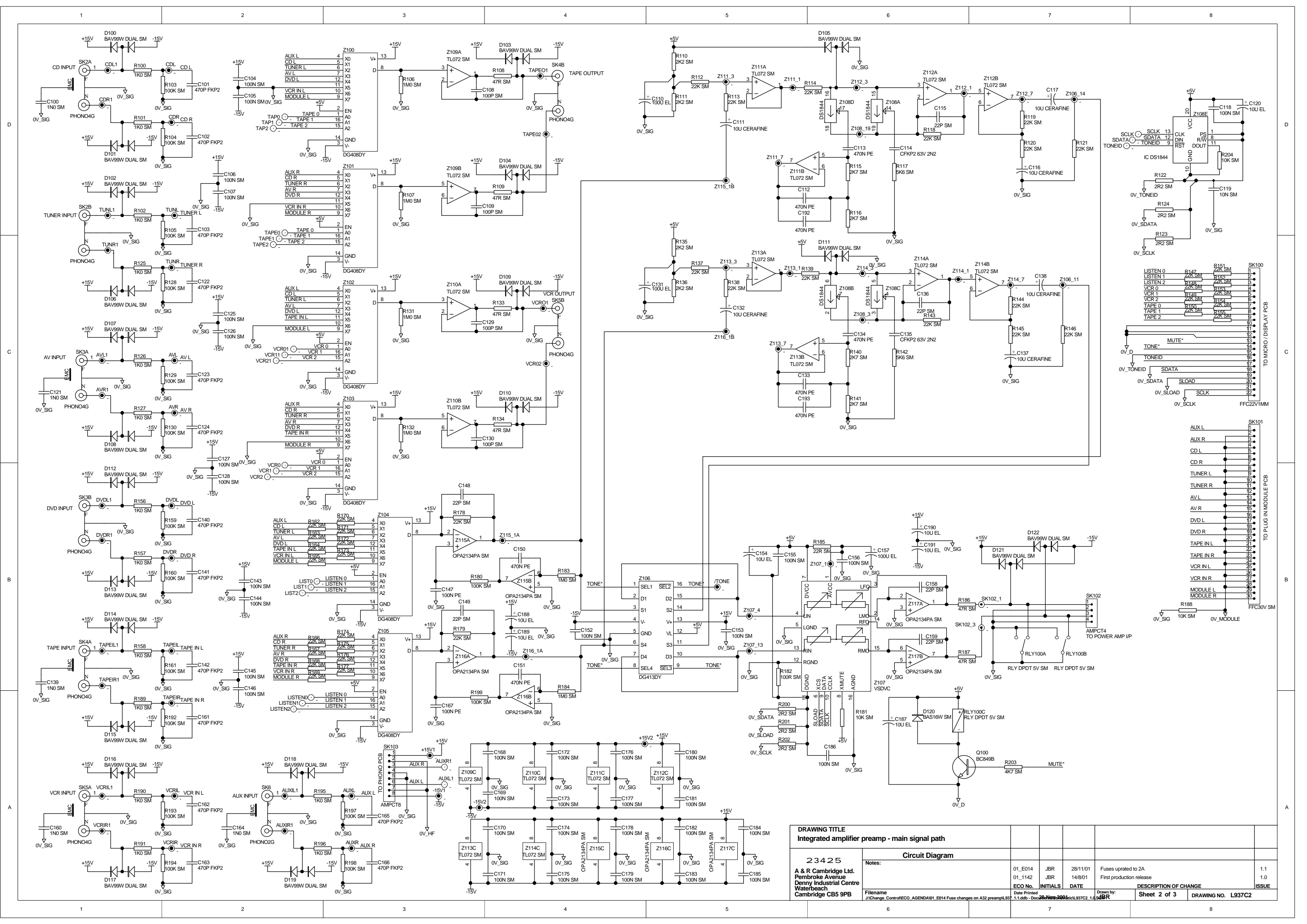
DRAWING TITLE Integrated amplifier preamp						
23425 A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB	Circuit Diagram					
	Notes:	01_E014	JBR	28/11/01	Fuses uprated to 2A	1.1
		01_1142	JBR	14/8/01	First production release	1.0
Filename	Date Printed	ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
J:\Change_Control\ECO_AGENDA\01_E014 Fuse changes on A32 preamp\L937_1.1.ddb - Document Schematic	28 Nov 2001		JBR		Sheet 1 of 3	DRAWING NO. L937C1

1

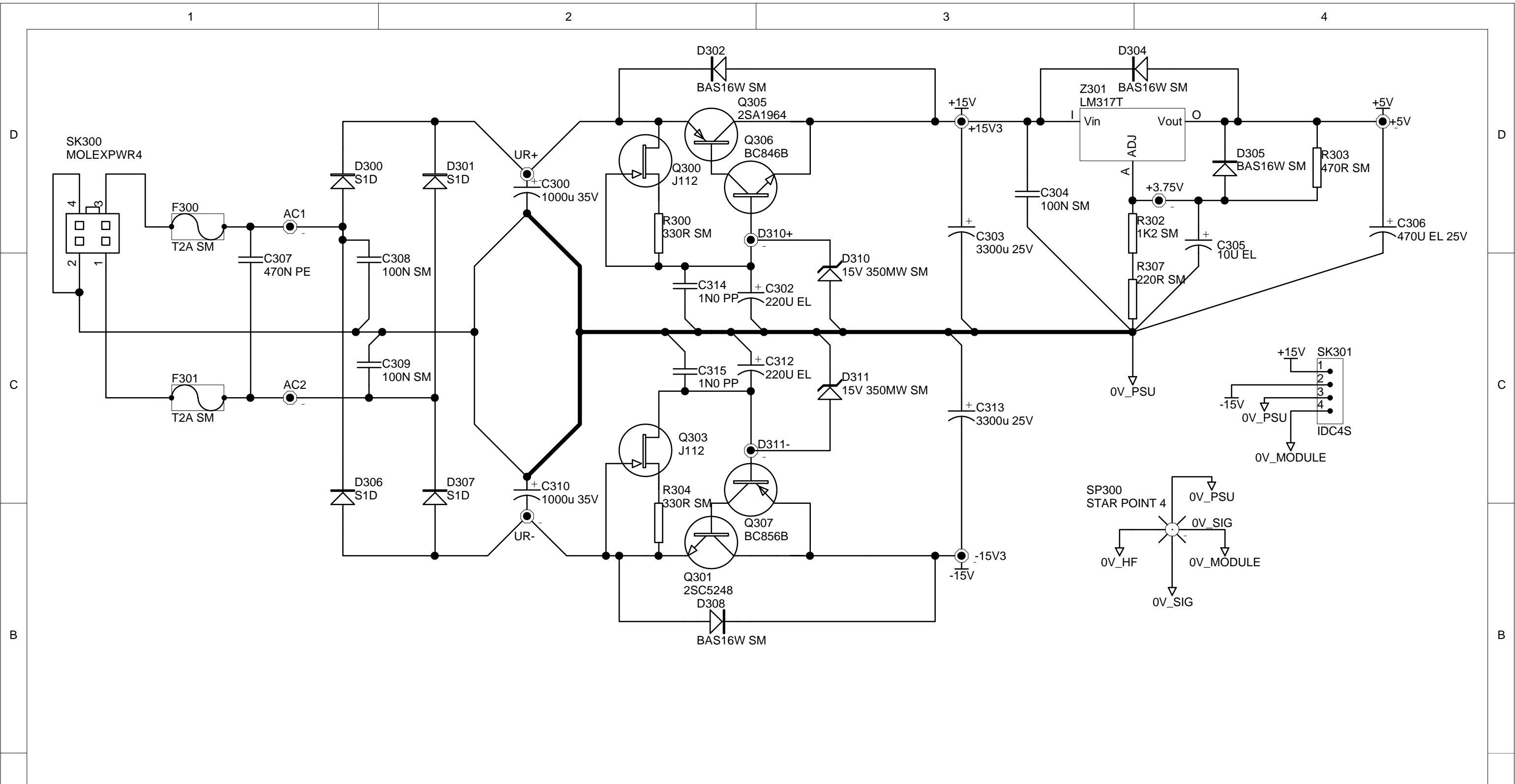
2

3

4



DRAWING TITLE		Circuit Diagram					
23425		A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB		ECO No. INITIALS DATE		Fuses updated to 2A First production release	
Notes:		Date Printed		Drawn by:		ISSUE	
Filename		J:\Change Control\ECO_AGENDA\01_E014 Fuse changes on A32 preamp\937		1.1.dwg - Doc No. 1137C2		Sheet 2 of 3 DRAWING NO. L937C2	



DRAWING TITLE							
Integrated amplifier preamp - power supply							
23425 A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB	Circuit Diagram						
	Notes:		01_E014	JBR	28/11/01	Fuses uprated to 2A	1.1
			01_1142	JBR	14/8/01	First production release	1.0
	Filename		ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
J:\Change_Control\ECO_AGENDA\01_E014 Fuse changes on A32 preamp\L937_1.1.ddb - DocuMate\Schematic\L937C3_1.0.dwg							
Date Printed		Drawn by:		Sheet 3 of 3		DRAWING NO. L937C3	
28 Nov 2001		JBR					

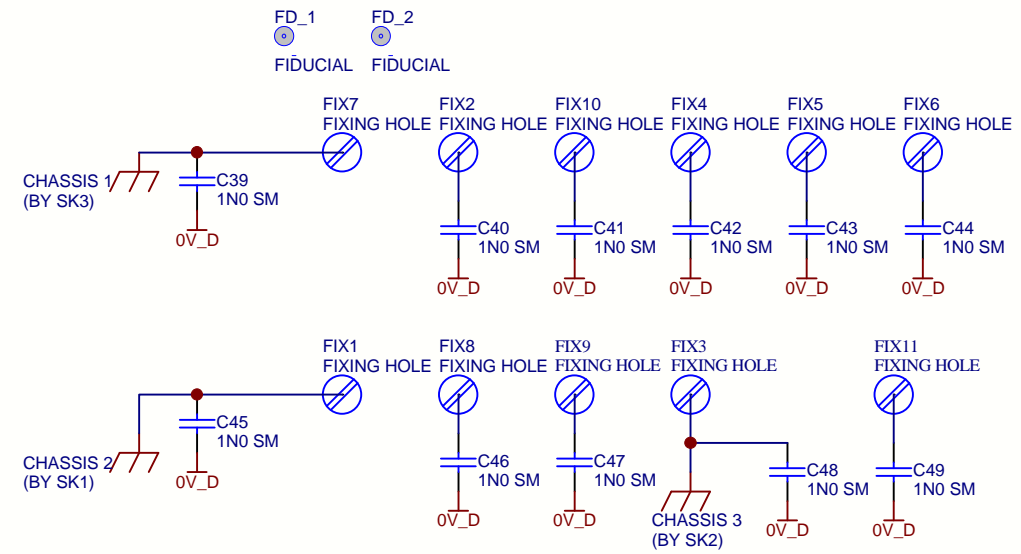
A85 DISPLAY PCB

L865C2_2.0
L865C2_2.0.SCH



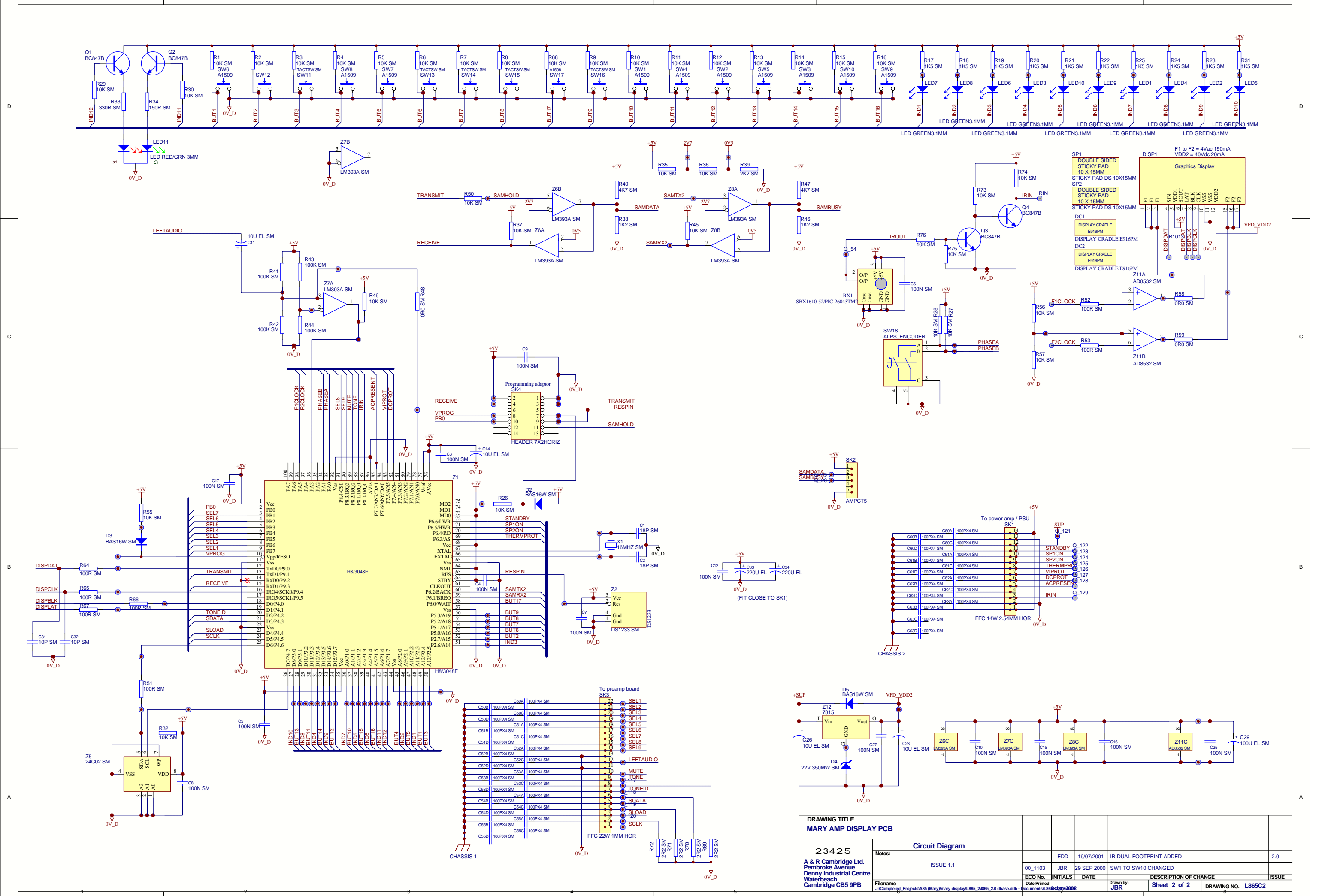
MICRO

UDB
Update Box
(Small)
UPDATE_SML

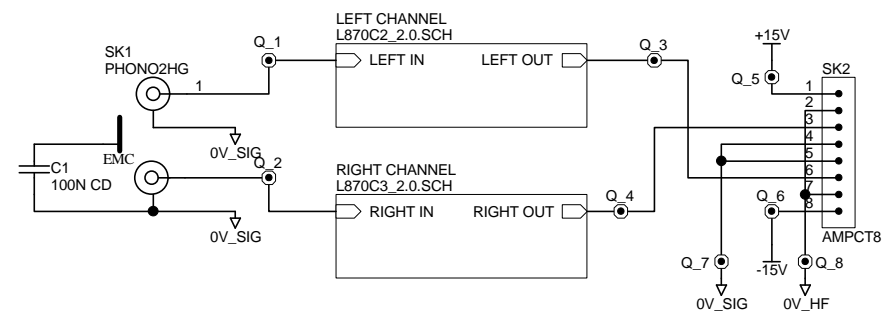


PCB1
PCB
L865PB_2

DRAWING TITLE MARY AMP DISPLAY PCB					
23425 A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB	Circuit Diagram				
	Notes:	ISSUE 1.1			
	ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
	00_1103	JBR	29 SEP 2000	SW1 TO SW10 CHANGED	1.1
Filename J:\Completed_Projects\A85 (Mary)\mary display\L865_2\l865_2.0 dbase.ddb	Date Printed 19/07/2001	Drawn by: JBR	Sheet 1 of 2	DRAWING NO. L865C1	



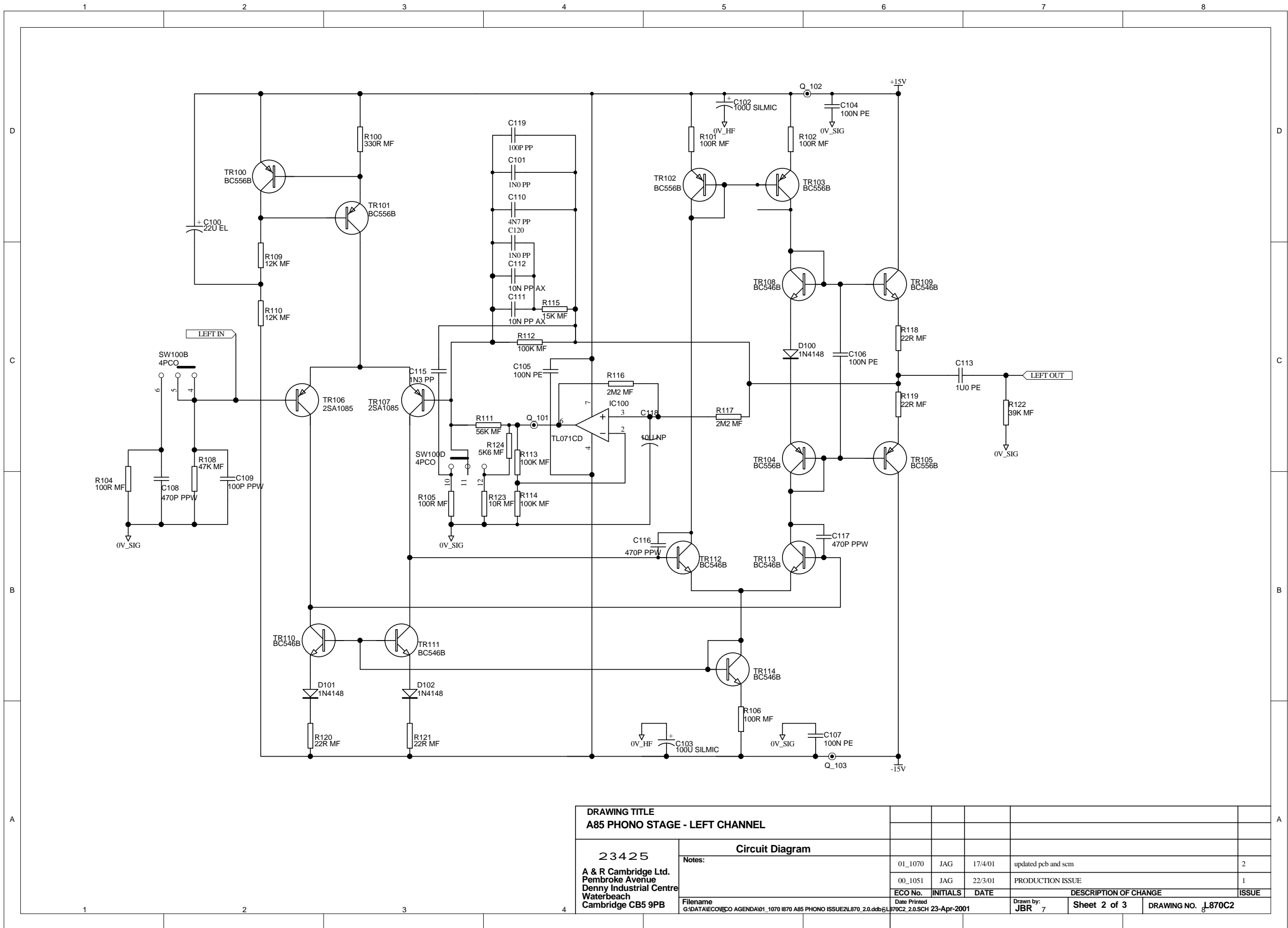
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MARY AMP DISPLAY PCB				
23425				
A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB				
Circuit Diagram				
Notes:				
ISSUE 1.1				
00_1103	JBR	29 SEP 2000	SW1 TO SW10 CHANGED	2.0
ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
	JBR		Sheet 2 of 2	DRAWING NO. L865C2



PCB1
PCB
 L870PB_2

EL1
 Update Box
 UPDATE_BOX

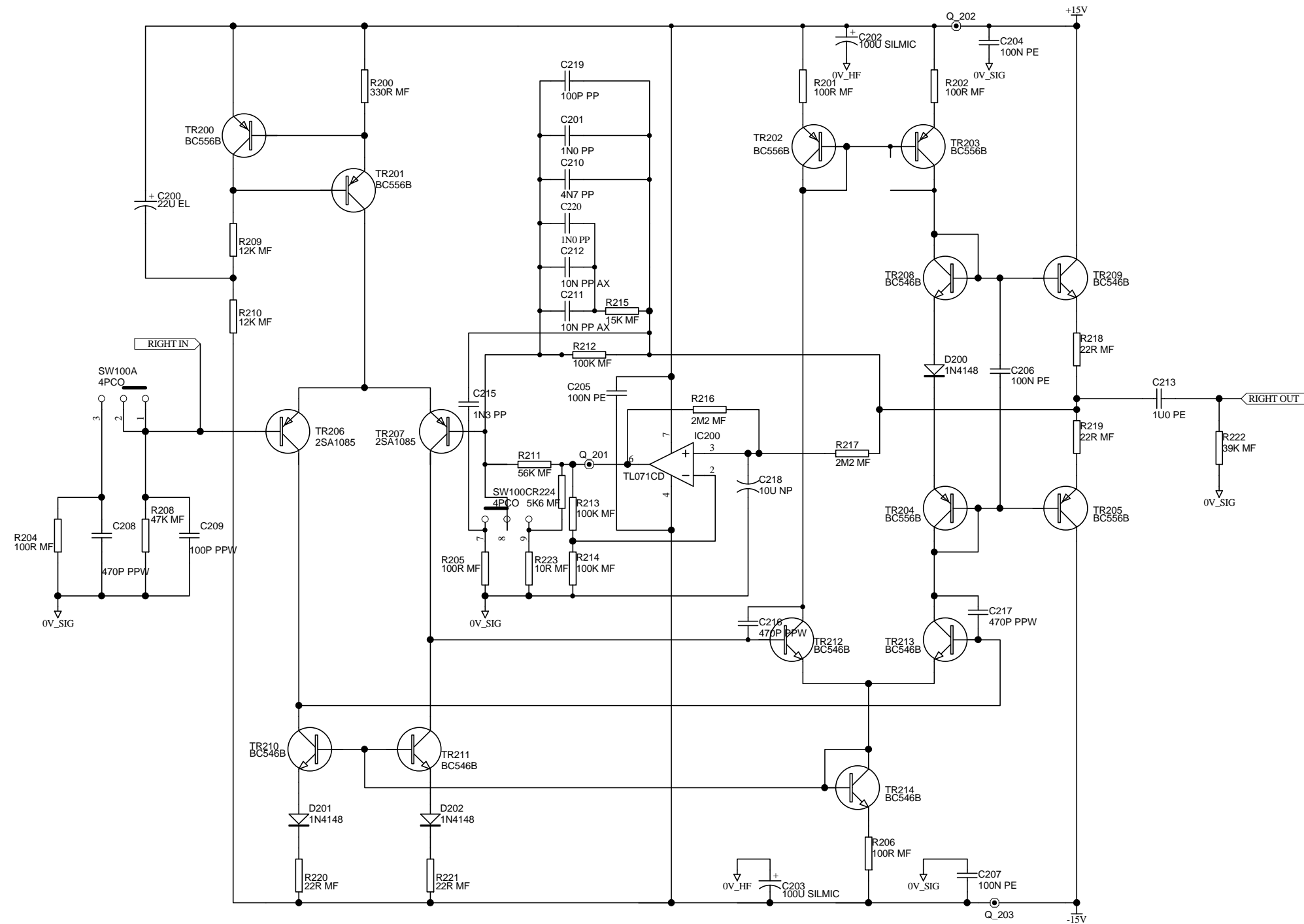
DRAWING TITLE A85 PHONO STAGE - TOP LEVEL										
23425 A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB						Circuit Diagram				
Notes:						01_1070	JAG	17/4/01	updated pcb and scm	2
						00_1051	JAG	22/3/01	PRODUCTION ISSUE	1
Filename G:\DATA\ECO\ECO AGENDA\01_1070\870 A85 PHONO ISSUE2\L870_2.0.ddb - L870c1_2.0.PRJ						ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
Date Printed 23-Apr-2001						Drawn by: JBR	Sheet 1 of 3		DRAWING NO. L870C1	



DRAWING TITLE					
A85 PHONO STAGE - LEFT CHANNEL					
23425		Circuit Diagram			
A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB		Notes:			
File name	Date Printed	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
G:\DATA\ECO\ECO AGENDA\01_1070\870 A85 PHONO ISSUE2\870 2.0.dwg	23-Apr-2001	JAG	17/4/01	updated pcb and scm	2
		JAG	22/3/01	PRODUCTION ISSUE	1
Drawn by:		Sheet 2 of 3		DRAWING NO. L870C2	
JBR		7			

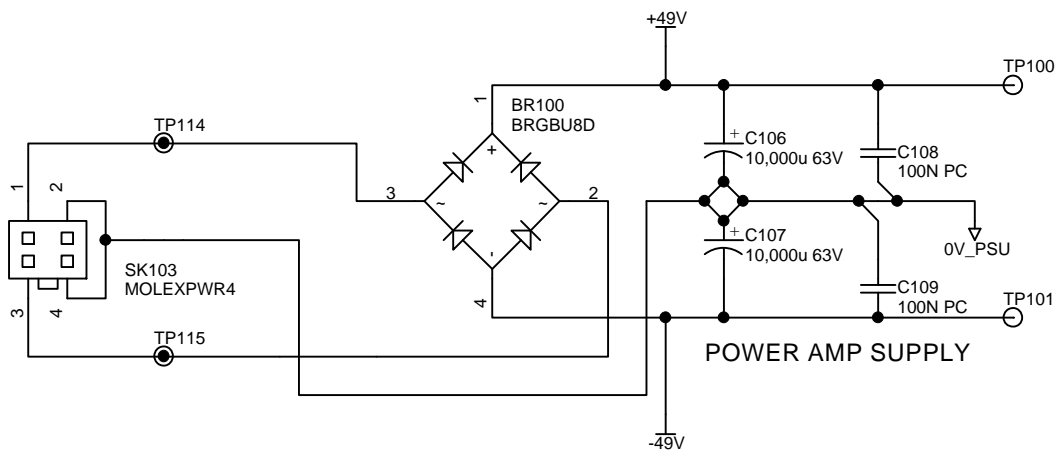
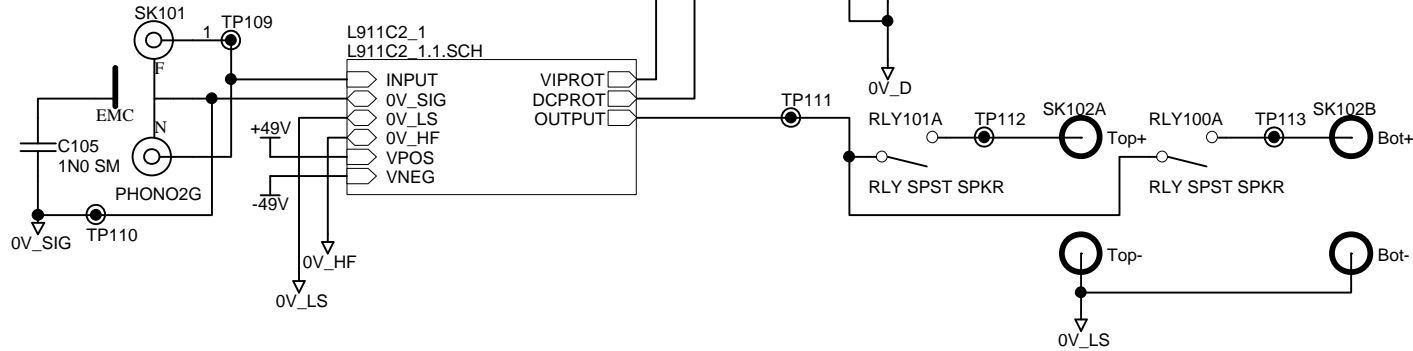
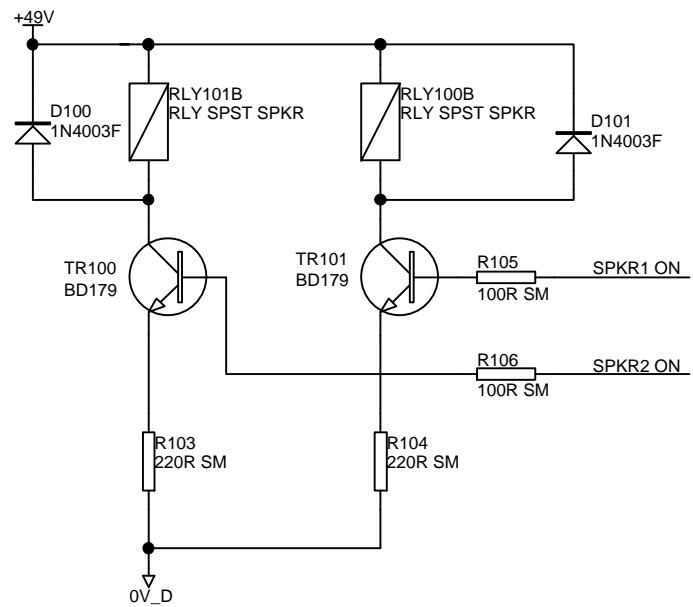
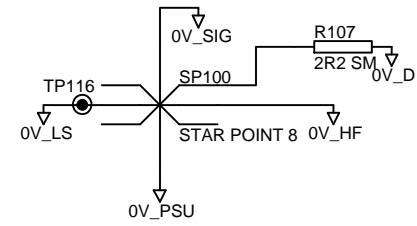
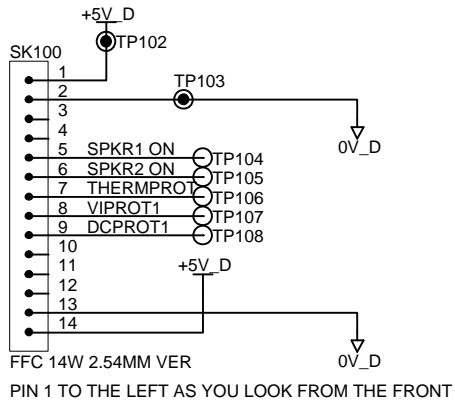
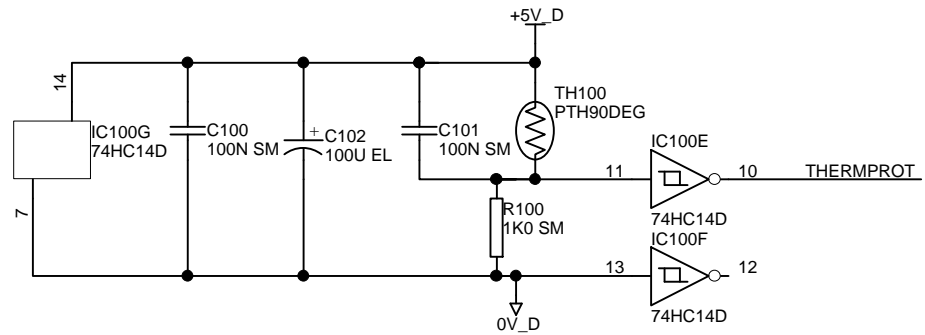
1 2 3 4 5 6 7 8

D
C
B
A



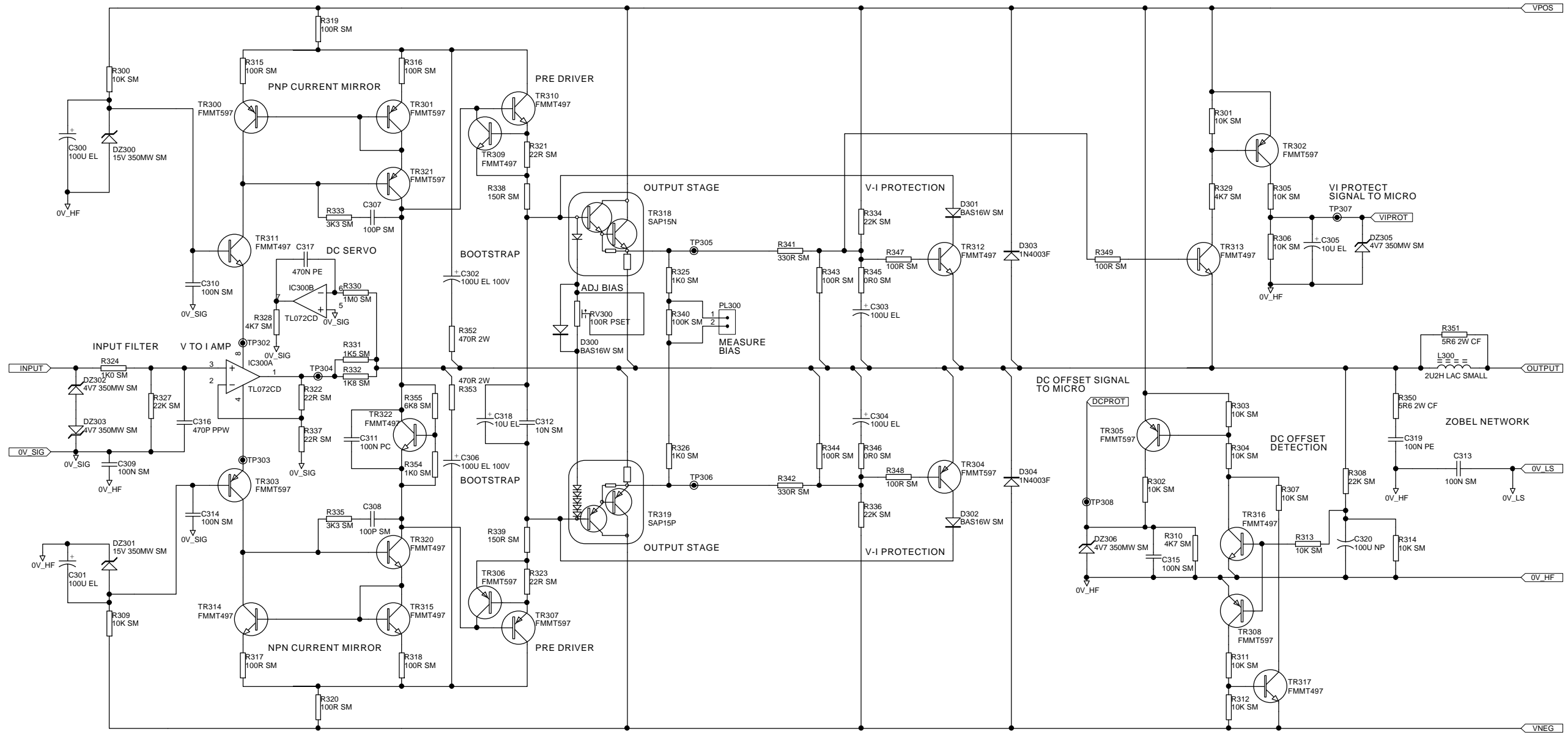
DRAWING TITLE									
A85 PHONO STAGE - RIGHT CHANNEL									
23425		Circuit Diagram							
A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB		Notes:		01_1070 JAG 17/4/01 updated pcb and scm				2	
				00_1051 JAG 22/3/01 PRODUCTION ISSUE				1	
				ECO No.		INITIALS		DATE	
				Date Printed		Drawn by:		DESCRIPTION OF CHANGE	
				G:\DATA\ECO\ECO AGENDA\01_1070\870 A85 PHONO ISSUE2\870 2.0.ddb		JBR 7		Sheet 3 of 3	
				6/7/03 2.0.SCH 23-Apr-2001				DRAWING NO. L870C3	
								ISSUE	

1 2 3 4

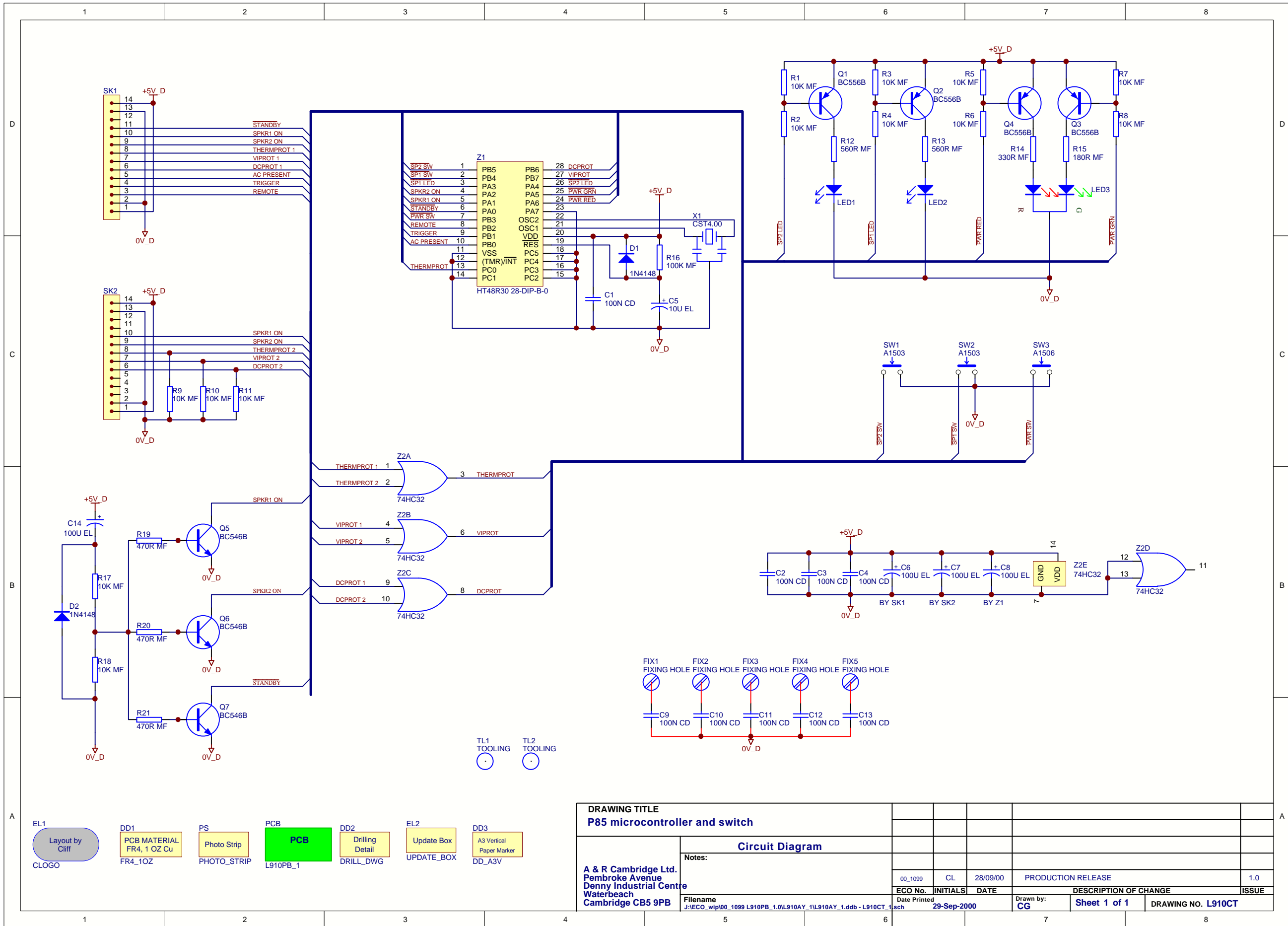


PB
PCB
L911PB_1

DRAWING TITLE											
AP85 third channel - top level											
23425						Circuit Diagram					
A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB						Notes:		01_1101 JR 4/6/01 DC OFFSET CHANGES		1.1	
								01_1018 JR 30/1/01 PRODUCTION ISSUE		1.0	
						ECO No.		INITIALS		DATE	
						Date Printed		Drawn by:		DESCRIPTION OF CHANGE	
						J Reckless		Sheet 1 of 2		DRAWING NO. L911C1	
Filename: J:\ECO_wip01_1101 A85 RANGE PCB FUSES AND DC OFFSET\L911_1.1.DDB - Document						Date Printed: 4/6/01		Drawn by: J Reckless		DRAWING NO. L911C1	

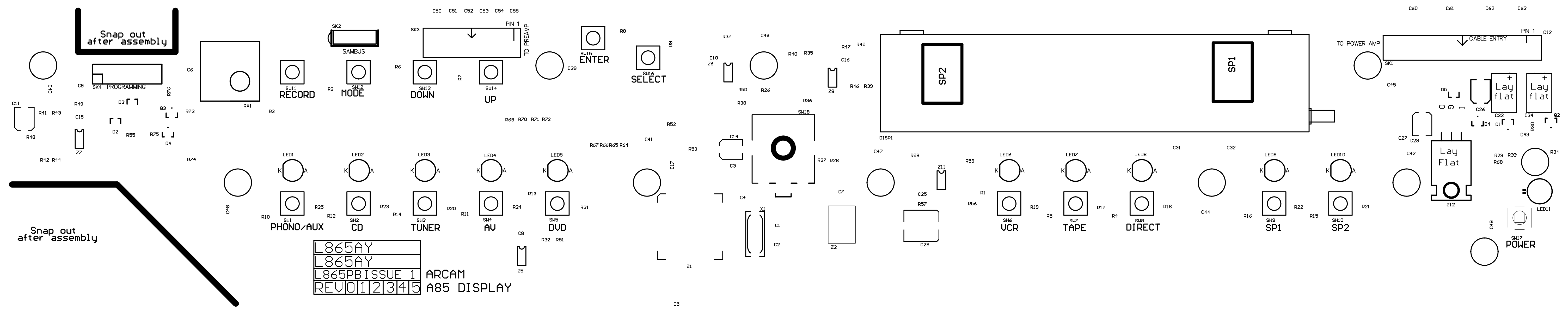


DRAWING TITLE AP85 third channel - output stage					
23425					
Circuit Diagram					
A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB					
Notes:	01_1101	JR	4/6/01	DC OFFSET CHANGES	1.1
	01_1018	JR	30/1/01	PRODUCTION ISSUE	1.0
Filename	L911C2_1.1.SCH		Date Printed	4-Jun-2001	Drawn by: J Reckless
				Sheet 2 of 2	DRAWING NO. L911C2



- EL1 Layout by Cliff
- DD1 PCB MATERIAL FR4, 1 OZ Cu
- PS Photo Strip
- PCB PCB
- DD2 Drilling Detail
- EL2 Update Box
- DD3 A3 Vertical Paper Marker
- CLOGO
- FR4_1OZ
- PHOTO_STRIP
- L910PB_1
- DRILL_DWG
- UPDATE_BOX
- DD_A3V

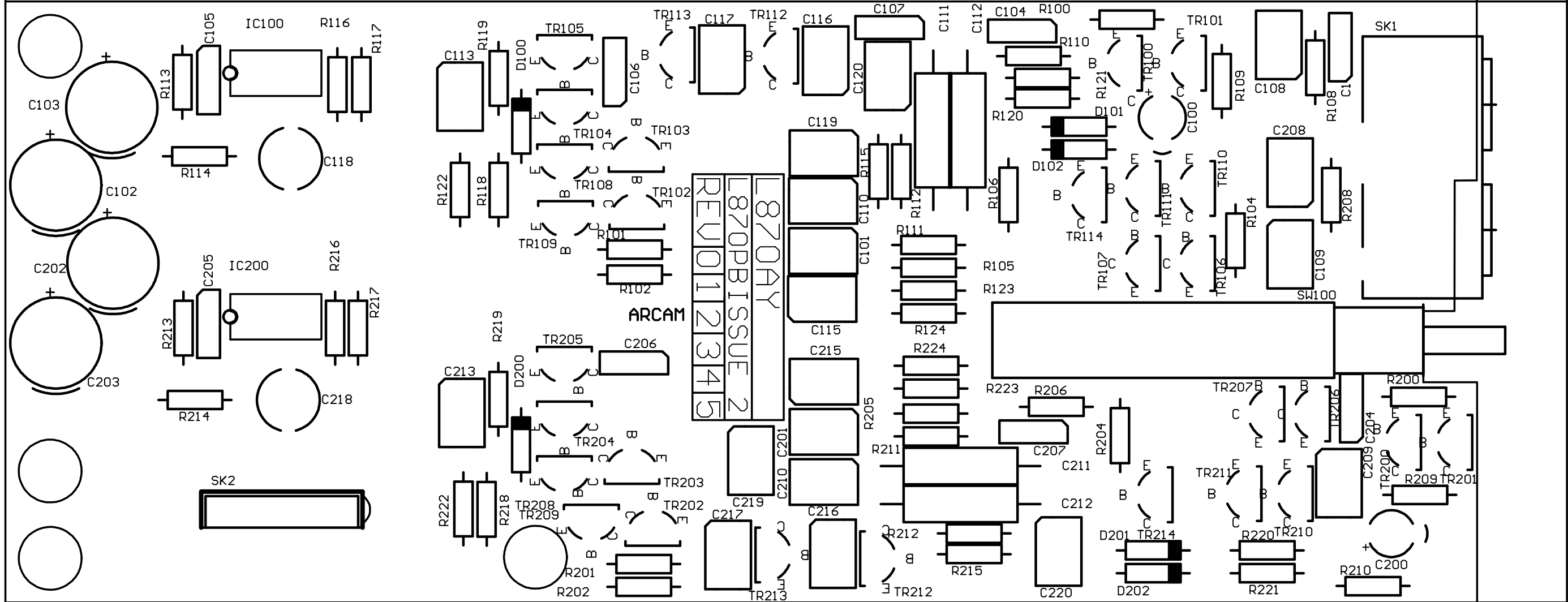
DRAWING TITLE							
P85 microcontroller and switch							
Circuit Diagram							
Notes:							
A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB							
Date Printed 29-Sep-2000		Date 28/09/00		Drawn by: CG		ISSUE	
ECO No. 00_1099		INITIALS CL		DESCRIPTION OF CHANGE PRODUCTION RELEASE		ISSUE 1.0	
Filename J:\ECO_wip\00_1099_L910PB_1.0\L910AY_1\L910AY_1.ddb - L910CT_1.sch		Date Printed 29-Sep-2000		Drawn by: CG		DESCRIPTION OF CHANGE Sheet 1 of 1	
						DRAWING NO. L910CT	



PHONO PCB
Top Overlay
8-Nov-2000

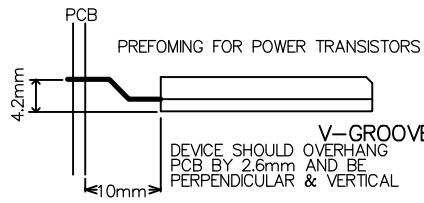
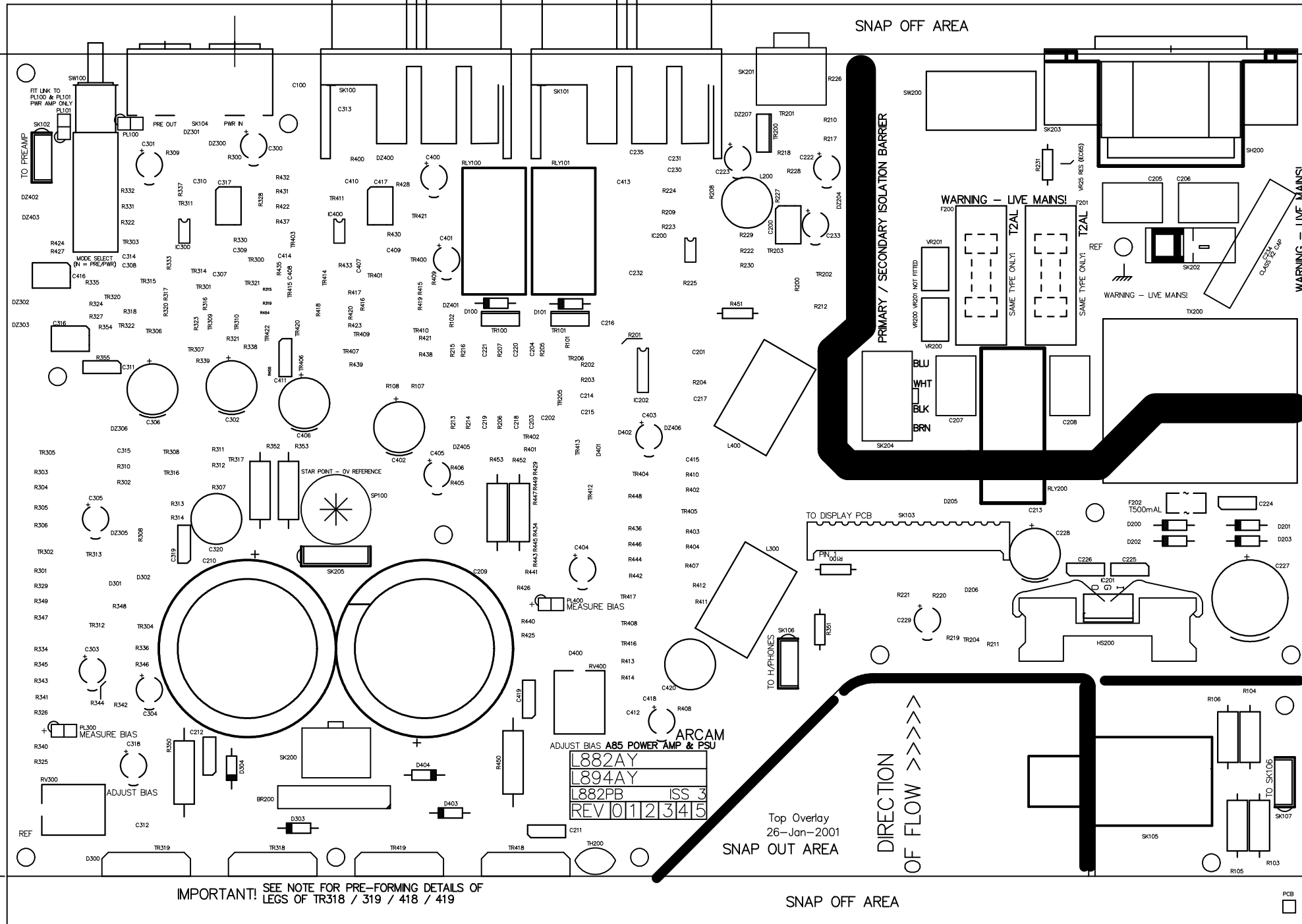
PCB1

L870pb_2.PCB
Top Overlay
17-Apr-2001



V-GROOVE>>>>>

SNAP OFF AREA



IMPORTANT! SEE NOTE FOR PRE-FORMING DETAILS OF LEGS OF TR318 / 319 / 418 / 419

ARCAM
 ADJUST BIAS A85 POWER AMP & PSU
 882AY
 894AY
 882PB ISS 3
 REV 10112131415

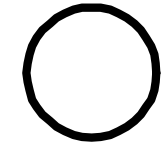
Top Overlay
 26-Jan-2001
 SNAP OUT AREA

DIRECTION OF FLOW >>>>>

SNAP OFF AREA

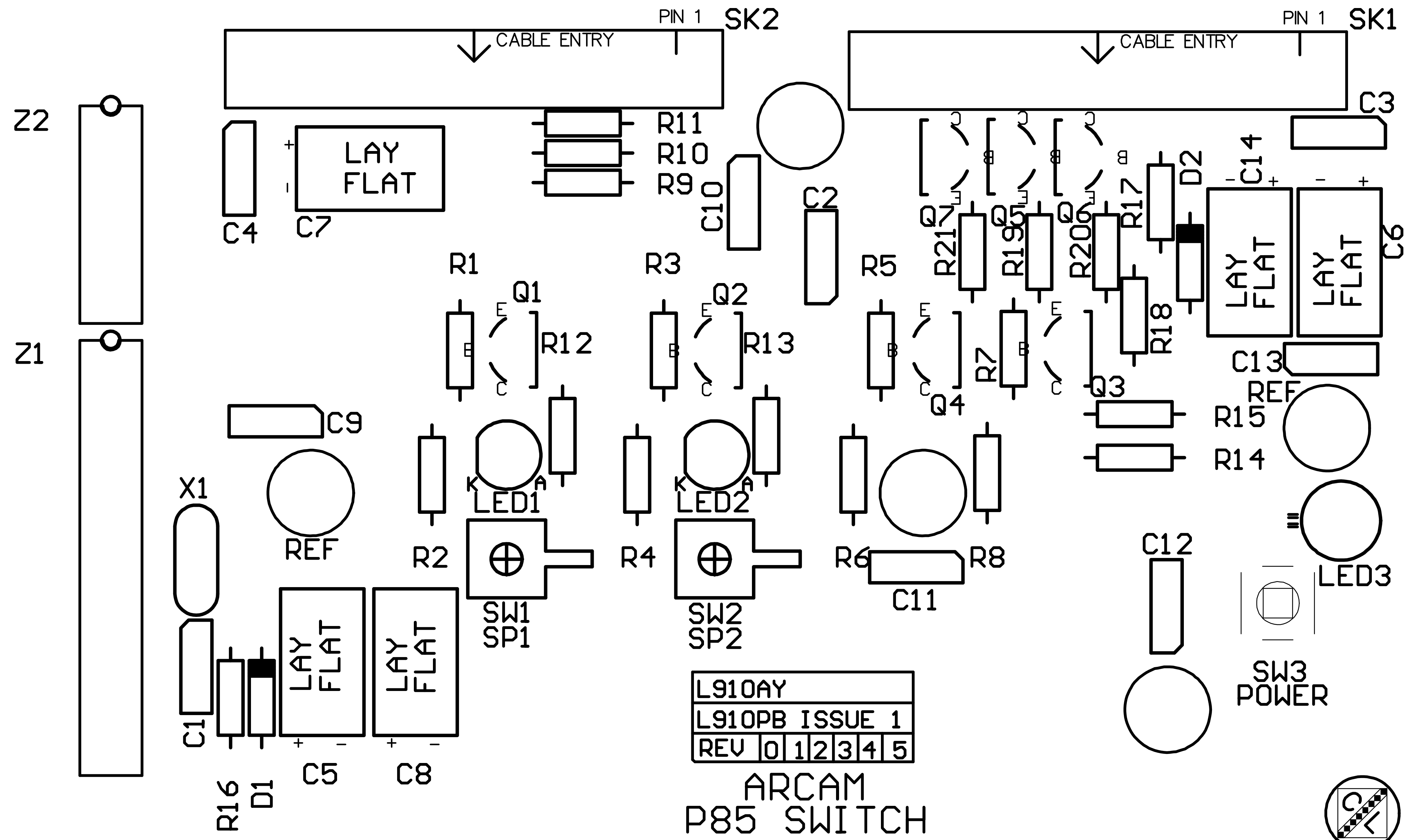
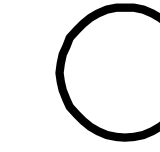
PCB

TOOLING

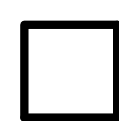


SNAP OFF

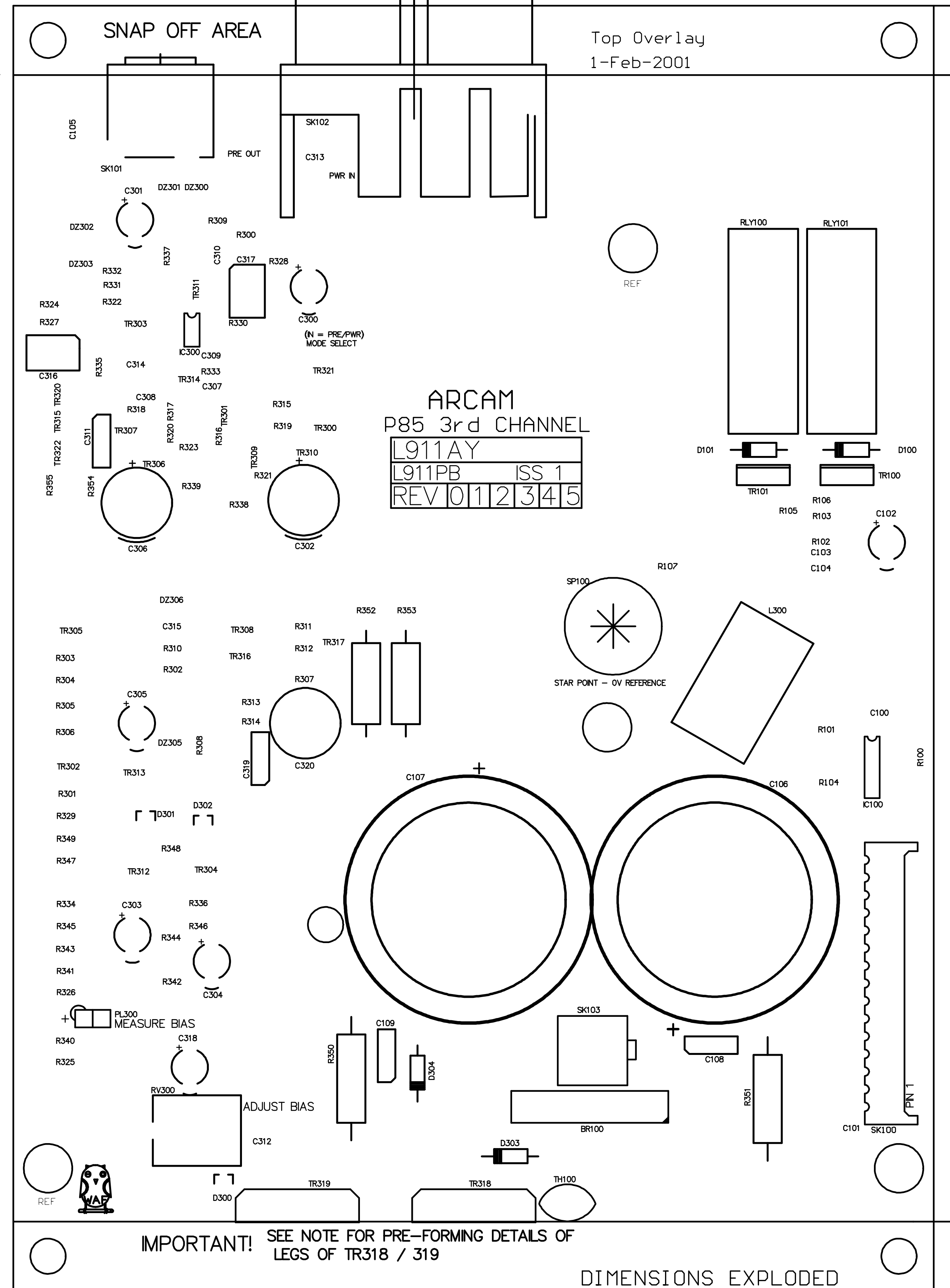
TOOLING



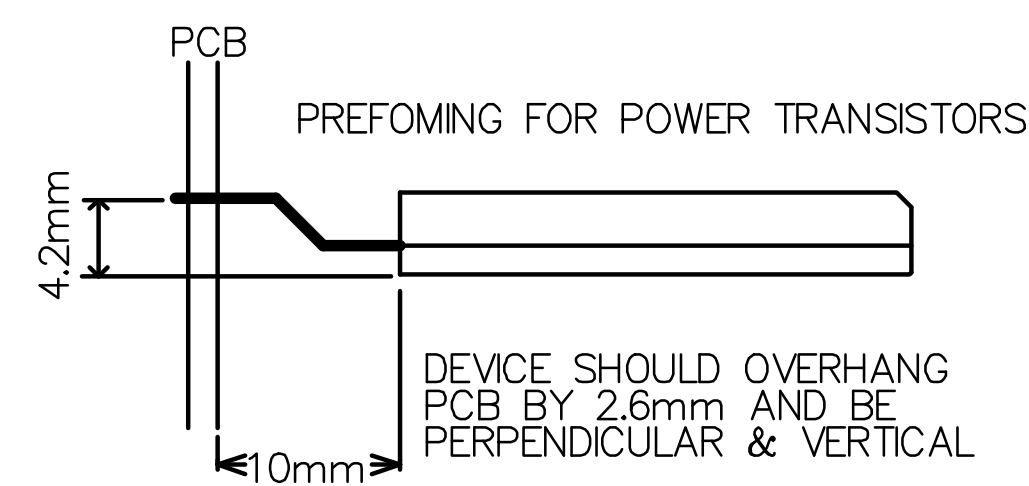
L910pb_1.pcb
 Top Overlay
 29-Sep-2000



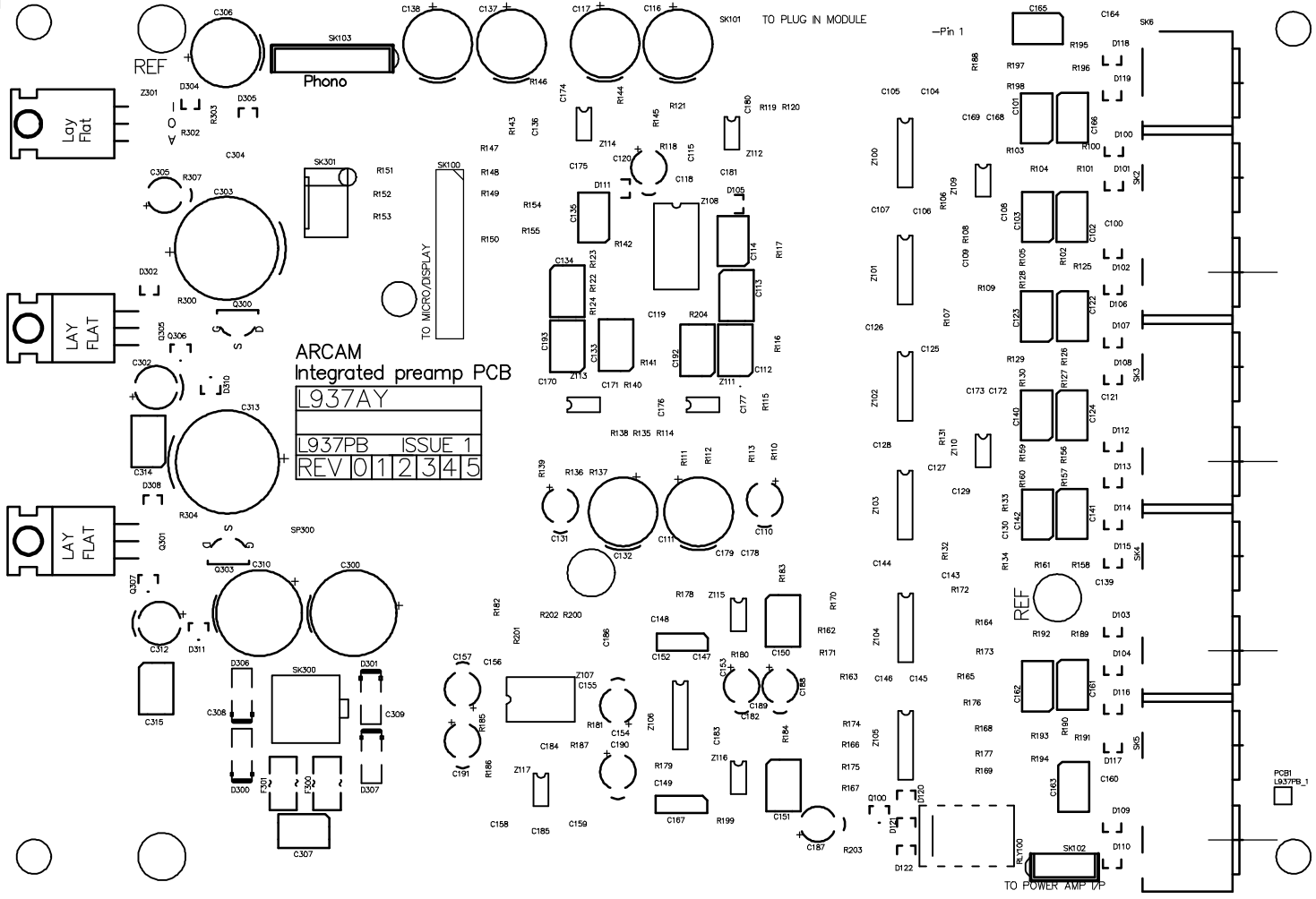
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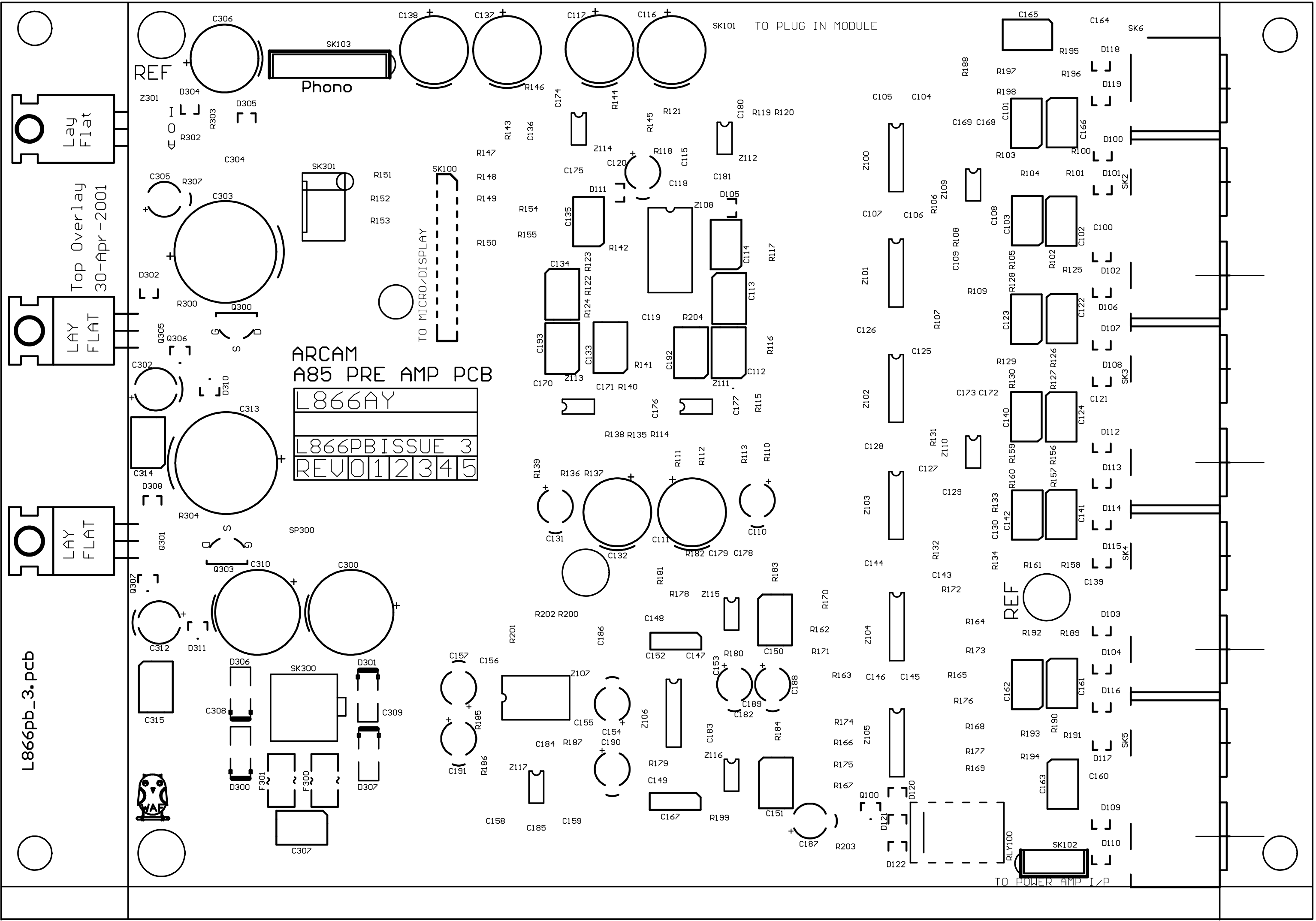
V-GROOVE>>>>>



V-GROOVE>>>>>



PCB1
L937PB_1



Lay Flat

Top Overlay
30-Apr-2001
LAY
FLAT

LAY
FLAT

L866pb_3.pcb



PCB1
L866PB_2.0



ARCAM

PCB Bill of Materials

Document title: A85 POWER AMPLIFIER AND PSU			
Document number: L882RS	Issue: 3	Revision: 2	ECO number: 01_1101A
Date: 06/06/01	Created by: JR		Page 1 of 3

(Excluding parts for NF.)

Part	Qty	Iss	Description	Designators
***** PCB Finish items:				
***** (For drawing office use only. Will be				
***** kitted from mechanical run-out sheet.)				
C12207	2		FUSE 20mm 2A AS	F200 F201
F022	2		INS COVER PCB FUSEHOLDER	F200 F201
***** PCB Build items:				
1A000	4		RES SM W4 1% 0R0 1206	R345 R346 R445 R446
1A010	3		RES SM W4 1% 10R 1206	R217 R220 R221
1A022	8		RES SM W4 1% 22R 1206	R321 R322 R323 R337
				R421 R422 R423 R437
1A110	24		RES SM W4 1% 100R 1206	R101 R102 R315 R316
				R317 R318 R319 R320
				R343 R344 R347 R348
				R349 R415 R416 R417
				R418 R419 R420 R443
				R444 R447 R448 R449
1A115	4		RES SM W4 1% 150R 1206	R338 R339 R438 R439
1A122	2		RES SM W4 1% 220R 1206	R107 R108
1A133	4		RES SM W4 1% 330R 1206	R341 R342 R441 R442
1A147	1		RES SM W4 1% 470R 1206	R226
1A210	17		RES SM W4 1% 1K0 1206	R200 R201 R202 R203
				R204 R205 R206 R207
				R227 R324 R325 R326
				R354 R424 R425 R426
				R454
1A215	3		RES SM W4 1% 1K5 1206	R230 R331 R431
1A218	5		RES SM W4 1% 1K8 1206	R219 R224 R225 R332
				R432
1A233	4		RES SM W4 1% 3K3 1206	R333 R335 R433 R435
1A247	11		RES SM W4 1% 4K7 1206	R212 R213 R214 R215
				R216 R310 R328 R329
				R410 R428 R429
1A268	2		RES SM W4 1% 6K8 1206	R355 R455
1A310	33		RES SM W4 1% 10K 1206	R208 R209 R210 R211
				R218 R222 R223 R300
				R301 R302 R303 R304
				R305 R306 R307 R309
				R311 R312 R313 R314
				R400 R401 R402 R403
				R404 R405 R406 R407
				R409 R411 R412 R413
				R414
1A322	8		RES SM W4 1% 22K 1206	R308 R327 R334 R336
				R408 R427 R434 R436
1A410	4		RES SM W4 1% 100K 1206	R228 R229 R340 R440
1A510	2		RES SM W4 1% 1M0 1206	R330 R430
1C856	2		RES CF 2W 5R6 5%	R350 R450
1E110	2		RES CF 1W 100R 5%	R105 R106
1E133	2		RES CF 1W 330R 5%	R103 R104
1H010	3		RES MF W4 1% 10R	R100 R351 R451
1J147	4		RES 2W MF 5% 470R	R352 R353 R452 R453
1K515	1		RES W25 5% VR25 1M5	R231
1T002	1		THERMISTOR SIEMENS B59008	TH200

ARCAM

PCB Bill of Materials

Document title: A85 POWER AMPLIFIER AND PSU			
Document number: L882RS	Issue: 3	Revision: 2	ECO number: 01_1101A
Date: 06/06/01	Created by: JR		Page 2 of 3

2A410	3	CERD 100N 63V 20% RA	C224 C225 C226
2C110	4	MLC 100P 50V NPO 5% SM	C307 C308 C407 C408
2C210	3	MLC 1N0 50V X7R 10% SM	C100 C231 C235
2C310	11	MLC 10N 50V X7R 10% SM	C213 C214 C215 C216
			C217 C218 C219 C221
			C230 C312 C412
2C410	16	MLC 100N 50V X7R 10% SM	C201 C202 C203 C204
			C220 C232 C309 C310
			C313 C314 C315 C409
			C410 C413 C414 C415
			C316 C416
2D147W	2	PPRO W 470P 63V 5% RA	C200
2D168	1	PPRO 680P 5% 63V RA	C234
2D422	1	220NF CLASS X2 CAP 275VRMS	C211 C212 C311 C411
2H410	4	PCRB 100N 100V 10% RA 5mm	C205 C206 C207 C208
2K233	4	SUPPR CAP 3N3 250V	C319 C419
2K410	2	PEST 100N 63V 10%	C317 C417
2K447	2	PEST 470N 63V 10%	C222 C223 C233 C305
2N610	7	ELST 10U 50V	C318 C405 C418
			C229
2N622	1	ELST 22U 63V	C300 C301 C303 C304
2N710	8	ELST 100U 25V	C400 C401 C403 C404
			C302 C306 C402 C406
2N710B	4	ELST 100U 100V	C228
2N810A	1	ELST 1M0 10V	C227
2N833	1	ELST 3M3 25V	C209 C210
2N910A	2	ELST 10m 63V RA 35mm	C320 C420
2V710	2	ELST NON POLAR 100UF 16V	D205 D206 D300 D301
3AS16W	8	DIODE SS SM BAS16W	D302 D400 D401 D402
			D100 D101 D200 D201
3B4003	10	RECTIFIER 1N4003F 1A 200V	D202 D203 D303 D304
			D403 D404
3BGBU8D	1	BRIDGE RECTIFIER 8A 200V	BR200
3CW315V	5	ZENER 15V OW35 SM SOT23	DZ207 DZ300 DZ301
			DZ400 DZ401
3CW34V7	9	ZENER 4V7 OW 35 SM SOT23	DZ204 DZ302 DZ303
			DZ305 DZ306 DZ402
			DZ403 DZ405 DZ406
4A849B	1	TRANS LF SS N SM BC849B	TR204
4A856B	2	TRANS LF SS P SM BC856B	TR205 TR206
4AFMMT497	24	TRANS LF SS N SM FMMT497	TR201 TR203 TR309
			TR310 TR311 TR312
			TR313 TR314 TR315
			TR316 TR317 TR320
			TR322 TR409 TR410
			TR411 TR412 TR413
			TR414 TR415 TR416
			TR417 TR420 TR422
4AFMMT597	21	TRANS LF SS P SM FMMT597	TR202 TR300 TR301
			TR302 TR303 TR304
			TR305 TR306 TR307
			TR308 TR321 TR400
			TR401 TR402 TR403
			TR404 TR405 TR406
			TR407 TR408 TR421
4B179	3	NPN TRANS MP BD179	TR100 TR101 TR200
4CSAP15N	2	TRANS POWER NPN SAP15N	TR318 TR418
4CSAP15P	2	TRANS POWER PNP SAP15P	TR319 TR419
5B072D	2	IC AUDIO SM DUAL TL072	IC300 IC400

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5D7805	1	IC VREG POS 7805	IC201
5J7414D	1	SURFACE MOUNT HEX SCHMITT TRIGGER	IC202
5M393AD	1	IC COMPARATOR SM DUAL LM393A	IC200
6F110	2	PRES 100R LIN HORIZ	RV300 RV400
7A9301	1	TRANSFORMER 3VA 9V+9V TYPE 9301	TX200
7D002C	2	INDUCT 2U2 12x20mm	L300 L400
7D327	1	27mH INDUCTOR	L200
8A001	1	IEC MAINS CONN PCB INS PX	SK203
8D225	1	PHONO SKT 4-WAY EMC GOLD	SK104
8D301	1	STEREO JACK PCB	SK105
8D302	1	MIN JACK DUAL 3.5mm HSJ1002-01-1020	SK201
8D418G	2	CAMCON BINDING POST 4WAY GOLD	SK100 SK101
8K2306	1	MOLEX MINI FIT HCS 6 WAY	SK200
8K2308	1	MOLEX MINI FIT HCS 8 WAY	SK204
8K2404	3	4-WAY AMP CT CONN	SK102 SK106 SK107
8K2406	1	6-WAY AMP CT CONN	SK205
8K6201	4	2WAY MOLEX VERT MALE CONNECTOR	PL100 PL101 PL300 PL400
8K7014	1	FFC 14W 2.54MM VER PTH	SK103
8M101	1	EARTH LEAD	EL
8Q003	1	CAGE CLAMP 16A 1 WAY ARC003-236	SK202
8S004	2	FUSEHOLDER 20mm PCB	F200 F201
A1008	1	SW PUSH 2PCO	SW100
A1404	1	VOLTAGE SELECTOR SLIDE SWITCH	SW200
A207	2	RELAY G5Z-2A-E 24V	RLY100 RLY101
A219	1	RELAY MAINS DPDT 5V 5A	RLY200
C3751	1	FUSE R452 T750mA	F202
E5402	1	MAINS EMC SHIELD	SH200
F006	1	HEATSINK CLIP TO220 13/8.6 DC/W	HS200
F008	1	HEATSINK TO220 8.6 DEGC/W	HS200
L882PB_3	1	X PRINTED CIRCUIT BOARD	PCB

***** Obsolete, absent, redundant, or incorrect issue in PDM:
L882PB_3 1 X PRINTED CIRCUIT BOARD PCB

***** Additions Since Last Issue *****

Part	Qty	Iss	Description	Designators
1A310	2		RES SM W4 1% 10K 1206	R314 R414
1A322	2		RES SM W4 1% 22K 1206	R308 R408
C3751	1		FUSE R452 T750mA	F202

***** Deletions Since Last Issue *****

Part	Qty	Iss	Description	Designators
1A247	2		RES SM W4 1% 4K7 1206	R314 R414
1A310	2		RES SM W4 1% 10K 1206	R308 R408
C3501	1		FUSE R452 T500mA	F202

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(Excluding parts for NF.)

Part	Qty	Iss	Description	Designators
1A022	1		RES SM W4 1% 22R 1206	R185
1A047	6		RES SM W4 1% 47R 1206	R108 R109 R133 R134 R186 R187
1A122	1		RES SM W4 1% 220R 1206	R307
1A133	2		RES SM W4 1% 330R 1206	R300 R304
1A147	1		RES SM W4 1% 470R 1206	R303
1A210	14		RES SM W4 1% 1K0 1206	R100 R101 R102 R125 R126 R127 R156 R157 R158 R189 R190 R191 R195 R196
1A212	1		RES SM W4 1% 1K2 1206	R302
1A222	4		RES SM W4 1% 2K2 1206	R110 R111 R135 R136
1A227	4		RES SM W4 1% 2K7 1206	R115 R116 R140 R141
1A247	1		RES SM W4 1% 4K7 1206	R203
1A256	2		RES SM W4 1% 5K6 1206	R117 R142
1A310	4		RES SM W4 1% 10K 1206	R181 R182 R188 R204
1A322	41		RES SM W4 1% 22K 1206	R112 R113 R114 R118 R119 R120 R121 R137 R138 R139 R143 R144 R145 R146 R147 R148 R149 R150 R151 R152 R153 R154 R155 R162 R163 R164 R165 R166 R167 R168 R169 R170 R171 R172 R173 R174 R175 R176 R177 R178 R179
1A410	16		RES SM W4 1% 100K 1206	R103 R104 R105 R128 R129 R130 R159 R160 R161 R180 R192 R193 R194 R197 R198 R199
1A510	6		RES SM W4 1% 1M0 1206	R106 R107 R131 R132 R183 R184
1A822	6		RES SM W4 1% 2R2 1206	R122 R123 R124 R200 R201 R202
2C022	6		MLC 22P 50V NPO 5% SM	C115 C136 C148 C149 C158 C159
2C110	4		MLC 100P 50V NPO 5% SM	C108 C109 C129 C130
2C210	6		MLC 1N0 50V X7R 10% SM	C100 C121 C139 C160 C164 C186
2C310	1		MLC 10N 50V X7R 10% SM	C119
2C410	36		MLC 100N 50V X7R 10% SM	C104 C105 C106 C107 C118 C125 C126 C127 C128 C143 C144 C145 C146 C152 C153 C155 C156 C168 C169 C170 C171 C172 C173 C174 C175 C176 C177 C178 C179 C180 C181 C182 C183 C184 C185 C304
2D147W	14		WIMA FKP2 470P 63V CAP	C101 C102 C103 C122 C123 C124 C140 C141 C142 C161 C162 C163 C165 C166

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PCB Bill of Materials

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2D210	2	PPRO 1N0 5% 63V RA	C314 C315
2D222W	2	WIMA FKP2 2N2 63V CAP	C114 C135
2H410	2	PCRB 100N 100V 10% RA 5mm	C147 C167
2K447	8	PEST 470N 63V 10%	C112 C113 C133 C134
			C150 C151 C192 C193
2N610	8	ELST 10U 50V	C120 C154 C187 C188
			C189 C190 C191 C305
2N710	3	ELST 100U 25V	C110 C131 C157
2N722	2	ELST 220U 16V	C302 C312
2N747	1	ELST 470U 25V RA	C306
2N810C	2	ELST 1M0 35V	C300 C310
2N833	2	ELST 3M3 25V	C303 C313
2P610CC	6	ELEC 10U 50V CERAFINE	C111 C116 C117 C132
			C137 C138
3AS16W	5	DIODE SS SM BAS16W	D120 D302 D304 D305
			D308
3AV99W	22	DIODE SS SM BAV99W	D100 D101 D102 D103
			D104 D105 D106 D107
			D108 D109 D110 D111
			D112 D113 D114 D115
			D116 D117 D118 D119
			D121 D122
3BS1D	4	RECT S1D 1A 200V SM	D300 D301 D306 D307
3CW315V	2	ZENER 15V OW35 SM SOT23	D310 D311
4A846B	1	TRANS LF SS N SM BC846B	Q306
4A849B	1	TRANS LF SS N SM BC849B	Q100
4A856B	1	TRANS LF SS P SM BC856B	Q307
4B1964	1	TRANS AUDIO DRIVER P 2SA1964	Q305
4B5248	1	TRANS AUDIO DRIVER N 2SC5248	Q301
4J112	2	TRANS JFET N J112	Q300 Q303
5A1844	1	IC DS1844S-010	Z108
5AVSDVC	1	IC AUDIO DIGITAL VOL SM	Z107
5B072D	6	IC AUDIO SM DUAL TL072	Z109 Z110 Z111 Z112
			Z113 Z114
5B2134	3	IC OPAMP DUAL SM OPA2134PA	Z115 Z116 Z117
5D317T	1	IC VREG POS LM317T	Z301
5S408DY	6	IC 8 TO 1 MUX DG408DY SO16	Z100 Z101 Z102 Z103
			Z104 Z105
5S413DY	1	IC QUAD SPST CMOS SW SO16	Z106
8D225	4	PHONO SKT 4-WAY EMC GOLD	SK2 SK3 SK4 SK5
8D226	1	PHONO SKT 2-WAY EMC GOLD	SK6
8K2304	1	MOLEX MINI FIT HCS 4 WAY	SK300
8K2404	1	4-WAY AMP CT CONN	SK102
8K2408	1	8-WAY AMP CT CONN	SK103
8K6604	1	4-WAY FR LOCK CONN	SK301
8K8322	1	22-WAY FFC CONN SM 1mm	SK100
8K8330	1	30-WAY FFC VERT CONN SM 1MM	SK101
A216	1	RELAY DPDT 5V SM NEC EB2-5NU	RLY100
C3751	2	FUSE R452 T750mA	F300 F301
L866PB_3	1	X PRINTED CIRCUIT BOARD	PCB1

Document title: A85 PREAMPLIFIER			
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***** Obsolete, absent, redundant, or incorrect issue in PDM:
L866PB_3 1 X PRINTED CIRCUIT BOARD PCB1

***** Additions Since Last Issue *****

Part	Qty	Iss	Description	Designators
C3751	2		FUSE R452 T750mA	F300 F301

***** Deletions Since Last Issue *****

Part	Qty	Iss	Description	Designators
C3501	2		FUSE R452 T500mA	F300 F301

Document title: A85 / A32 Integrated amplifier preamp PCB			
Document number: L937RS	Issue: 1	Revision: 1	ECO number: 01_E014
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Part	Qty	Iss	Description	Designators
1A022	1		RES SM W4 1% 22R 1206	R185
1A047	6		RES SM W4 1% 47R 1206	R108 R109 R133 R134 R186 R187
1A110	1		RES SM W4 1% 100R 1206	R182
1A122	1		RES SM W4 1% 220R 1206	R307
1A133	2		RES SM W4 1% 330R 1206	R300 R304
1A147	1		RES SM W4 1% 470R 1206	R303
1A210	14		RES SM W4 1% 1K0 1206	R100 R101 R102 R125 R126 R127 R156 R157 R158 R189 R190 R191 R195 R196
1A212	1		RES SM W4 1% 1K2 1206	R302
1A222	4		RES SM W4 1% 2K2 1206	R110 R111 R135 R136
1A227	4		RES SM W4 1% 2K7 1206	R115 R116 R140 R141
1A247	1		RES SM W4 1% 4K7 1206	R203
1A256	2		RES SM W4 1% 5K6 1206	R117 R142
1A310	3		RES SM W4 1% 10K 1206	R181 R188 R204
1A322	41		RES SM W4 1% 22K 1206	R112 R113 R114 R118 R119 R120 R121 R137 R138 R139 R143 R144 R145 R146 R147 R148 R149 R150 R151 R152 R153 R154 R155 R162 R163 R164 R165 R166 R167 R168 R169 R170 R171 R172 R173 R174 R175 R176 R177 R178 R179
1A410	16		RES SM W4 1% 100K 1206	R103 R104 R105 R128 R129 R130 R159 R160 R161 R180 R192 R193 R194 R197 R198 R199
1A510	6		RES SM W4 1% 1M0 1206	R106 R107 R131 R132 R183 R184
1A822	6		RES SM W4 1% 2R2 1206	R122 R123 R124 R200 R201 R202
2C022	6		MLC 22P 50V NPO 5% SM	C115 C136 C148 C149 C158 C159
2C110	4		MLC 100P 50V NPO 5% SM	C108 C109 C129 C130
2C210	5		MLC 1N0 50V X7R 10% SM	C100 C121 C139 C160 C164
2C310	1		MLC 10N 50V X7R 10% SM	C119
2C410	39		MLC 100N 50V X7R 10% SM	C104 C105 C106 C107 C118 C125 C126 C127 C128 C143 C144 C145 C146 C152 C153 C155 C156 C168 C169 C170 C171 C172 C173 C174 C175 C176 C177 C178 C179 C180 C181 C182 C183 C184 C185 C186 C304 C308 C309
2D147W	14		WIMA FKP2 470P 63V CAP	C101 C102 C103 C122 C123 C124 C140 C141 C142 C161 C162 C163 C165 C166

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PCB Bill of Materials

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2D210	2	PPRO 1N0 5% 63V RA	C314 C315
2D222W	2	WIMA FKP2 2N2 63V CAP	C114 C135
2K410	2	PEST 100N 63V 10%	C147 C167
2K447	9	PEST 470N 63V 10%	C112 C113 C133 C134 C150 C151 C192 C193 C307
2N610	8	ELST 10U 50V	C120 C154 C187 C188 C189 C190 C191 C305
2N710	3	ELST 100U 25V	C110 C131 C157
2N722	2	ELST 220U 16V	C302 C312
2N747	1	ELST 470U 25V RA	C306
2N810C	2	ELST 1M0 35V	C300 C310
2N833	2	ELST 3M3 25V	C303 C313
2P610CC	6	ELEC 10U 50V CERAFINE	C111 C116 C117 C132 C137 C138
3AS16W	5	DIODE SS SM BAS16W	D120 D302 D304 D305 D308
3AV99W	22	DIODE SS SM BAV99W	D100 D101 D102 D103 D104 D105 D106 D107 D108 D109 D110 D111 D112 D113 D114 D115 D116 D117 D118 D119 D121 D122
3BS1D	4	RECT S1D 1A 200V SM	D300 D301 D306 D307
3CW315V	2	ZENER 15V OW35 SM SOT23	D310 D311
4A846B	1	TRANS LF SS N SM BC846B	Q306
4A849B	1	TRANS LF SS N SM BC849B	Q100
4A856B	1	TRANS LF SS P SM BC856B	Q307
4B1964	1	TRANS AUDIO DRIVER P 2SA1964	Q305
4B5248	1	TRANS AUDIO DRIVER N 2SC5248	Q301
4J112	2	TRANS JFET N J112	Q300 Q303
5A1844	1	IC DS1844S-010	Z108
5AVSDVC	1	IC AUDIO DIGITAL VOL SM	Z107
5B072D	6	IC AUDIO SM DUAL TL072	Z109 Z110 Z111 Z112 Z113 Z114
5B2134	3	IC OPAMP DUAL SM OPA2134PA	Z115 Z116 Z117
5D317T	1	IC VREG POS LM317T	Z301
5S408DY	6	IC 8 TO 1 MUX DG408DY SO16	Z100 Z101 Z102 Z103 Z104 Z105
5S413DY	1	IC QUAD SPST CMOS SW SO16	Z106
8D225	4	PHONO SKT 4-WAY EMC GOLD	SK2 SK3 SK4 SK5
8D226	1	PHONO SKT 2-WAY EMC GOLD	SK6
8K2304	1	MOLEX MINI FIT HCS 4 WAY	SK300
8K2404	1	4-WAY AMP CT CONN	SK102
8K2408	1	8-WAY AMP CT CONN	SK103
8K6604	1	4-WAY FR LOCK CONN	SK301
8K8022B	1	Connector 22way Molex 52806-2210	SK100
8K8330	1	30-WAY FFC VERT CONN SM 1MM	SK101
A216	1	RELAY DPDT 5V SM NEC EB2-5NU	RLY100
C3202	2	FUSE R452 T2A	F300 F301
L937PB_1	1	PRINTED CIRCUIT BOARD	PCB1

SUMMARY OF CHANGES FROM 1.0 TO 1.1

DELETED:

C3751	2	FUSE R452 T750mA	F300 F301
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ADDED:

C3202	2	FUSE R452 T2A	F300 F301
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Document title: A85 DISPLAY PCB			
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Part	Qty	Iss	Description	Designators
1A000	3		RES SM W4 2% 0R0	R58 R59 R48
1A110	7		RES SM W4 1% 100R 1206	R51 R52 R53 R64 R65 R66 R67
1A115	1		RES SM W4 2% 150R	R34
1A133	1		RES SM W4 2% 330R	R33
1A212	2		RES SM W4 2% 1K2	R38 R46
1A215	10		RES SM W4 2% 1K5	R20 R23 R24 R31 R17 R18 R19 R21 R22 R25
1A222	1		RES SM W4 2% 2K2	R39
1A247	2		RES SM W4 2% 4K7	R40 R47
1A310	36		RES SM W4 2% 10K	R49 R50 R56 R57 R73 R74 R75 R76 R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R26 R27 R28 R29 R30 R32 R35 R36 R37 R45 R55 R68
1A410	4		RES SM W4 2% 100K	R41 R42 R43 R44
1A822	4		RES SM W4 1% 2R2 1206	R69 R70 R71 R72
2C010A	2		MLC 10P 50V NPO 10% SM	C31 C32
2C018	2		MLC 18P 50V X7R 10% SM	C1 C2
2C210	11		MLC 1N0 50V X7R 10% SM	C39 C40 C41 C42 C43 C44 C45 C46 C47 C48 C49
2C410	14		MLC 100N 50V X7R 10% SM	C3 C4 C5 C6 C7 C8 C9 C10 C12 C15 C16 C17 C25 C27
2M610	4		ELST 10U 50V SM	C11 C14 C26 C28
2M710	1		ELST 100U 25V SM	C29
2N722	2		ELST 220U 16V	C33 C34
2W110X4	10		CAP PACK NPO 0612 4X100P 50V 5%	C50 C51 C52 C53 C54 C55 C60 C61 C62 C63
3AS16W	3		DIODE SS SM BAS16W	D2 D3 D5
3C5251B	1		ZENER 22V OW 35 SM SOT23	D4
3D006	1		LED RED/GREEN 3MM L-93WEGW	LED11
3D007	10		LED GREEN 3.1MM SLR-37MG3F	LED1 LED2 LED3 LED4 LED5 LED6 LED7 LED8 LED9 LED10
4A847	4		TRANS LF SS N SM BC847B	Q1 Q2 Q3 Q4
5D7815	1		IC VREG POS 7815	Z12
5G2402	1		IC CMOS EPROM 24C02 SM	Z5
5H1233A	1		IC MICRO RESET DS1233 SM	Z2
5H3048	1		H8/3048 128K FLASH MICROCONTROLLER	Z1
5M393AD	3		IC COMPARATOR SM DUAL LM393A	Z6 Z7 Z8
5M8532	1		DUAL OUTPUT SINGLE SUPPLY AMP AD8532	Z11
7X040	1		XTAL 16MHZ SM GSX49-4	X1
8K2005	1		5-WAY AMP CT CONN	SK2
8K6315	1		14 WAY DIL HEADER HORIZ	SK4
8K7014A	1		FFC 14W 2.54MM HOR PTH	SK1
8K8022A	1		22-WAY FFC CONN HORIZ 1MM PTH	SK3
A1211	1		EC16B2414	SW18
A1505	6		TACT SWITCH SM SDTM-610-NTR	SW11 SW12 SW13 SW14 SW15 SW16
A1506	1		TACT SWITCH BOURNS SDTX-644	SW17
A1509	10		TACT SWITCH SM SDTM-620-NTR	SW1 SW2 SW3 SW4 SW5 SW6 SW7 SW8 SW9 SW10

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Document title: A85 DISPLAY PCB			
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B1013	1	MN12818A VFD ITRON	DISP1
B2107	1	REMOTE RX PIC-26043TM2 38KHZ	RX1
E916PM	2	DISPLAY CRADLE E916PM	DC1 DC2
F163	2	STICKY PAD S/A 10 X 15mm	SP1 SP2
L865PB_2	1	X PRINTED CIRCUIT BOARD	PCB1

***** Obsolete, absent, redundant, or incorrect issue in PDM:

L865PB_2	1	X PRINTED CIRCUIT BOARD	PCB1
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 ***** Additions Since Last Issue *****

Part	Qty	Iss	Description	Designators
B2107	1		REMOTE RX PIC-26043TM2 38KHZ	RX1
E916PM	2		DISPLAY CRADLE E916PM	DC1 DC2
L865PB_2	1	X	PRINTED CIRCUIT BOARD	PCB1

 ***** Deletions Since Last Issue *****

Part	Qty	Iss	Description	Designators
B2103	1		REMOTE RX SBX1610-52 38KHZ	RX1
L865PB_1	1	X	PRINTED CIRCUIT BOARD	PCB1

TITLE A85 PHONO PCB			
DWG. No. L870RS	ISSUE 2.0	ECO No 01_1070	DATE 17-4-01
DRAWN BY JAG	RUN-OUT SHEET		SHEET 1 of 1

Part	Qty	Iss	Description	Designators
1H010	2		RES MF W4 1% 10R	R123 R223
1H022	8		RES MF W4 1% 22R	R118 R119 R120 R121 R218 R219 R220 R221
1H110	10		RES MF W4 1% 100R	R101 R102 R104 R105 R106 R201 R202 R204 R205 R206
1H133	2		RES MF W4 1% 330R	R100 R200
1H256	2		RES MF W4 1% 5K6	R124 R224
1H312	4		RES MF W4 1% 12K	R109 R110 R209 R210
1H315	2		RES MF W4 1% 15K	R115 R215
1H339	2		RES MF W4 1% 39K	R122 R222
1H347	2		RES MF W4 1% 47K	R108 R208
1H356	2		RES MF W4 1% 56K	R111 R211
1H410	6		RES MF W4 1% 100K	R112 R113 R114 R212 R213 R214
1H522	4		RES MF W4 1% 2M2	R116 R117 R216 R217
2A410	1		CERD 100N 63V -20% +80% RA	C1
2D110N	2		PPRO 100P 63V 5% RA	C119 C219
2D110W	2		PPRO W 100P 63V 5% RA	C109 C209
2D147W	6		PPRO W 470P 63V 5% RA	C108 C116 C117 C208 C216 C217
2D210	4		PPRO 1N0 5% 63V RA	C101 C120 C201 C220
2D213N	2		PPRO 1N3 63V 5% RA	C115 C215
2D247N	2		PPRO 4N7 63V 5% RA	C110 C210
2D310	4		PPRO 10N 63V 1% AXIAL	C111 C112 C211 C212
2K410	8		PEST 100N 63V 10%	C104 C105 C106 C107 C204 C205 C206 C207
2K510	2		CAP MKS2 1U0 16V 10%	C113 C213
2N622	2		ELST 22U 63V	C100 C200
2P710AS	4		ELEC 100U 25V SILMIC	C102 C103 C202 C203
2U610	2		ELST NON POLAR 10UF 35V	C118 C218
3A4148	6		SSDIODE 1N4148 75V	D100 D101 D102 D200 D201 D202
4A1085	4		TRANS LF SS P 2SA1085	TR106 TR107 TR206 TR207
4A546	14		TRANS LF SS N BC546B	TR108 TR109 TR110 TR111 TR112 TR113 TR114 TR208 TR209 TR210 TR211 TR212 TR213 TR214
4A556	12		TRANS LF SS P BC556B	TR100 TR101 TR102 TR103 TR104 TR105 TR200 TR201 TR202 TR203 TR204 TR205
5B071	2		IC FET OPAMP TL071	IC100 IC200
8D230	1		PHONO SKT 2-WAY HOR EMC GOLD	SK1
8K2408	1		8-WAY AMP CT CONN	SK2
A1013	1		SW PUSH 4PCO	SW100
L870PB_2	1	X	PRINTED CIRCUIT BOARD	PCB1

***** Obsolete, absent, redundant, or incorrect issue in PDM:

TITLE A85 PHONO PCB			
DWG. No. L870RS	ISSUE 2.0	ECO No 01_1070	DATE 17-4-01
DRAWN BY JAG	RUN-OUT SHEET		SHEET 2 of 1

L870PB_2 1 X PRINTED CIRCUIT BOARD PCB1

 ***** Additions Since Last Issue *****

Part	Qty	Iss	Description	Designators
2D210	2		PPRO 1N0 5% 63V RA	C120 C220
L870PB_2	1	X	PRINTED CIRCUIT BOARD	PCB1

 ***** Deletions Since Last Issue *****

Part	Qty	Iss	Description	Designators
2D147W	2		PPRO W 470P 63V 5% RA	C114 C214
L870PB_1	1	X	PRINTED CIRCUIT BOARD	PCB1

ARCAM

PCB Bill of Materials

Document title: P85 THIRD CHANNEL			
Document number: L911RS	Issue: 1	Revision: 1	ECO number: 01_1101
Date: 06/06/01	Created by: JR		Page 1 of 2

Part	Qty	Iss	Description	Designators
1A000	2		RES SM W4 1% 0R0 1206	R345 R346
1A022	4		RES SM W4 1% 22R 1206	R321 R322 R323 R337
1A110	13		RES SM W4 1% 100R 1206	R105 R106 R315 R316 R317 R318 R319 R320 R343 R344 R347 R348 R349
1A115	2		RES SM W4 1% 150R 1206	R338 R339
1A122	2		RES SM W4 1% 220R 1206	R103 R104
1A133	2		RES SM W4 1% 330R 1206	R341 R342
1A210	7		RES SM W4 1% 1K0 1206	R100 R101 R102 R324 R325 R326 R354
1A215	1		RES SM W4 1% 1K5 1206	R331
1A218	1		RES SM W4 1% 1K8 1206	R332
1A233	2		RES SM W4 1% 3K3 1206	R333 R335
1A247	3		RES SM W4 1% 4K7 1206	R310 R328 R329
1A268	1		RES SM W4 1% 6K8 1206	R355
1A310	13		RES SM W4 1% 10K 1206	R300 R301 R302 R303 R304 R305 R306 R307 R309 R311 R312 R313 R314
1A322	4		RES SM W4 1% 22K 1206	R308 R327 R334 R336
1A410	1		RES SM W4 1% 100K 1206	R340
1A510	1		RES SM W4 1% 1M0 1206	R330
1A822	1		RES SM W4 1% 2R2 1206	R107
1C856	2		RES CF 2W 5R6 5%	R350 R351
1J147	2		RES 2W MF 5% 470R	R352 R353
1T002	1		THERMISTOR SIEMENS B59008	TH100
2C110	2		MLC 100P 50V NPO 5% SM	C307 C308
2C210	1		MLC 1N0 50V X7R 10% SM	C105
2C310	3		MLC 10N 50V X7R 10% SM	C103 C104 C312
2C410	7		MLC 100N 50V X7R 10% SM	C100 C101 C309 C310 C313 C314 C315
2D147W	1		PPRO W 470P 63V 5% RA	C316
2H410	3		PCRB 100N 100V 10% RA 5mm	C108 C109 C311
2K410	1		PEST 100N 63V 10%	C319
2K447	1		PEST 470N 63V 10%	C317
2N610	2		ELST 10U 50V	C305 C318
2N710	5		ELST 100U 25V	C102 C300 C301 C303 C304
2N710B	2		ELST 100U 100V	C302 C306
2N910A	2		ELST 10m 63V RA 35mm	C106 C107
2V710	1		ELST NON POLAR 100UF 16V	C320
3AS16W	3		DIODE SS SM BAS16W	D300 D301 D302
3B4003	4		RECTIFIER 1N4003F 1A 200V	D100 D101 D303 D304
3BGBU8D	1		BRIDGE RECTIFIER 8A 200V	BR100
3CW315V	2		ZENER 15V OW35 SM SOT23	DZ300 DZ301
3CW34V7	4		ZENER 4V7 OW 35 SM SOT23	DZ302 DZ303 DZ305 DZ306
4AFMMT497	11		TRANS LF SS N SM FMMT497	TR309 TR310 TR311 TR312 TR313 TR314 TR315 TR316 TR317 TR320 TR322
4AFMMT597	10		TRANS LF SS P SM FMMT597	TR300 TR301 TR302 TR303 TR304 TR305 TR306 TR307 TR308 TR321

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4B179	2	NPN TRANS MP BD179	TR100 TR101
4CSAP15N	1	TRANS POWER NPN SAP15N	TR318
4CSAP15P	1	TRANS POWER PNP SAP15P	TR319
5B072D	1	IC AUDIO SM DUAL TL072	IC300
5J7414D	1	SURFACE MOUNT HEX SCHMITT TRIGGER	IC100
6F110	1	PRES 100R LIN HORIZ	RV300
7D002C	1	INDUCT 2U2 12x20mm	L300
8D226	1	PHONO SKT 2-WAY EMC GOLD	SK101
8D418G	1	CAMCON BINDING POST 4WAY GOLD	SK102
8K2304	1	MOLEX MINI FIT 4 WAY	SK103
8K6201	1	2WAY MOLEX VERT MALE CONNECTOR	PL300
8K7014	1	FFC 14W 2.54MM VER PTH	SK100
A213	2	RLY SPST 24V SPKR	RLY100 RLY101
L911PB_1	1	X PCB	PB

***** Obsolete, absent, redundant, or incorrect issue in PDM:
L911PB_1 1 X PCB PB

***** Additions Since Last Issue *****

Part	Qty	Iss	Description	Designators
1A310	1		RES SM W4 1% 10K 1206	R314
1A322	1		RES SM W4 1% 22K 1206	R308

***** Deletions Since Last Issue *****

Part	Qty	Iss	Description	Designators
1A247	1		RES SM W4 1% 4K7 1206	R314
1A310	1		RES SM W4 1% 10K 1206	R308

TITLE P85 SWITCH BOARD			
DWG. No. L910PB	ISSUE 1.0	ECO No 00_1099	DATE 29/09/00
DRAWN BY CL	RUN-OUT SHEET		SHEET 1 of 2

part	Qty	Iss	Description	Designators
***** PCB Finish items:				
***** (For drawing office use only. Will be				
***** kitted from mechanical run-out sheet.)				
5B483028	1		IC CMOS MICRO HT48R30 28-DIP-B-0	Z1
***** PCB Build items:				
1H118	1		RES MF W4 1% 180R	R15
1H133	1		RES MF W4 1% 330R	R14
1H147	3		RES MF W4 1% 470R	R19 R20 R21
1H156	2		RES MF W4 1% 560R	R12 R13
1H310	13		RES MF W4 1% 10K	R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R17 R18
1H410	1		RES MF W4 1% 100K	R16
2A410	9		CERD 100N 63V -20% +80% RA	C1 C2 C3 C4 C9 C10 C11 C12 C13
2N610	1		ELST 10U 50V	C5
2N710	4		ELST 100U 25V	C6 C7 C8 C14
3A4148	2		SSDIODE 1N4148 75V	D1 D2
3D006	1		LED RED/GREEN 3MM L-93WEGW	LED3
3D007	2		LED GREEN 3.1MM SLR-37MG3F	LED1 LED2
4A546	3		TRANS LF SS N BC546B	Q5 Q6 Q7
4A556	4		TRANS LF SS P BC556B	Q1 Q2 Q3 Q4
5J7432	1		HCOS 74HC32	Z2
7W005	1		CER RESON 4.00MHZ	X1
8K7014A	2		FFC 14W 2.54MM HOR PTH	SK1 SK2
8S028N	1		IC SOCKET 28 NARROW	Z1
A1503	2	A	TACT SWITCH SKHVPE	SW1 SW2
A1506	1		TACT SWITCH BOURNS SDTX-644	SW3
L910PB_1	1	X	PRINTED CIRCUIT BOARD	PCB

***** Prototype or pre-production parts used:
A1503 2 A TACT SWITCH SKHVPE SW1 SW2

***** Obsolete, absent, redundant, or incorrect issue in PDM:
L910PB_1 1 X PRINTED CIRCUIT BOARD PCB

***** Additions Since L910RS Issue C *****

Part	Qty	Iss	Description	Designators
A1503	2	A	TACT SWITCH SKHVPE	SW1 SW2
L910PB_1	1	X	PRINTED CIRCUIT BOARD	PCB

***** Deletions Since L910RS Issue C *****

TITLE P85 SWITCH BOARD			
DWG. No. L910PB	ISSUE 1.0	ECO No 00_1099	DATE 29/09/00
DRAWN BY CL	RUN-OUT SHEET		SHEET 2 of 2

Part	Qty	Iss	Description	Designators
A1504	2		TACT SWITCH 2-PIN LOW PROF	SW1 SW2
L910PB_C	1		PRINTED CIRCUIT BOARD	PCB

A85 General Assembly Parts List

ITEM	230V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
A	L813RC					REMOTE CONTROL		1
B			L907TX			TRANSF A85 100V	REPLACE 7A9301 AT TX200 TRANSFORMER FITTED ON PCB L865AY	1
ITEM	240V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
	C12406	C12406	TBA			T4AL FUSE	FUSE & SPARE FUSE HOLDER	2
	E804HK					HEAT-SINK		1
	E804MI					MAINS INSULATOR	ON TOP OF CHASSIS UNDER TX SPACER	1
	E821CH					CHASSIS		1
	E83001					TX GASKET	UNDER TX	1
	E032AY					REAR PANEL		1
	E912MC					85 AMP TRANSISTOR CLAMP	ON HEAT-SINK E804HK	4
	E850MC					HEAT SHUNT		1
	E853MC					2000 A85 PRE-AMP REG CLAMP		1
	E858PM					LARGE VOLUME KNOB		1
	E859MC					PHONO BLANKING PLATE		1
	E860MC					MODULE BLANK		1
	E866MC					A85 TOROIDAL SHIELD	BETWEEN TOROID TX & CHS	1
	E869PM					TACT BUTTON POWER		1
	E879PM					FOOT		6
	E879SL					CONFIGURATION LABEL	CHASSIS	1
	E907MC					KOOL PAD	HEAT-SINK	1
	E920MC					HEAT SINK CLAMP	HEAT SINK	1
	F022					FUSE HOLDER COVER	FOR FUSE HOLDERS	2
	F037					TOROID CLAMP 90MM DIA.	FOR TX	1
	F038					RUBBER WASHER	ON TOP OF TX	1
	F062					FUSE CLIP	FOR SPARE FUSE	1
	F065					ADHESIVE CABLE CLIP	FOR TX SCREEN WIRE	1
	F082					TO220 SIL PAD	UNDER VOLTAGE REG	3
	F162					TAPE 50m ROLL	ON TOP OF HEAT SINK	0.003
	F164					DAMPING PAD	COVER TO FP	400M M
	HA3A16A					M3 x 16mm SCREW	HEATSHUNT	2
	HA3V10A					MC TORX M3X10 STZP		14
	HA3V06A					M3 x 6mm SCREW	MOTHER PCB & SUB-FRONT	11
	HA4A12B					M4 x 12mm SCREW	RR PAN 'E' EARTH	2
	HA5L20B					M5 x 20mm HEX HEAD BOLT BLACK	CLAMP E912MC TO E804HK	4
	HA5K70B					M5 x 70mm BOLT	HEATSINK SCREWS	3
	HA6K45A					M6 x 45mm BOLT	TX FXG	1

A85 General Assembly Parts List

ITEM	230V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
	HA6K60A					TRANSBOLT		1
	HF4V09B					No. 4 x 9mm SCREW	REAR & MODULES	17
	HJ4A00A					M4 NUT	RR PAN 'E' EARTH	1
	HJ4C00D					M4 WAISTED NUT	RR PAN 'E' EARTH	1
	HL4SA					WASHER		3
	HL4SB					M4 SHAKE PROOF	RR PAN 'E' EARTH	1
	HL5EB					M5 WASHER BLACK	HEATSINK WASHER CTRE	3
	HP008					SNAP RIVET BLACK PLASTIC (3000)	BLANKING PLATES	4
	K5408					SLEEVE FOR LIGHT PIPES (6mm)		1
	L865AY					A85 DISPLAY PCB ASSEMBLY		1
	L937AY					A85 PRE AMP PCB ASSEMBLY PREVIOUS BOARD FITTED L866AY		1
	L882AY		L894AY			A85 PCB ASSEMBLY		1
	L882TX	L882TX	L879TX			A85 TRANSFORMER	TX	1
	L914CA					DISP - PRE CABLE ASSEMBLY		1
	L915CA					DISP - PWR CABLE ASSEMBLY		1
	L916CA					PWR - HEADPHONE CABLE ASSEMBLY		1
	L917CA					PWR - PRE CABLE ASSEMBLY		1
				E834CP	E833CP	COVER PLATE		1
				E973AY	E980AY	FASCIA ASSEMBLY		1
				HA4V06S	HA4V06B	M4 X 6mm SCREW	COVER TO CHS	4
			E802SL			100V LABEL	COVER VOL SEL SW HOLE	1

P85 General Assembly

ITEM	230V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
	5B483028					HOLTEK PLUS L819SW	Z1 of L910AY	1
	8K004					JUMPER SOCKET 0.1" M7571-05		2
	8K006					CONNECTOR 14MM SHORTING BAR P2148		1
	C12406	C12406	TBA			FUSE T4AT	FUSE & SPARE FUSE HOLDER	2
	E031AY					REAR PANEL ASSEMBLY		1
	E804HK					HEAT-SINK		1
	E804MI					MAINS INSULATOR	ON TOP OF CHASSIS UNDER TX SPACER	1
	E821CH					CHASSIS		1
	E823AP					TX MASK	On Top of TX	1
	E83001					TX GASKET	UNDER TX	1
	E861MC					P85 3RD CHANEL BLANKING PLATE	RAER PANEL	1
	E866MC					A85 TOROIDAL SHIELD	BETWEEN TOROID TX & CHS	1
	E869PM					TACT BUTTON POWER		1
	E879PM					FOOT		6
	E879SL					CONFIGURATION LABEL	CHASSIS	1
	E907MC					KOOL PAD	HEAT SINK	1
	E912MC					85 AMP TRANSISTOR CLAMP	FOR HEAT-SINKS	4
	E916SL	E916SL	E917SL			FUSE LABEL		2
	E920MC					HEATSINK CLAMP	HEAT SINK	1
	F022					FUSE HOLDER COVER	FOR FUSE HOLDERS	2
	F037					TOROID CLAMP	FOR TX	1
	F038					RUBBER WASHER	ON TOP OF TX	2
	F065					ADHESIVE CABLE CLIP	FOR TX SCREEN WIRE	1
	F162					TAPE 50m ROLL	ON TOP OF HEAT SINK	0.003
	F164					DAMPING PAD	COVER TO FP	400MM
	F200					HOLE BLANKING GROMMET	FOR REAR PANEL 'LINK PARKING'	2
	HA3V10A					M3 x 10mm SCREW	MOTHER PCB & SUB-FRONT	9
	HA 3V06A					MC TORX M3X6 STZP		4
	HA4A12B					M4 x 12mm SCREW	RR PAN 'E' EARTH	1
	HA5K70B					M5 x 70mm BOLT	HEATSINK SCREWS	3
	HA5L20B					M5 x 20MM HEX HEAD BOLT BLACK ST'L	CLAMPING OF E912MC TO E804HK	4
	HA6K60A					M6 x 60mm BOLT	TX FXG	1
	HF4V09B					No. 4 x 9mm SCREW	REAR	16
	HJ4A00A					M4 NUT	EARTH	1
	HL4SA					M4 SHAKE PROOF	CHASSIS EARTH	2
	HL5EB					M5 WASHER BLACK	HEAT-SINK WASHER CTRE	3
	K5408					SLEEVE FOR LIGHT PIPES (6mm)		1
	L882AY					POWER SUPPLY & AMP PCB		1

P85 General Assembly

ITEM	230V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
	L884TX	L884TX	L880TX			A85P TRANSFORMER		1
	L910AY					SWITCH PCB		1
	L915CA					CABLE FFC 0.1" 14WAY A85 DISP - PWR		1
				E834CP	E833CP	COVER PLATE		1
				E974AY	E990AY	FACIA ASSY		1
				HA4V06S	HA4V06B	M4 X 6mm SCREW		4

P85/3 General Assembly

ITEM	230V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
	5B483028					PIC CHIP + L819SW		1
	8K004					2 WAY JUMPER SKT		2
	8K006					CONNECTOR 14MM SNORTING BAR P2148		1
	C12406	C12406	TBA			FUSE 20MM 4AT	FUSE & SPARE FUSE HOLDER	2
	E031AY					REAR PANEL ASSEMBLY		1
	E804HK					HEAT-SINK		1
	E804MI					MAINS INSULATOR	ON TOP OF CHASSIS UNDER TX SPACER	1
	E806HK					P85 3 RD CHANNEL HEAT-SINK		1
	E821CH					CHASSIS		1
	E823AP					P85 TX MASK		1
	E83001					TX GASKET	UNDER TX	1
	E866MC					TORODIAL SAFETY SHEILD	UNDER TX & WASHER	1
	E869PM					TACT BUTTON POWER		1
	E879PM					FOOT		6
	E879SL					CONFIGURATION LABEL	CHASSIS	1
	E907MC					KOOL PAD	HEAT SINK	1
	E909MC					P85 3 RD CHANNEL SIL PAO		1
	E912MC					85 AMP TRANSISTOR CLAMP	FOR HEAT-SINKS E804HK & E806HK	6
	E921MC					HEATSINK CLAMP	HEAT SINK	1
	E922SL					P85 3RD CHANEL FUSE LABEL		2
	F022					FUSE HOLDER COVER	FOR FUSE HOLDERS	2
	F037					TOROID CLAMP	FOR TX	1
	F038					RUBBER WASHER	ON TOP OF TX	2
	F065					ADHESIVE CABLE CLIP	FOR TX SCREEN WIRE	1
	F065					ADHESIVE CABLE CLIP	FOR TX SCREEN WIRE	1
	F162					TAPE 50m ROLL	ON TOP OF HEAT SINK	0.003
	F164					DAMPING PAD	COVER TO FP	400MM
	F200					HOLE BLANKING GROMMET	FOR REAR PANEL	2
	HA3V10A					M3 x 10mm SCREW	MOTHER PCB & SUB-FRONT	22
	HA3V06A					MC TORX P/H M3X6 STZP		4
	HA4A12B					M4 x12mm SCREW		
	HA5K70B					M5 x 70mm BOLT	HEATSINK SCREWS	5

P85/3 General Assembly

ITEM	230V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
	HA5L20B					M5 x 20MM HEX HEAD BOLT BLACK ST=L	CLAMP E912MC TO E804HK / E806HK	6
	HA6K60A					M6 x 60mm BOLT	TX FXG	1
	HF4V09B					No. 4 x 9mm SCREW	REAR	20
	HJ4A00A					M4 NUT	FOR HEAT SINK	1
	HL4SA					M4 SHAKE PROOF	CHASSIS EARTH	2
	HL5EB					M5 WASHER BLACK	HEAT-SINK WASHER CTRE	5
	K5408					SLEEVE FOR LIGHT PIPES (6mm)		1
	L882AY					POWER SUPPLY & AMP PCB		1
	L884TX	L884TX	L880TX			A85 TRANSFORMER	TX	1
	L910AY					SWITCH PCB		1
	L911AY					A85 3 RD CHANNEL		1
	L915CA					CABLE FFC 0.1" 14WAY A85 DISP - PWR		1
	L919CA					CABLE FFC 0.1" 14WAY A85 3RD CHANNEL		1
				E832CP	E831CP	COVER PLATE		1
				E974AY	E990AY	FACIA ASSY		1
				HA4V06S	HA4V06B	M4 X 6mm SCREW	COVER SIDE	4