

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

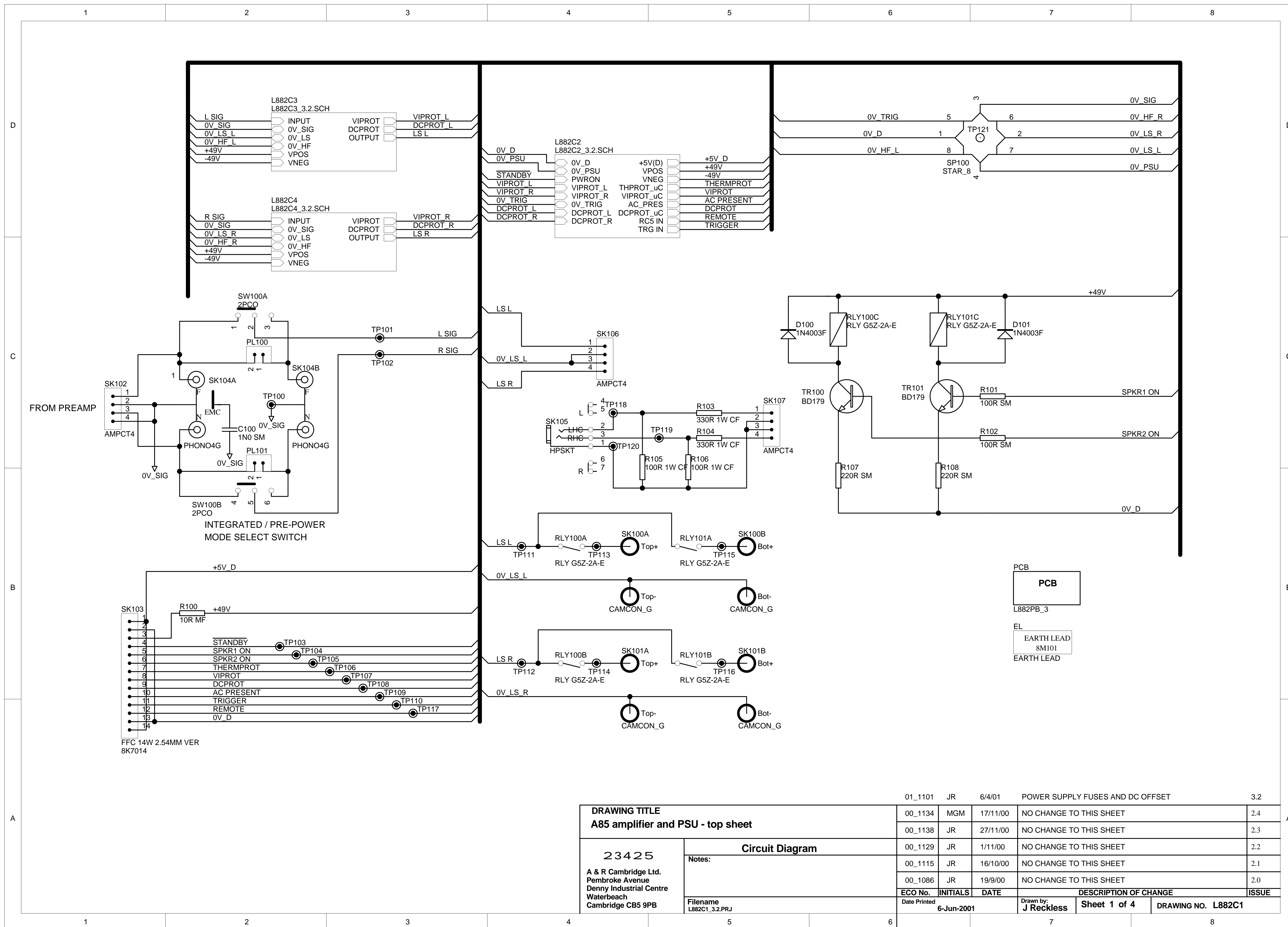
| | |
|---------------|---|
| Left channel | Measure points indicated on PCB - Adjust RV300 for 8.5mV cold or 12 mV when warm |
| Right channel | Measure points indicated on PCB - Adjust RV400 for 8.5mV cold or 12 mV when warm |

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).

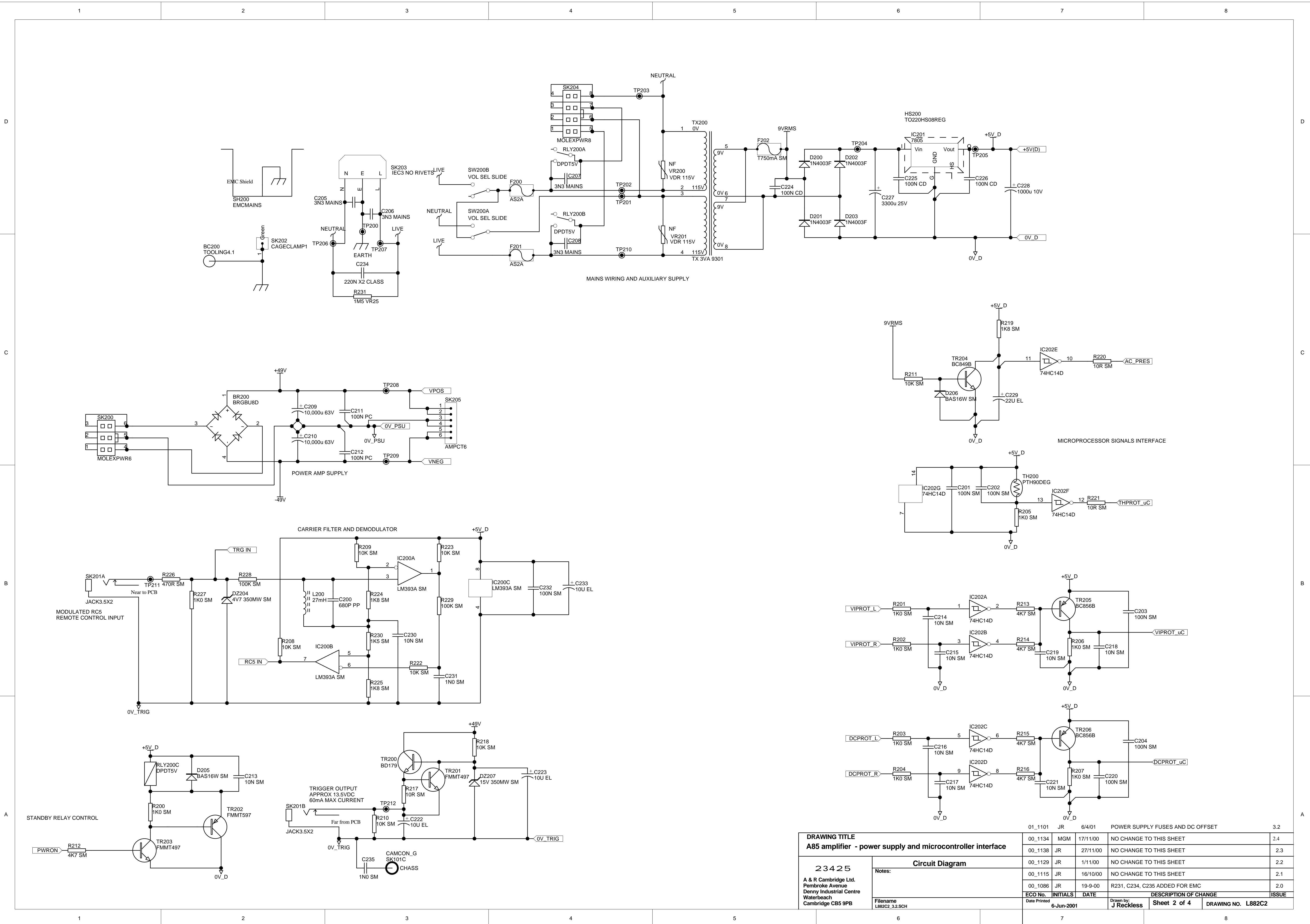


FFC 14W 2.54MM VER 8K7014

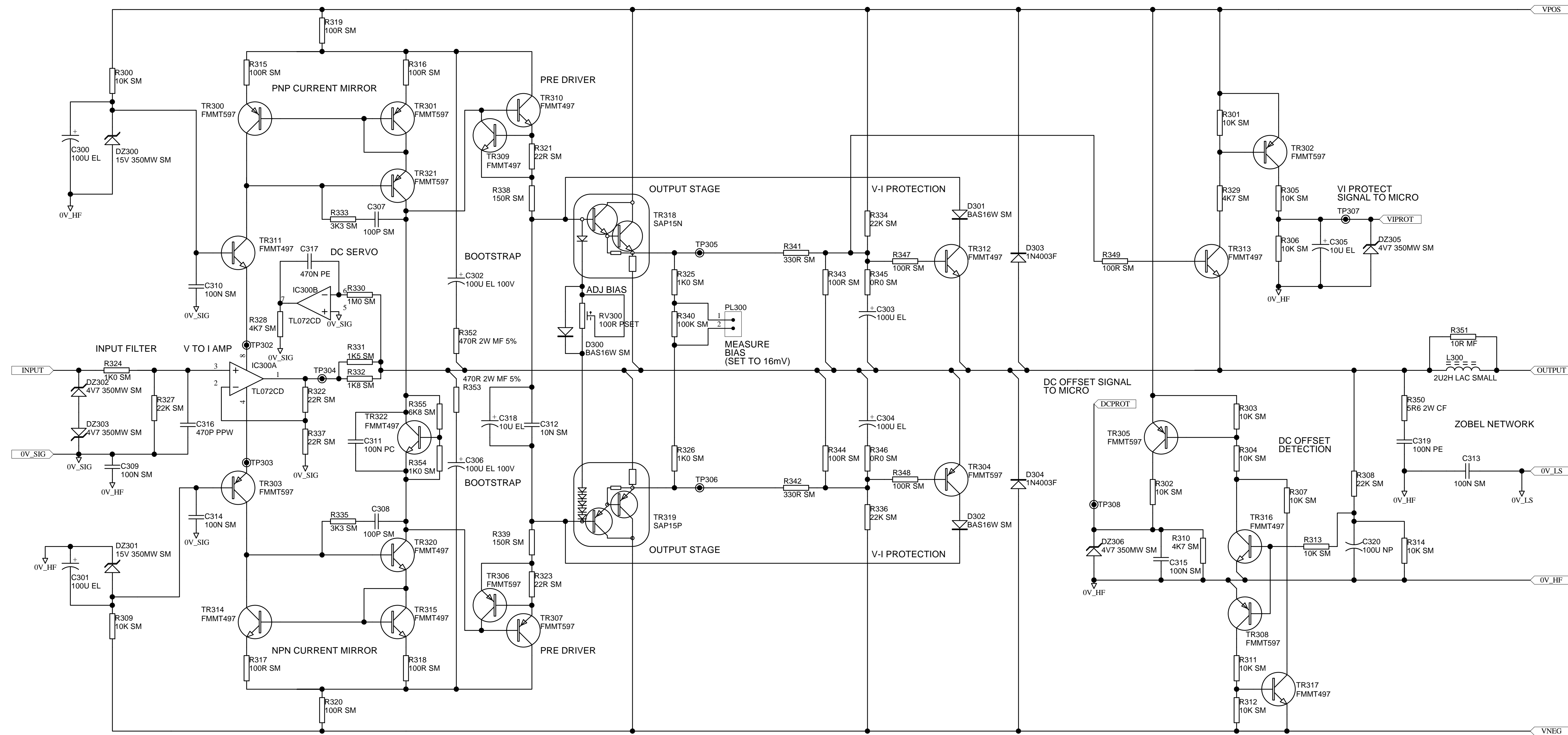
PCB
L882PB_3
EL
EARTH LEAD
8M101
EARTH LEAD

| 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_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 | NO CHANGE TO THIS SHEET | 2.0 |
| Notes: Filename: L882C1_3.2.PRJ Date Printed: 6-Jun-2001 | | ECO No. INITIALS DATE Date Printed: 6-Jun-2001 | | DESCRIPTION OF CHANGE Drawn by: J Reckless Sheet 1 of 4 DRAWING NO. L882C1 | | |

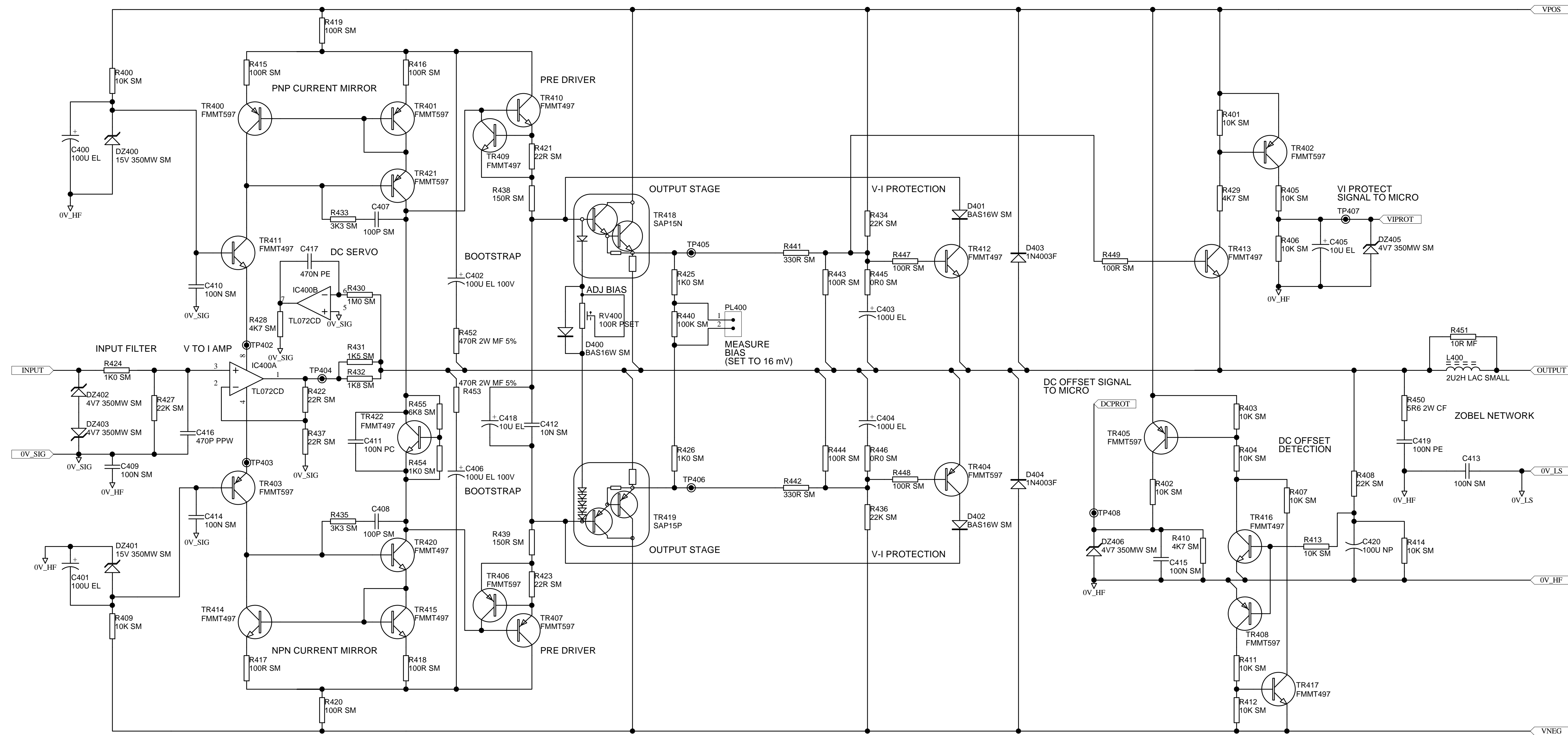
01_1101 JR 6/4/01 POWER SUPPLY FUSES AND DC OFFSET 3.2



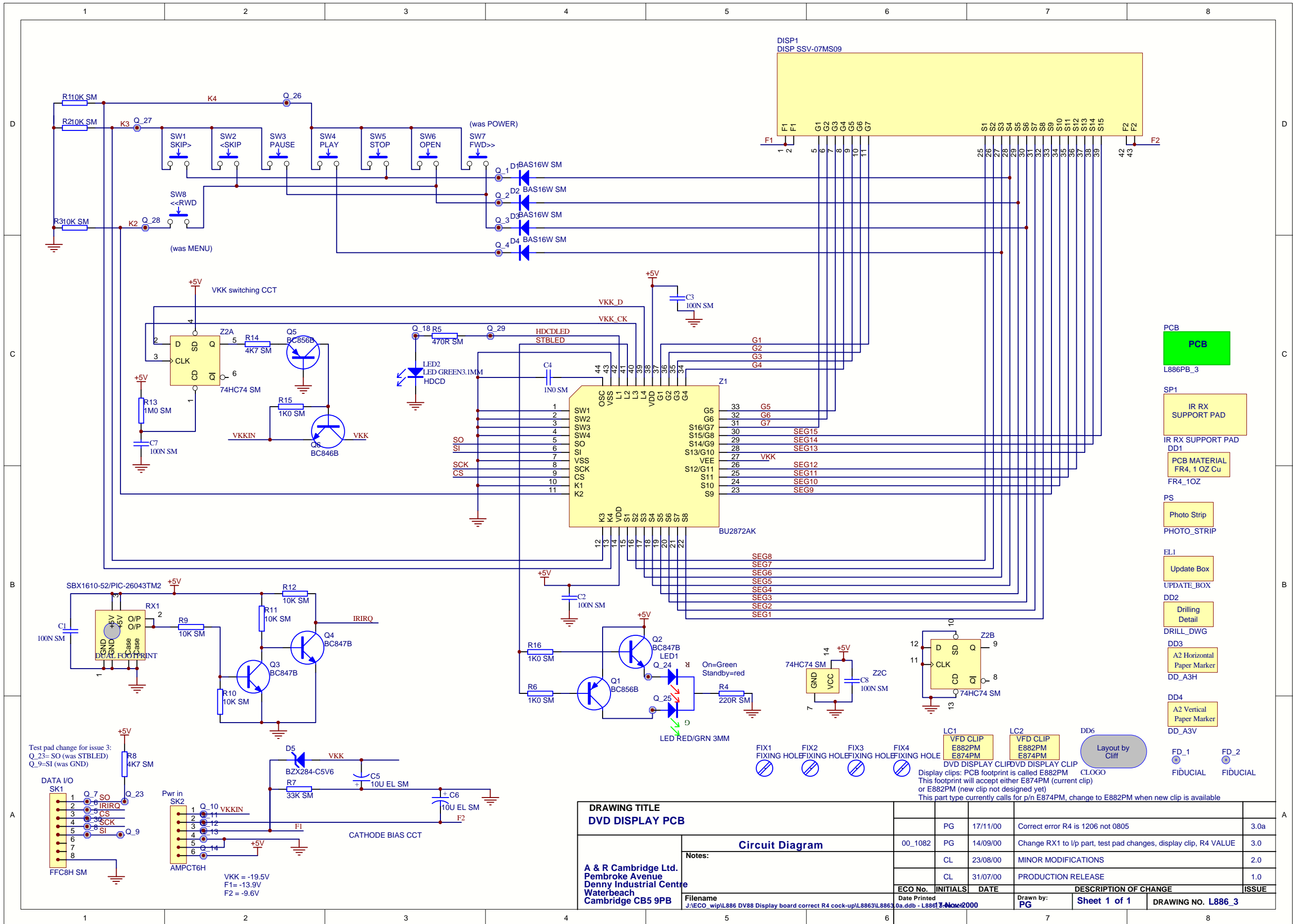
| DRAWING TITLE | | 01_1101 JR 6/4/01 POWER SUPPLY FUSES AND DC OFFSET | | 3.2 | | |
|--|--------------|--|-----------------------|--------------|--------------------------------|-----|
| A85 amplifier - power supply and microcontroller interface | | 00_1134 | MGM | 17/11/00 | NO CHANGE TO THIS SHEET | 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 |
| ECO No. | INITIALS | DATE | DESCRIPTION OF CHANGE | | ISSUE | |
| Filename | Date Printed | | Drawn by | Sheet 2 of 4 | DRAWING NO. L882C2 | |
| L882C2_3.2.SCH | 6-Jun-2001 | | J Reckless | | | |



| 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 |
| A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB | | Date Printed | | 6-Jun-2001 | Drawn by J Reckless | Sheet 3 of 4 DRAWING NO. L882C3 |
| Filename L882C3_3.2.sch | | | | | | |



| 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 | ISSUE |
| 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

DD6
Layout by Cliff
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 | ISSUE |
| Date Printed | | | Drawn by: PG | Sheet 1 of 1 |
| Filename: J:\ECO_wip\L886 DV88 Display board correct R4 cock-up\L8863L8863.0a.ddb - L8863.1-Nov-2000 | | | DRAWING NO. L886_3 | |

1

2

3

4

D

D

C

C

B

B

A

A

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

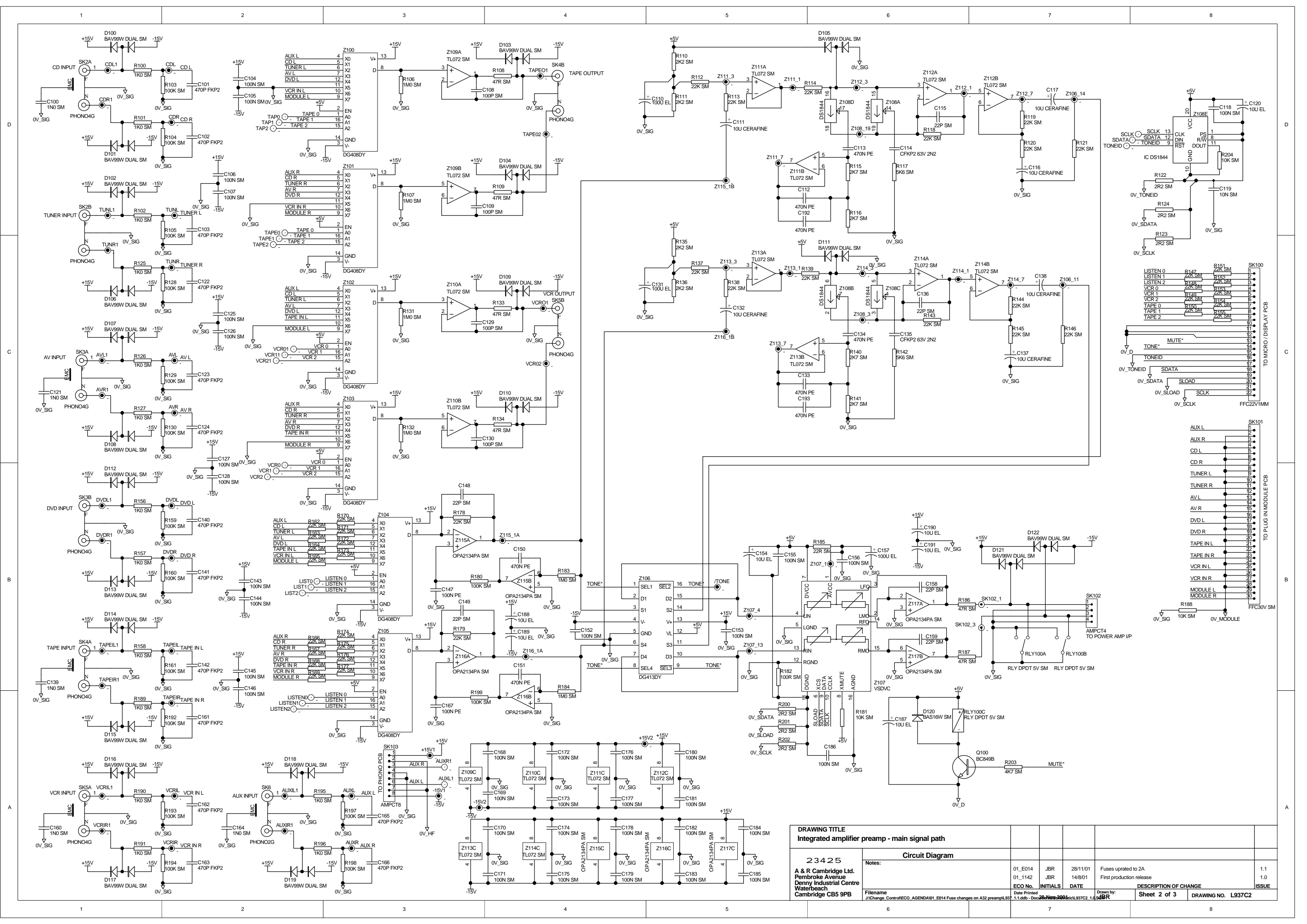
| | | | | | | |
|--|------------------------|---------|----------|----------|--------------------------|--------------------|
| DRAWING TITLE Integrated amplifier preamp | | | | | | |
| 23425 A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB | Circuit Diagram | | | | | |
| | 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\L937C1_1.0.R | 28 Nov 2001 | | JBR | | Sheet 1 of 3 | DRAWING NO. L937C1 |

1

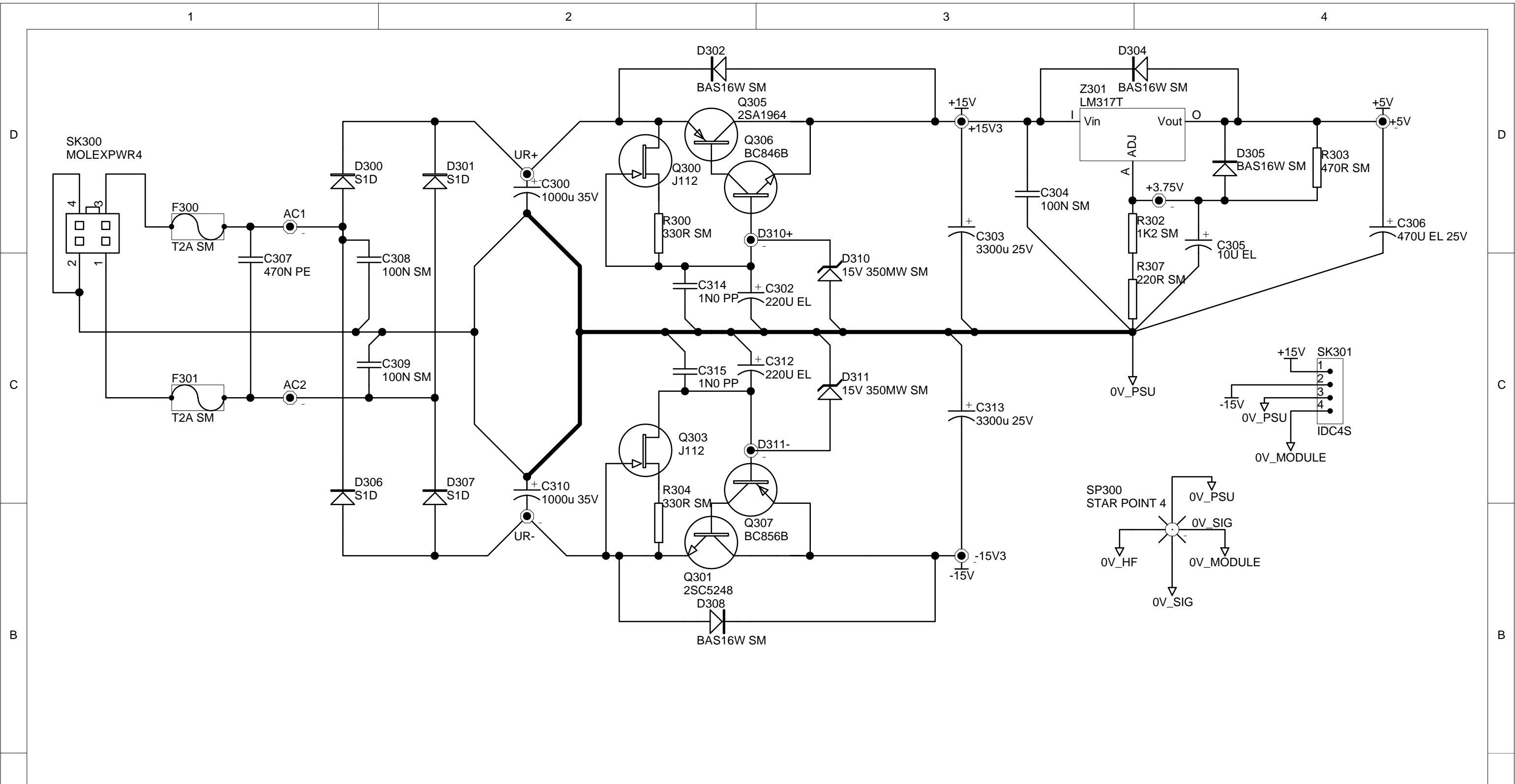
2

3

4



| DRAWING TITLE | | Circuit Diagram | | | | | | | |
|---------------|--|---|--|--------------|----------|--------------------|--------------------------|-------|--|
| 23425 | | A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB | | ECO No. | INITIALS | DATE | DESCRIPTION OF CHANGE | ISSUE | |
| Notes: | | Fuses updated to 2A | | 01_E014 | JBR | 28/11/01 | First production release | 1.1 | |
| Filename | | J:\Change Control\ECO_AGENDA\01_E014 Fuse changes on A32 preamp\937 | | 1.1.dwg | Doc | 28/11/01 | 1.1 | 1.0 | |
| Date Printed | | 28/11/01 | | 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 | |
| | | 28 Nov 2001 | | JBR | | DRAWING NO. L937C3 | |

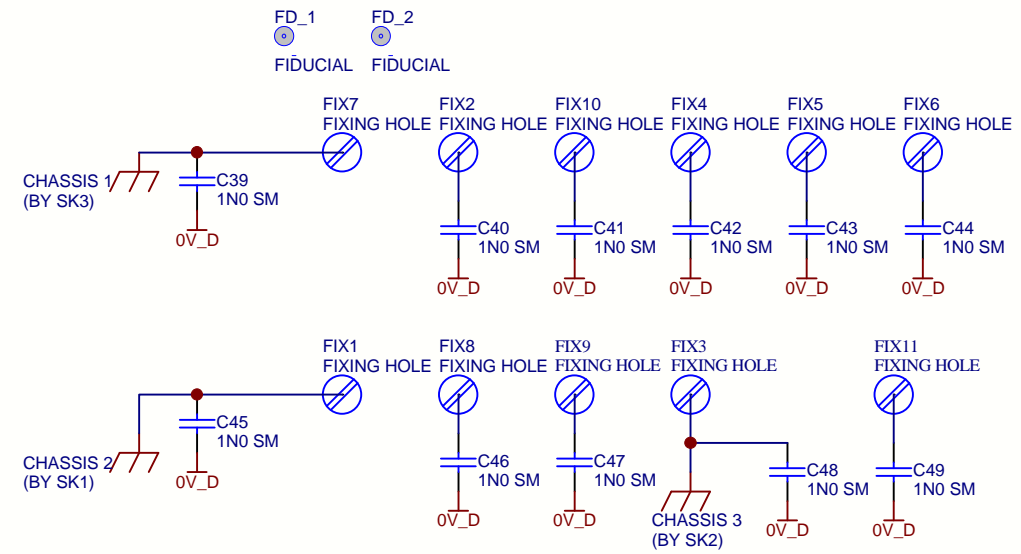
A85 DISPLAY PCB

L865C2_2.0
L865C2_2.0.SCH



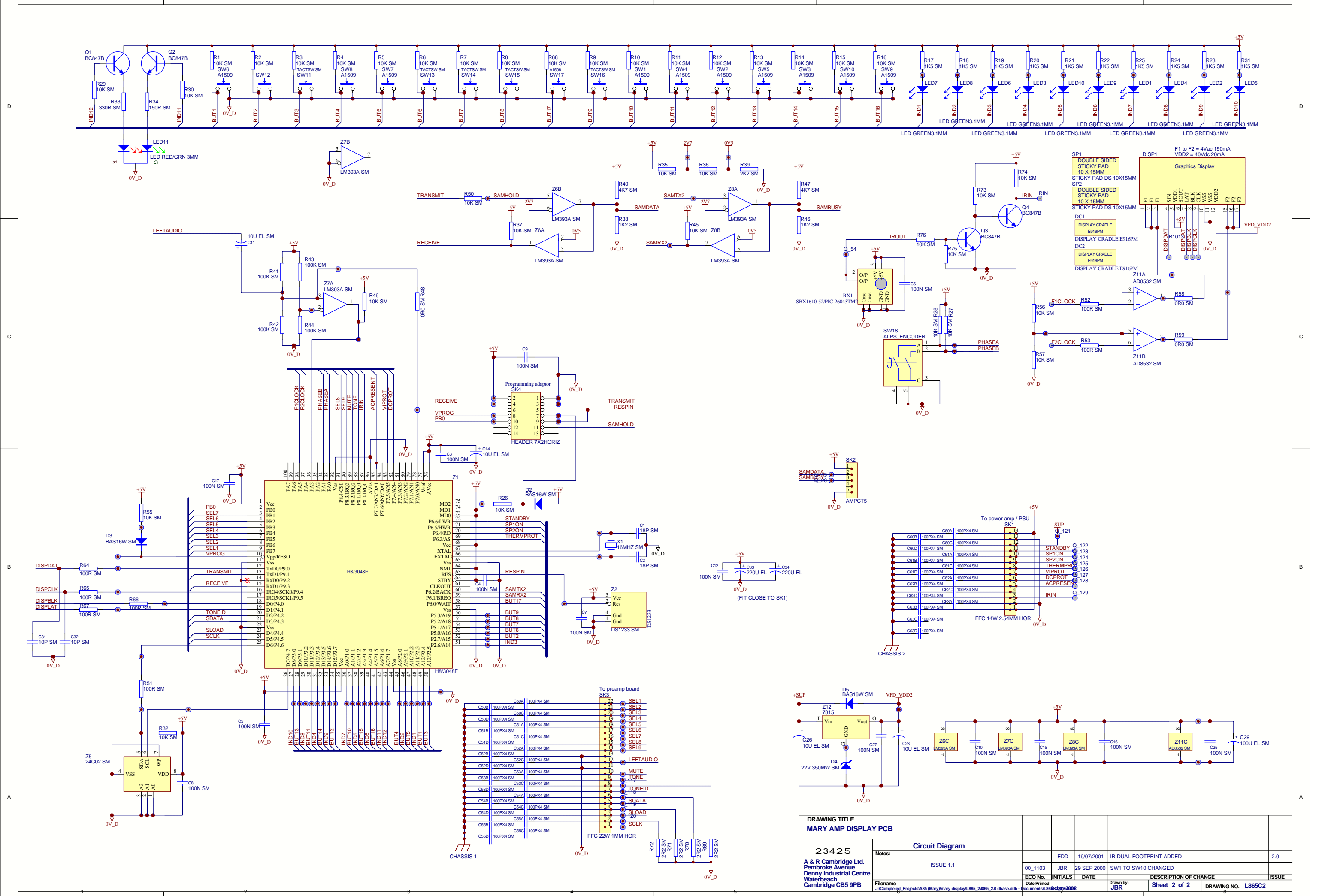
MICRO

UDB
Update Box
(Small)
UPDATE_SML

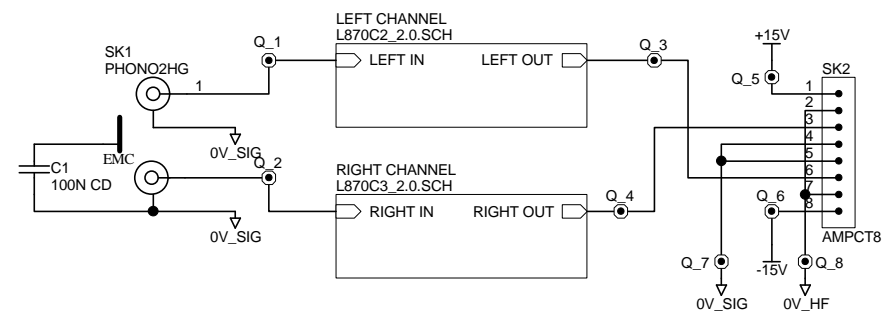


PCB1
PCB
L865PB_2

| | | | | | |
|--|----------------------------|------------------|--------------|-----------------------|-------|
| 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 | |



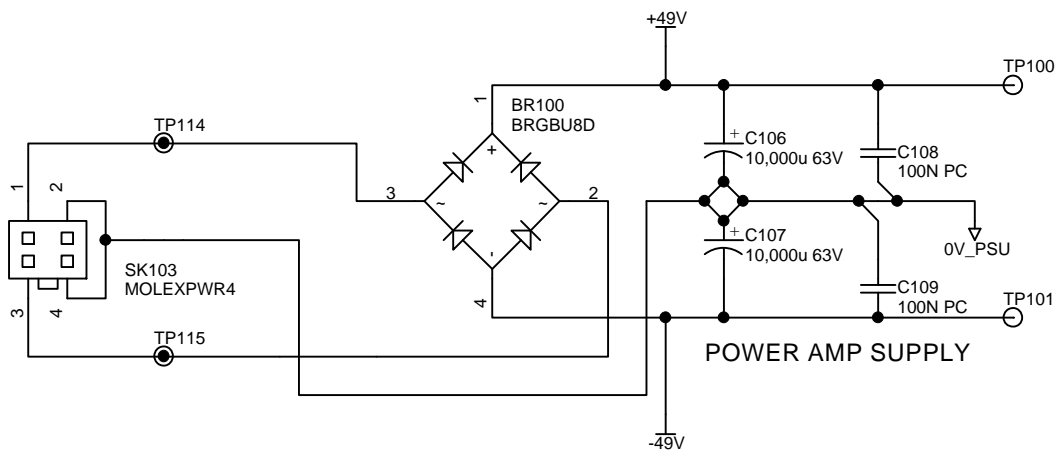
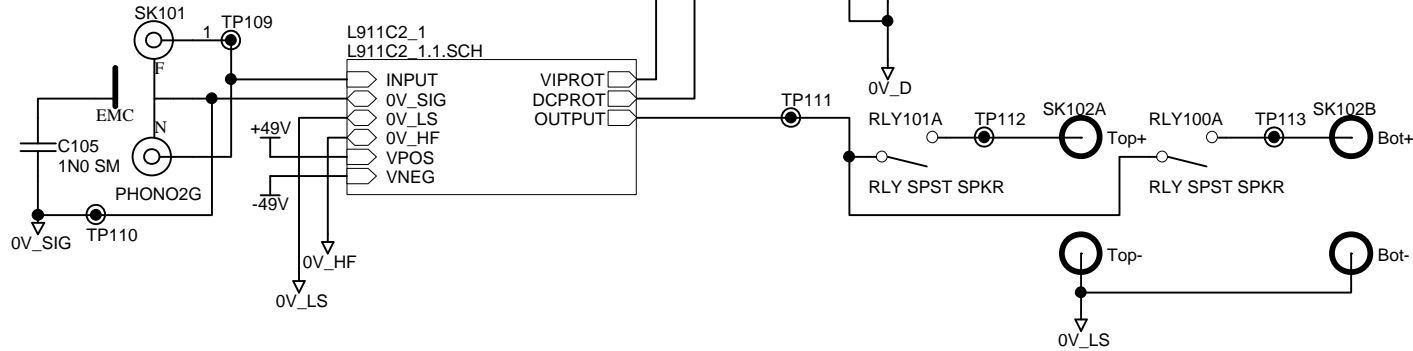
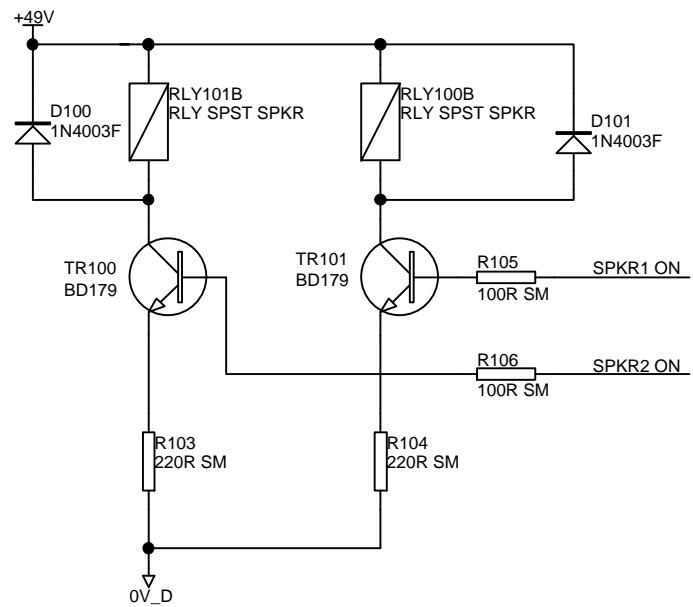
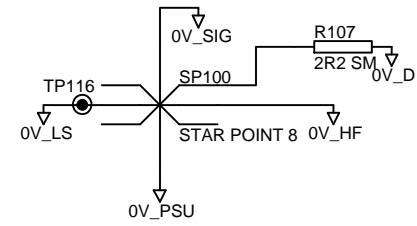
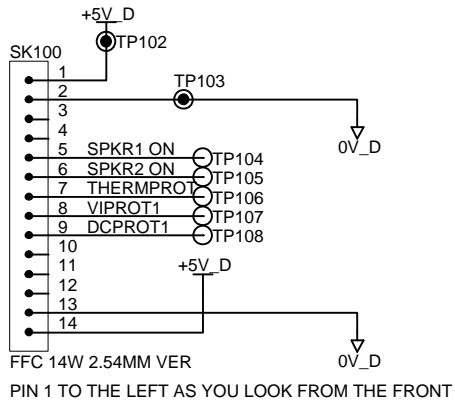
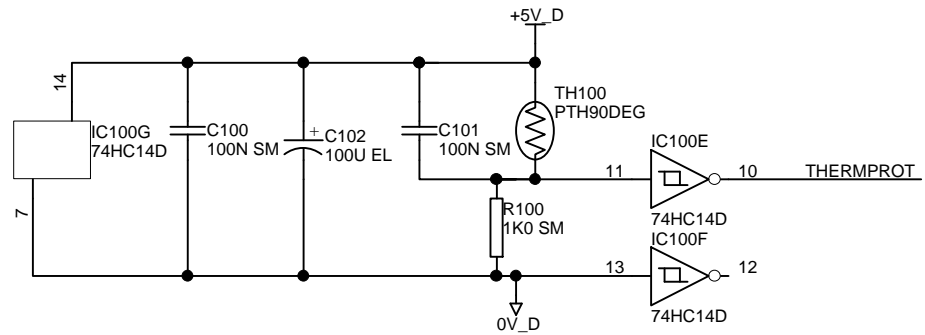
| DRAWING TITLE | | | | | | | |
|---|--|-------------------------------------|--|--|--|-----------------------|--|
| MARY AMP DISPLAY PCB | | Circuit Diagram | | | | | |
| 23425 | | ISSUE 1.1 | | | | | |
| A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB | | Notes: | | EDD 19/07/2001 IR DUAL FOOTPRINT ADDED | | 2.0 | |
| Date Printed | | JBR 29 SEP 2000 SW1 TO SW10 CHANGED | | ECO No. | | INITIALS DATE | |
| J:\Completed Projects\A85 (Mary)\mary display\L865 21865 2.0 dbase.dwg | | 28/09/2002 | | Drawn by: | | DESCRIPTION OF CHANGE | |
| | | JBR | | Sheet 2 of 2 | | DRAWING NO. L865C2 | |



PCB1
PCB
 L870PB_2

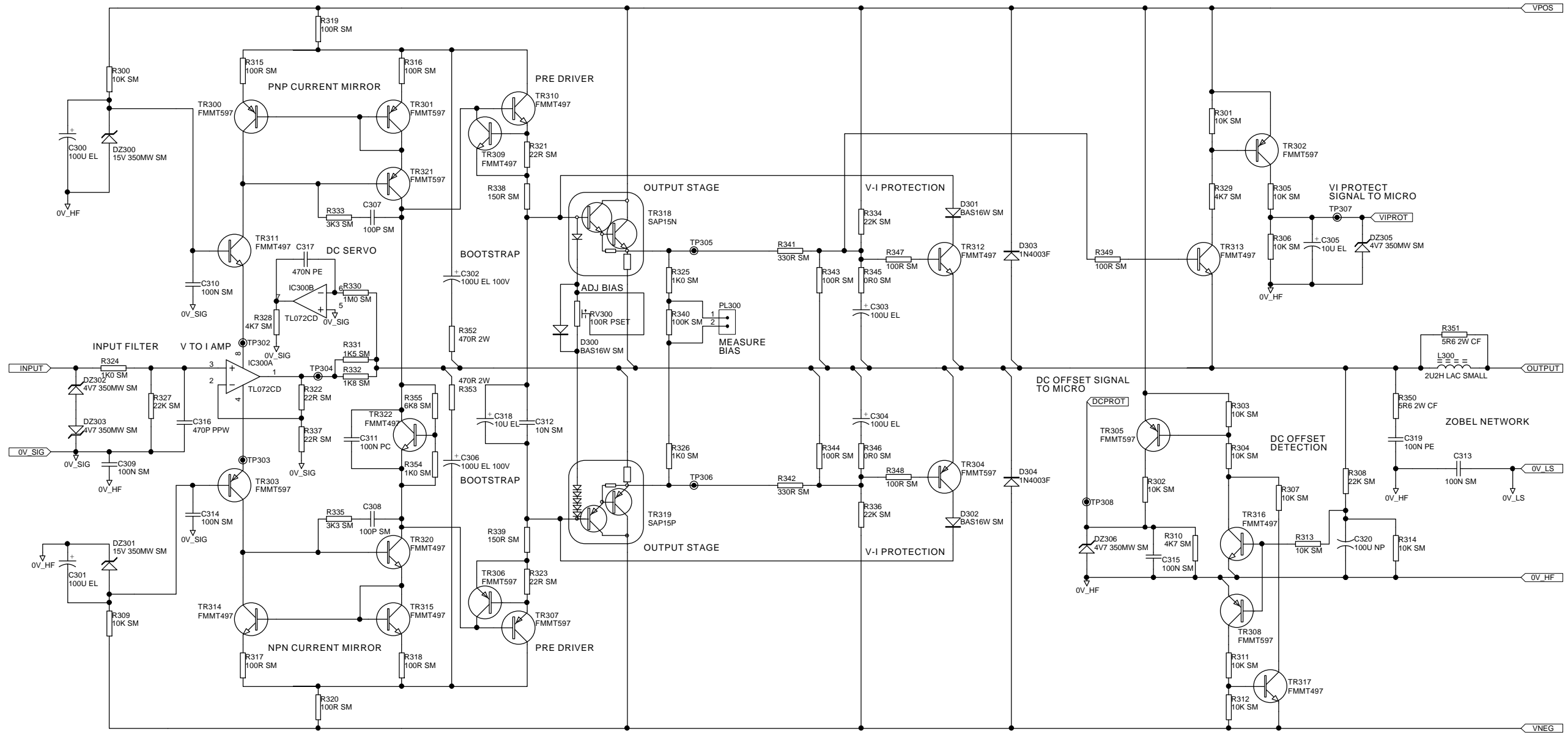
EL1
 Update Box
 UPDATE_BOX

| | | | | | |
|---|-----------------------------|-------------------------|---------------------|-------------|------------------------------|
| 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 |
| | | 00_1051 | JAG | 22/3/01 | PRODUCTION ISSUE |
| Filename G:\DATA\ECO\ECO AGENDA\01_1070\870 A85 PHONO ISSUE2\L870_2.0.ddb - L870c1_2.0.PRJ | Date Printed 23-Apr-2001 | ECO No. | INITIALS | DATE | DESCRIPTION OF CHANGE |
| | | | | | ISSUE |
| | | Drawn by: JBR | Sheet 1 of 3 | | DRAWING NO. L870C1 |

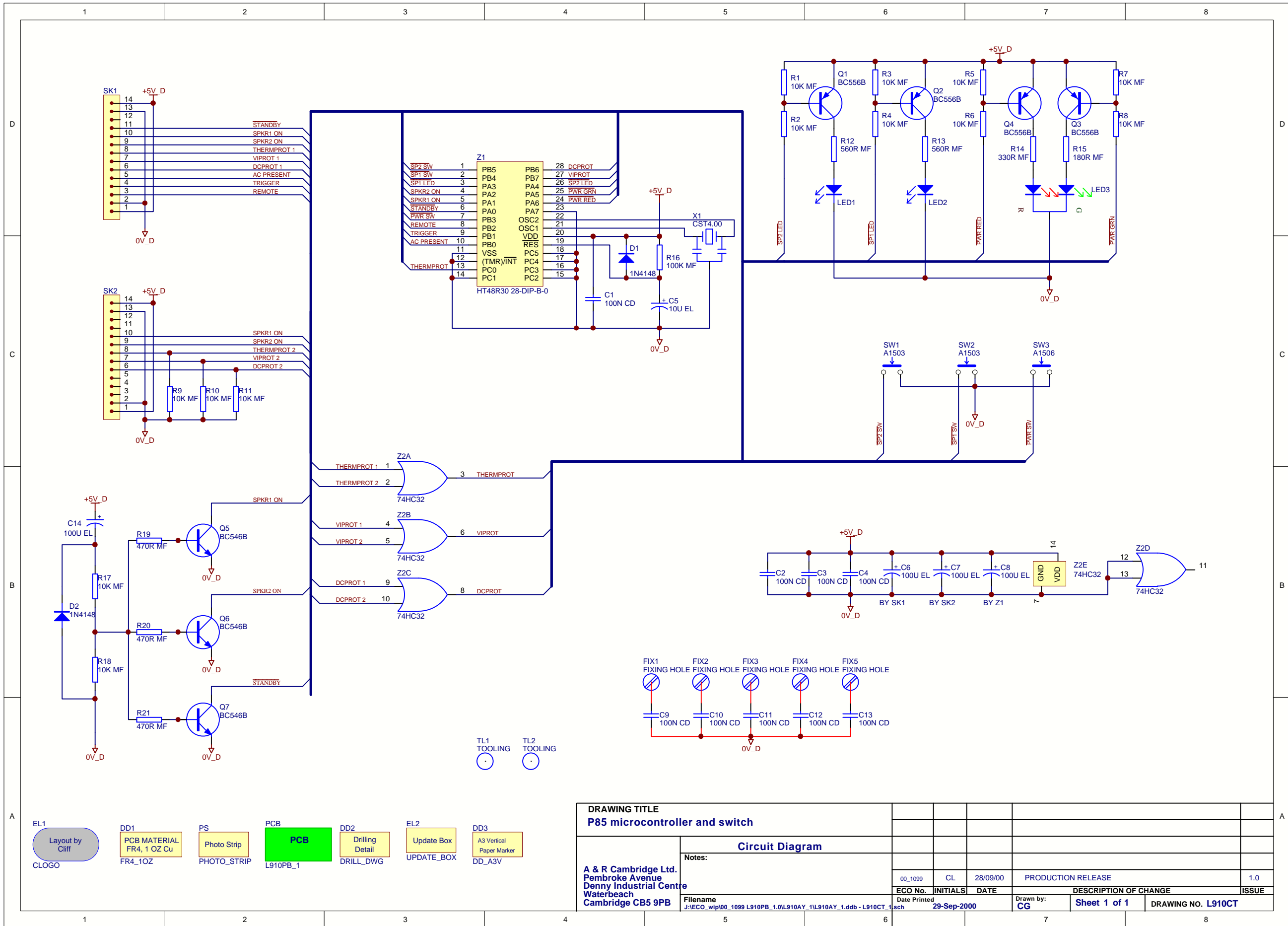


PB
PCB
L911PB_1

| 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 | |
| Filename: J:\ECO_wip01_1101 A85 RANGE PCB FUSES AND DC OFFSET\L911_1.1.DDB - Document | | | | | | Date Printed: 4/6/01 | | Date: 4/6/01 | | Drawn by: J Reckless | |
| | | | | | | ECO No. | | DESCRIPTION OF CHANGE | | ISSUE | |
| | | | | | | Date Printed: 4/6/01 | | Sheet 1 of 2 | | DRAWING NO. L911C1 | |

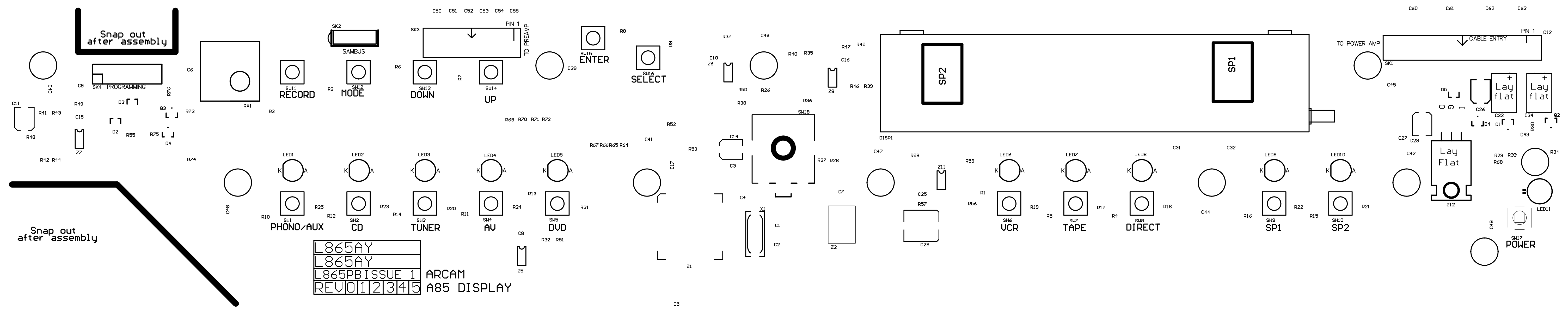


| | | | | | |
|---|-----------------------------------|--------------------------------|---------------------|------------------------------|--------------|
| DRAWING TITLE AP85 third channel - output stage | | | | | |
| 23425 | | | | | |
| A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB | | | | | |
| Circuit Diagram | | | | | |
| 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 | DESCRIPTION OF CHANGE | ISSUE |
| | | | | | |



- 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 | | | | |
| ECO No. | INITIALS | DATE | DESCRIPTION OF CHANGE | ISSUE |
| 00_1099 | CL | 28/09/00 | PRODUCTION RELEASE | 1.0 |
| Filename | Date Printed | Drawn by: | DRAWING NO. L910CT | |
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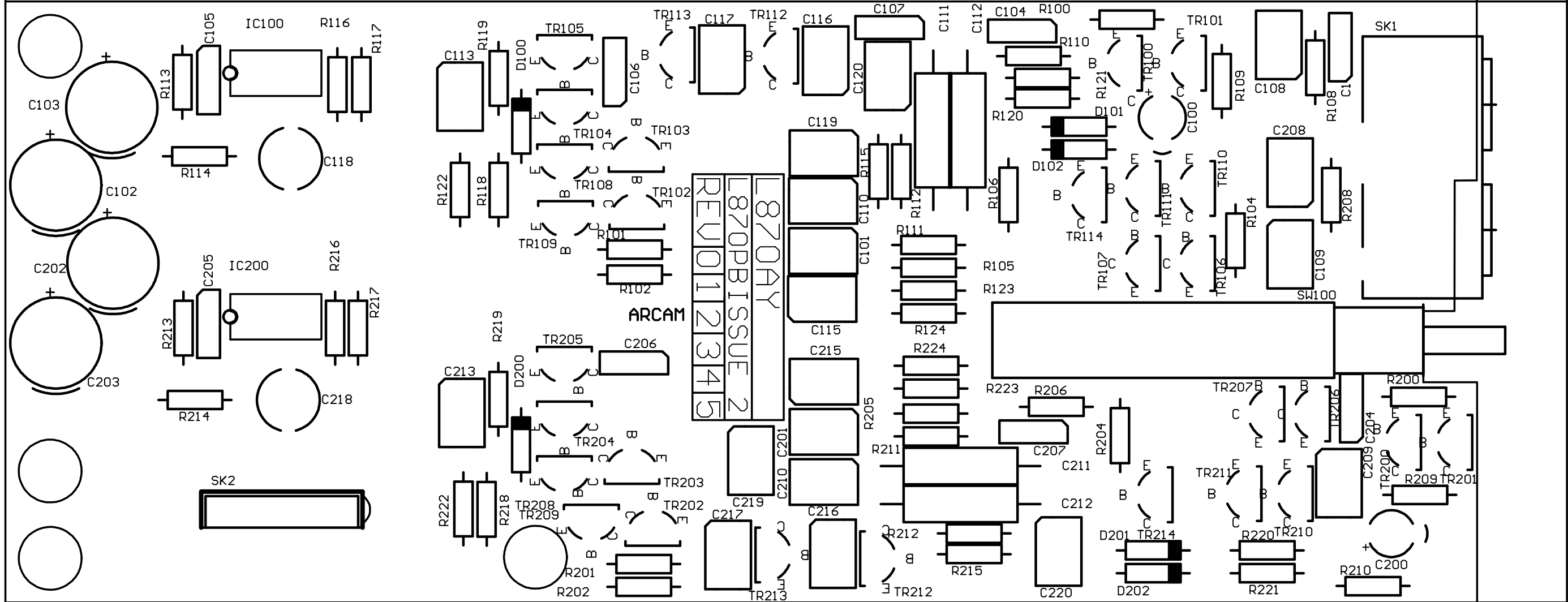


L865AY
 L865AY
 L865PB ISSUE 1 ARCAM
 REV 01 1 2 3 4 5 A85 DISPLAY

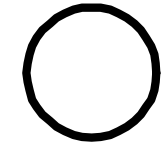
P4928101 pcb
 Top Overlay
 8-Nov-2000

PCB1

L870pb_2.PCB
Top Overlay
17-Apr-2001

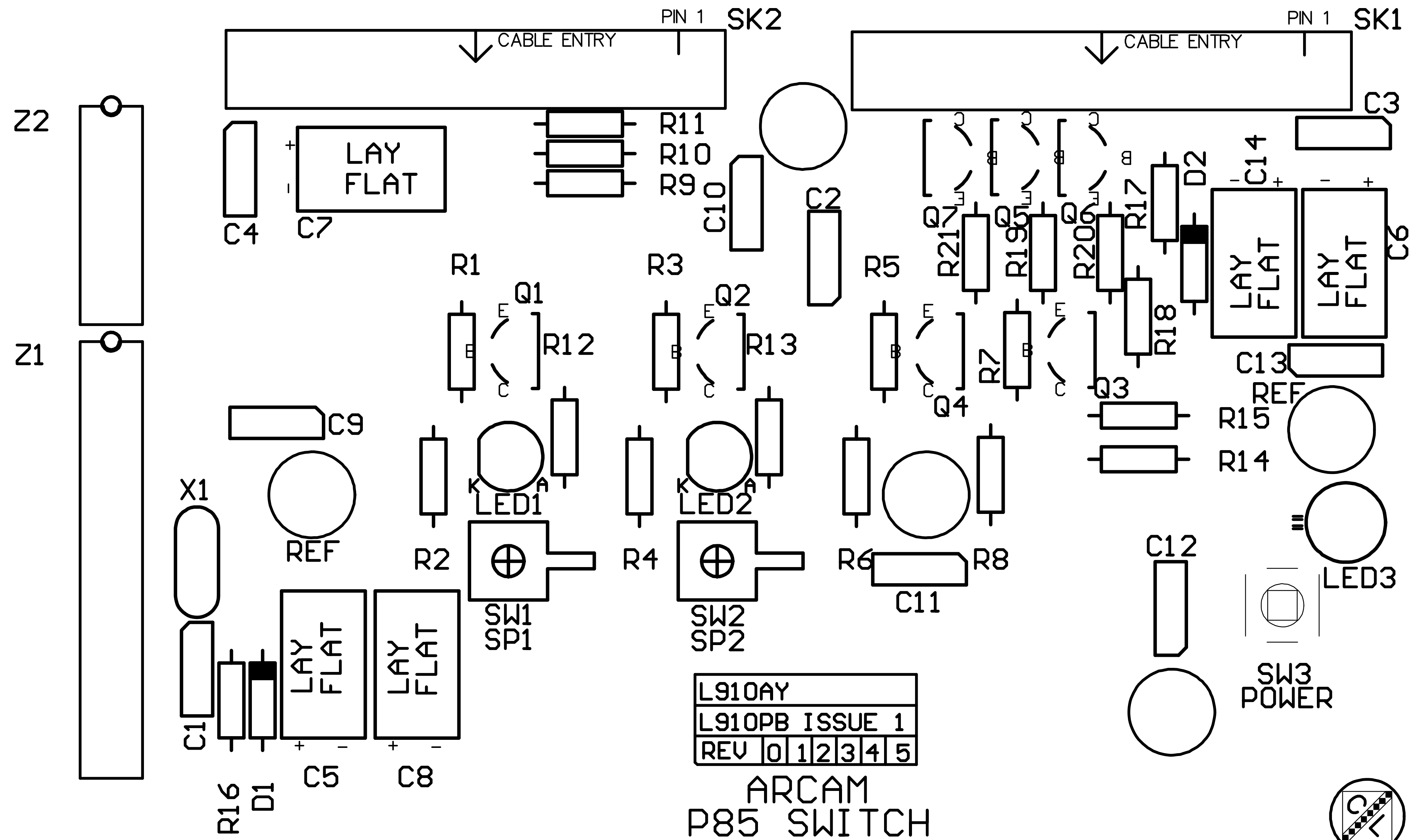
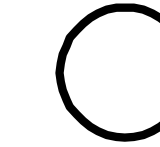


TOOLING



SNAP OFF

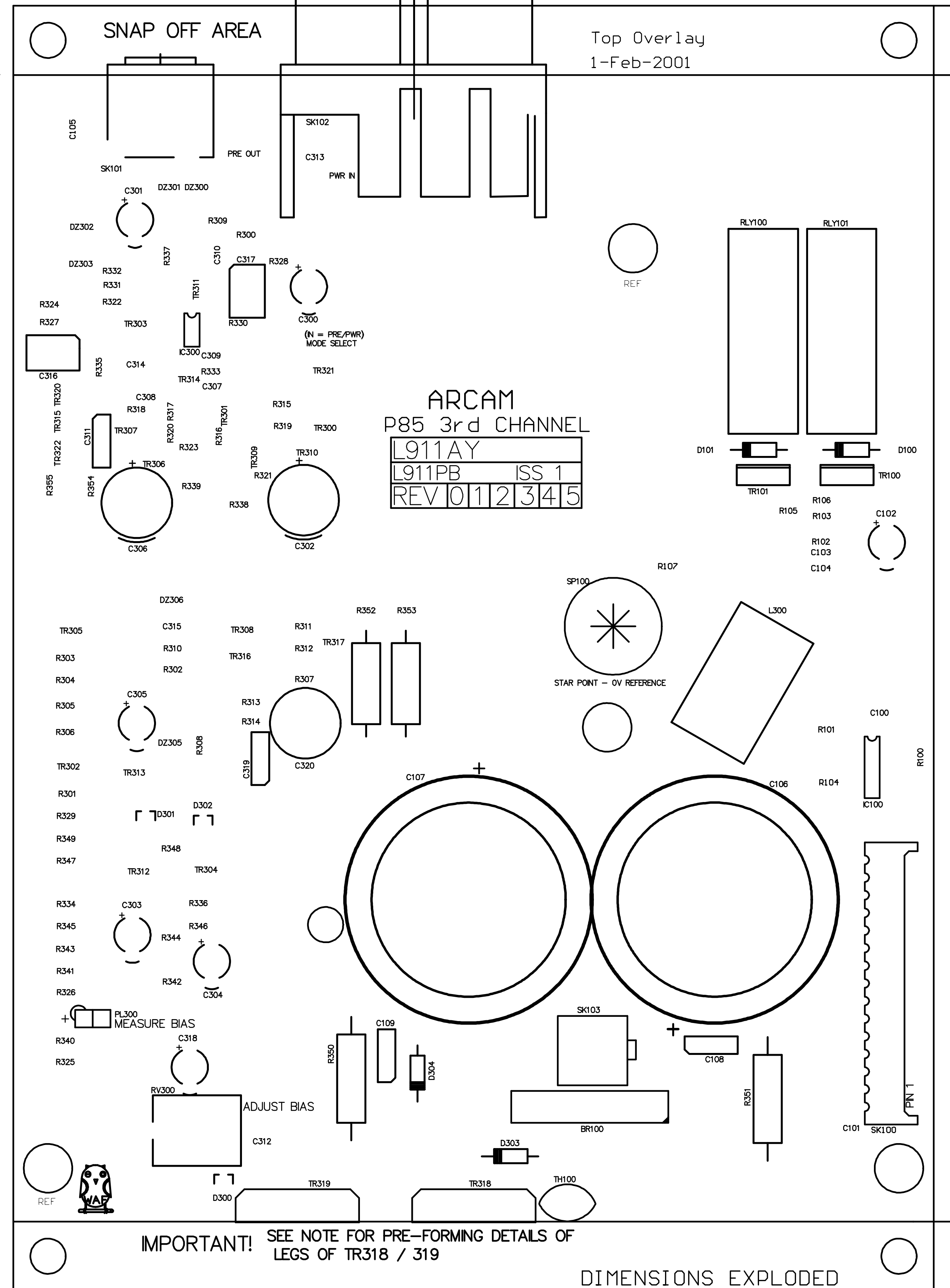
TOOLING



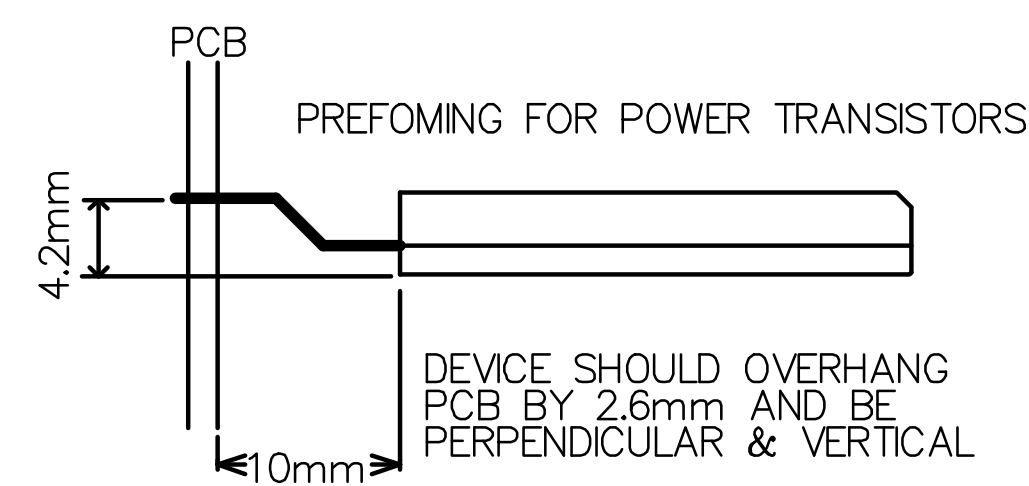
L910pb_1.pcb
 Top Overlay
 29-Sep-2000



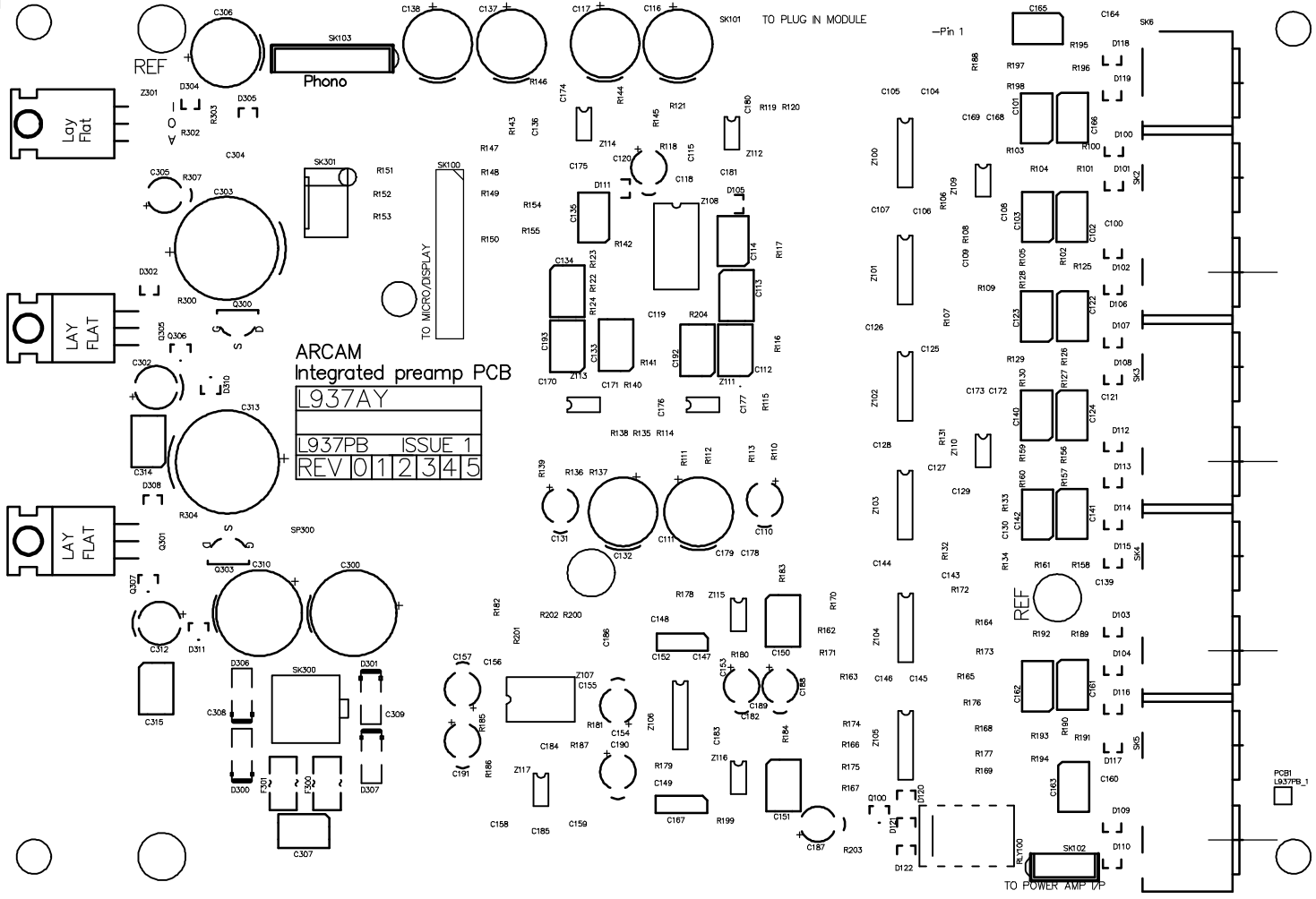
V-GROOVE>>>>>



V-GROOVE>>>>>



V-GROOVE>>>>>

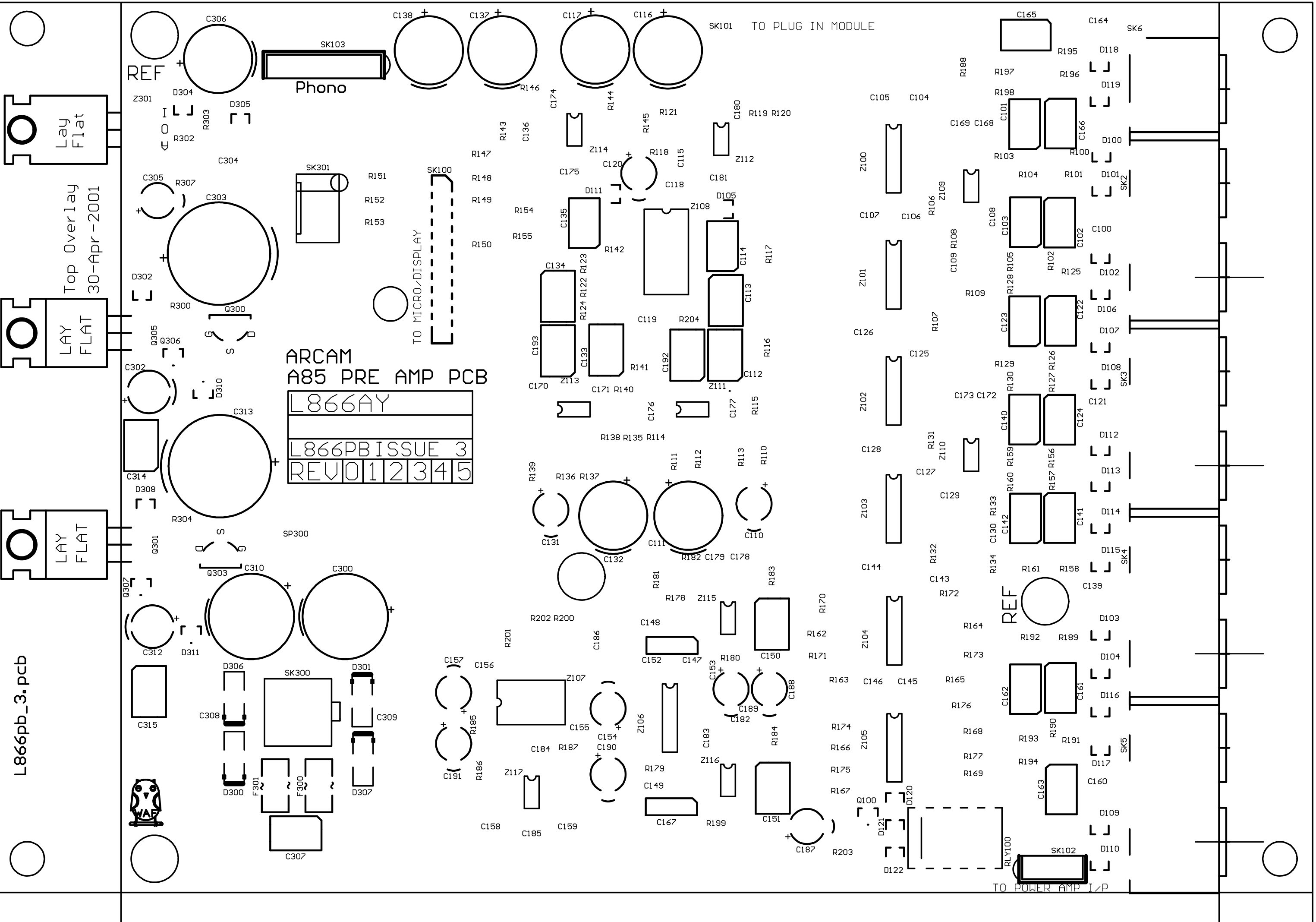


ARCAM
Integrated preamp PCB
L937AY

| | |
|--------|-----------|
| L937PB | ISSUE 1 |
| REV 0 | 1 2 3 4 5 |

TO POWER AMP I/P

PCB1
L937PB



REF
D304
D305
R303
R302

Phono

SK101 TO PLUG IN MODULE

Top Overlay
30-Apr-2001

LAY FLAT

ARCAM
A85 PRE AMP PCB
L866AY
L866PBISSUE 3
REV 0 1 2 3 4 5

TO MICRO/DISPLAY

LAY FLAT

SP300

L866pb_3.pcb



REF

TO POWER AMP I/P

PCB1
L866PB_2.0



U-GROOVE>>>>

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 |

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PCB Bill of Materials

| | | | |
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| Document title: A85 POWER AMPLIFIER AND PSU | | | |
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| | | | |
|-----------|----|----------------------------|---------------------|
| 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 |
| 2D147W | 2 | PPRO W 470P 63V 5% RA | C316 C416 |
| 2D168 | 1 | PPRO 680P 5% 63V RA | C200 |
| 2D422 | 1 | 220NF CLASS X2 CAP 275VRMS | C234 |
| 2H410 | 4 | PCRB 100N 100V 10% RA 5mm | C211 C212 C311 C411 |
| 2K233 | 4 | SUPPR CAP 3N3 250V | C205 C206 C207 C208 |
| 2K410 | 2 | PEST 100N 63V 10% | C319 C419 |
| 2K447 | 2 | PEST 470N 63V 10% | C317 C417 |
| 2N610 | 7 | ELST 10U 50V | C222 C223 C233 C305 |
| | | | C318 C405 C418 |
| 2N622 | 1 | ELST 22U 63V | C229 |
| 2N710 | 8 | ELST 100U 25V | C300 C301 C303 C304 |
| | | | C400 C401 C403 C404 |
| 2N710B | 4 | ELST 100U 100V | C302 C306 C402 C406 |
| 2N810A | 1 | ELST 1M0 10V | C228 |
| 2N833 | 1 | ELST 3M3 25V | C227 |
| 2N910A | 2 | ELST 10m 63V RA 35mm | C209 C210 |
| 2V710 | 2 | ELST NON POLAR 100UF 16V | C320 C420 |
| 3AS16W | 8 | DIODE SS SM BAS16W | D205 D206 D300 D301 |
| | | | D302 D400 D401 D402 |
| 3B4003 | 10 | RECTIFIER 1N4003F 1A 200V | D100 D101 D200 D201 |
| | | | 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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| | | | |
|----------|----|------------------------------|---------------------|
| 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 |

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| Document number: L866RS | Issue: 3 | Revision: 1 | ECO number: 01_1101 |
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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 |

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|---|------------------------|-------------|---------------------|
| Document title: A85 / A32 Integrated amplifier preamp PCB | | | |
| Document number: L937RS | Issue: 1 | Revision: 1 | ECO number: 01_E014 |
| Date: 28/11/01 | Created by: J Reckless | | Page 1 of 2 |

| 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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| Document title: A85 / A32 Integrated amplifier preamp PCB | | | |
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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 |
|-------|---|------------------|-----------|

ADDED:

| | | | |
|-------|---|---------------|-----------|
| C3202 | 2 | FUSE R452 T2A | F300 F301 |
|-------|---|---------------|-----------|

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|---------------------------------|-----------------|-------------|---------------------|
| Document title: A85 DISPLAY PCB | | | |
| Document number: L865RS | Issue: 2 | Revision: 0 | ECO number: 01_E028 |
| Date: 13/02/02 | Created by: WAF | Page 1 of 2 | |

| 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 |

ARCAM

| | | | |
|---------------------------------|-----------------|-------------|---------------------|
| Document title: A85 DISPLAY PCB | | | |
| Document number: L865RS | Issue: 2 | Revision: 0 | ECO number: 01_E028 |
| Date: 13/02/02 | Created by: WAF | Page 2 of 2 | |

| | | | |
|----------|---|------------------------------|---------|
| 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 |
|----------|---|-------------------------|------|

 ***** 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 |

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

| | | | |
|----------|---|-----------------------------------|---------------|
| 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 |