Service Manual

DV88

Issue 2.0

DiVA DV88 DVD Player
+ Progressive Scan

ARCAM

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Circuit Descriptions

L875 DSP Circuit

Summary
This board is used in the DV88 and DV27 DVD players. It can be considered to be the central digital core of the player, and is based around the Zoran Vaddis III DVD decoder IC. A Siemens C161 microcontroller is used as the system CPU and software runs on this which controls the whole system. A video DAC is also present, as well as an ATAPI bridge device.
The board interfaces with the display board, the DVD drive, and the AV board.

Overview
The heart of the system is the Zoran Vaddis III IC, which receives a data stream on its AV interface. The chip has 2 separate DSPs, one for audio and one for video. The MPEG video/ audio decoding and Dolby digital audio decoding are performed in these DSPs as well as other post processing on audio and video, OSD generation, decryption of DVD and other functions.
The vaddis is controlled by the system CPU via its host bus interface.
The system uses an ATAPI type DVD drive.
With the AV interface the Vaddis AV input comes directly from the drive, and the drive is controlled from the system CPU via an SSC bus (standard synchronous control).
The design was modified to use the ATAPI standard by the inclusion of the ATAPI bridge chip. This has an ATAPI interface to the drive, and an SSC interface to the CPU. A data stream is provided which interfaces to the Vaddis AV input.
On the output side of the system, the digital audio output from the Vaddis is passed to the AV board in I2S format.
The video output from the Vaddis is in the form of a digital 8 bit parallel bus, with 27MHz clock, containing multiplexed chroma and luma data. H and V synchronisation is performed by the use of embedded sync patterns in the data. This type of bus is a standard interface known as BT-656. This bus connects to the video DAC, an Analog Devices ADV7172. This does PAL/NTSC encoding and D-A conversion, and gives out 6 channels of analogue video. These are composite, S-Video, and 3 lines that are switchable YUV/RGB. All video outputs are passed to the AV board where they are filtered and buffered before going to the outside world.

Circuit Description
Refer to L875 circuit diagrams

Sheet 1 - Top level
This is the top level of the schematic and shows how the sheets link together plus some of the board interfaces.
CN8 provides a serial port which may be connected to a PC via an RS232 transceiver, for debugging purposes.
CN6 is the interface to the front panel. A 4 wire serial interface communicates with the VFD driver chip, which drives the display, scans the buttons and drives the LEDs on the front panel. This interface consists of FPDIN (serial data from panel), FPSEL (chip select), FPCLK (serial clock) and FPDOUT (serial data to front panel).
IRIRQ is the signal from the IR remote receiver on the front panel, driven by an open collector circuit. This is because that line also goes to the progressive scan board in the DV27, which has the remote bus input on it.
CN1 is the power input. +5V and +3.3V rails are provided. The Vaddis and its SDRAM operate on 3.3V, everything else runs on +5V.
CN5 is the audio connector to the AV board. Digital audio in I2S and SPDIF formats are passed to the AV board from here, as well as a number of control signals:
FSEL0..1 Selects 1 of 4 audio clock frequencies
MD, MC, ML8716_L, ML_8716_R, ML_8716_X 5 wire SPI bus to configure audio DACs
GAIN_SCALING HDCD gain scaling signal.
The audio master clock also comes on to the board here. It is generated on the AV board and fed to the DSP board to synchronise the audio, of which more later.
CN2 and CN3 are not fitted. They are the AV and host interface for the AV type drive that the system was originally designed to use.

Sheet 2 - CPU
The system CPU, U3, is a Siemens C161 16 bit ROM-less microcontroller running at 16MHz.
ROM and RAM are external to the micro, so we have a CPU bus with 19 bits of address and 16 bits of data.
The ROM memory is provided by U4 and U5 which contain the lower and upper 8 bits of program memory respectively. These are 28SF040 4Mbit (512K x 8) FLASH EEPROMs. These must be programmed and fitted in their sockets before the board can be tested. Once in place they can be re-programmed in system, and the software has a feature where new software can be uploaded from a CD. It is important to note that these devices are **re-programmable**.
The system RAM is provided by U6 and 7 which contain the lower and upper 8 bits of memory respectively. These are 1 Mbit (128K x 8) devices, making 256KByte memory altogether.
U12 is an 8 bit wide latch that provides a few extra control output lines - these being a 5 wire serial control interface for the audio DACs, a reset signal for the AV drive (not used), and '16/9' which is used on the SCART status line.
U1 is a power on reset generator, this resets the micro, and the micro has an output RSTOUT which provides the signal RESET. This goes to many devices on this board and the AV board and progressive scan board.
U2 is a serial EEPROM, providing non-volatile storage of setup data. All the parameters from the setup menu are stored here, as well as bookmarks and the region code. The resistor packs RP1-3, are important pullup/pulldown resistors which configure the mode of the micro on power up.
The resistors R2 and R12-15 are provided so we may configure the board for different devices. All must be fitted except R12 and R15 for normal configuration.

Sheet 3 - Vaddis DVD decoder
This sheet shows the Vaddis DVD decoder IC, U8, and its associated components.
Going back to the block diagram, various bus interfaces were mentioned. These can be seen on the schematic as follows:

The AV interface
This is used for carrying audio/video data from the ATAPI bridge to the Vaddis. The following lines are used.

DVDDAT[0:7]	8 bit parallel data
DVDSTRB	Strobe signal
DVDSOS	Start of sector indicator
DVDVALID	Valid data indicator
DVDREQ	Request signal (Vaddis output)

DVDERR is not actually used in the ATAPI configuration we are using.

The HOST bus interface
The CPU uses this to control the Vaddis, it carries information both to and from the micro.

HD[0..7] The lower 8 bits of the system data bus
HA[1..4] Lower 4 bits of system address bus

HWR-	Write strobe
HRD-	Read strobe
MPGCS-	Chip select
MPEGIRQ-	Interrupt line generated by Vaddis

Digital Video bus

The 8 bit bus YUV[0:7], with CLK27 provides the BT-656 type parallel digital video bus. The 27MHz clock is provided on 2 different lines. CLK27 is used for the video DAC (and also goes to the ATAPI chip). CLK27PS is used for the progressive scan board.

Digital Audio

The audio output of the Vaddis is given out on the following signals

SPDIF-I34	IEC 958 SPDIF output
ASDAT0	Serial data for Left and right
ASDAT1	Serial data for Lsurround,
ASDAT2	Serial data for Centre, sub
ALRCLK	Wordclock
ABCLK	Bit clock

Audio/Video clocks

Special note should be made of the audio and video clocks in the system, there are separate asynchronous clocks used for video and audio. The video runs on the system 27MHz clock, which is generated by the Vaddis in conjunction with the crystal Y2.

The audio clock is generated on the AV board and this is totally asynchronous with respect to the 27MHz clock.

This is slightly unusual, since most DVD players derive the audio clock from the video clock via a phase locked loop

The Vaddis has a PLL which generates the audio clock, but we don't use it because it has horrendous jitter. Instead, we bypass the Vaddis PLL and configure AMCLK as an input. Our clock source is on the AV board and this is a very low jitter oscillator.

The Vaddis maintains AV sync by dropping or repeating 1 frame of video to re-synchronise the streams when they start to get out of sync. In practice this happens very rarely because the 2 clocks are very accurate so the difference in frequency will be very small. It is important to note that without the audio clock present, no audio or video material can be played.

CD-DSP interface

(CDERR, CDFRM, CDDAT, CDCLK.)

The Vaddis chip has a CD-DSP interface designed to connect to DVD drives with this type of interface for CDs. These signals are tracked on the board but they are **not used**. The data path for CDs is exactly the same as for DVDs.

Reset and standby signals

The signal MPGRST- is an active low signal that the micro uses to reset the Vaddis and ATAPI bridge chip.

The signal MPGSTBY- is an active low signal that the micro uses to put the Vaddis in a low power mode while the player is in standby.

SDRAM

The Vaddis requires some memory for video and audio decoding and processing. This is provided by a 16MBit synchronous DRAM (512K x 16 bit x 2 banks).

The board is arranged to allow 2 SDRAMs, but at present we only use one. U11 is fitted while U10 is not fitted. The Vaddis interfaces directly to the SDRAM with no other device being involved.

PSU Synchronisation

An interesting feature of the Arcam DVD player is that the switch mode supply on the PSU is synchronised to the audio sampling frequency. This is done to reduce the switch mode noise on the audio output. The PSU will free run on its own, when tested, but when connected to the DSP board it will lock to the audio word clock. The signal ALRCLK is buffered by U14 to provide the signal LRCK_PSU which goes to the PSU.

Sheet 4 - Video DAC

This sheet shows the video encoder/DAC and output buffers.

U9 is an Analog Devices ADV7172, which does PAL/NTSC encoding and has 6 DACs providing all our video outputs.

It takes its input from the BT-656 video bus YUV[0..7], this bus is clocked by CLK27 (27MHz). No H/V sync signals are required since the H and V synchronisation is done with embedded sync patterns in the data.

The chip has its operating parameters loaded by the system CPU via the I2C bus.

There are 6 analogue outputs from U9. These are composite PAL/NTSC, S-Video, and 3 lines that are configurable (via setup menu) to be YUV or RGB. The DACs have current outputs, so R16-21 have been chosen to give the required output level voltage, in conjunction with R22/24 and R23/25 which program the DAC current outputs.

All channels are buffered by op-amps U13,16,17. These have a gain of +2, and drive out to the AV board through a source impedance of 75R. The AV board has filtering and another buffer stage.

There are 2 control signals that also go to the AV board video section.

ENABLE_AV	Used for SCART status signal. High when player is not in standby
16/9	Used for SCART status signal. High when 16:9 TV type has been selected in setup menu.

Digital Video output

Connector CN4 provides a digital video output. This is used in the DV27 only, for connection to the progressive scan board.

YUV[0..7] are present on this connector along with clock CLK27PS.

The system reset signal RESET- is provided, and the I2C bus for control of devices on the progressive scan board.

The signal IRIRQ is connected to pick up the output of the remote bus circuit which is on the progressive scan board. This is an open collector signal which can be driven from either the front panel or the remote bus input.

Sheet 5 - ATAPI Bridge and interface

U18 is a Zoran ZR36701 ATAPI to AV port bridge.

It interfaces with the system CPU via the SSC bus, made up of the following signals:

SSC_SCLK	Clock (input to ZR36701)
SSC_MTSR	Data input (CPU to ZR36701)
SSC_MRST	Data output (ZR36701 to CPU)
SSC_ATN-	Port ready signal (output from ZR36701)
DRV_IRQ-	Interrupt request generated by ZR36701

The chip also receives MPGRST- to reset it from the CPU. The system video clock CLK27 is connected to generate timing signals.

The chip has an interface with the Vaddis referred to as the AV interface. See the section on the Vaddis for a description.

The ZR36701 acts as a bridge between the SSC and AV interfaces on one side, and the ATAPI drive on the other. The ATAPI interface of the chip connects to the DVD drive via 40 way IDC connector CN10.

Signal descriptions:

ATCRESET-Active low reset generated by ZR36701 to ATAPI drive
DD[0..15] Bidirectional data bus
DA[0..2] Address lines - output from ZR36701
CS0-,CS1- Chip selects - output from ZR36701 – make up part of ATAPI address
INTRQ Interrupt request from drive to ZR36701
DIOW- Write strobe - output from ZR36701
DIOR- Read strobe - output from ZR36701
IORDY Device ready signal from drive

Board Specifications

Power Supply:

+5V +/- 5% at 280mA nominal

3.3V +/-5% at 400mA nominal.

Video output levels:

Composite: 700mV nominal (in PAL) black-peak white into 75R

S-Video: Y 700mV nominal (in PAL) black-peak white (in PAL) into 75R

S-Sideo: C 885mV pk-pk nominal (in PAL) into 75R

Component Y: 700mV nominal (in PAL) black to peak white into 75R.

Component U: 700mV pk-pk nominal for 100% colour bars, into 75R.

Component V: 700mV pk-pk nominal for 100% colour bars, into 75R.

L877 Circuit

The PSU consists of 4 function blocks.

These are :

1. Mains to DC block
2. -19V5 supply.
3. PSU Sync Cicuit.
4. Switch Mode PSU .

The Mains to DC Block.

The mains to DC Block provides an unregulated Isolated DC Voltage from the mains supply.
The Mains Transformer TX1 (which is now toroidal - for reduced induced hum) has dual 115V primaries which are connected in series for 230V operation and in parallel for 115 V operation by the rear panel operated slide switch SW2. F1 and F2 provide fusing for each primary winding and the switching is arranged to obviate the requirement for different fuses for 115V and 230V operation. For a given output power the current requirements for 115V operation are twice that for 230V operation. This requirements is met by having the fuses in parallel for 115V operation and having only F2 in circuit for 230V operation.

The VDRs (Voltage Dependent Resistors) VDR1 and VDR2 ensure that the fuses will blow in the event of the rear panel switch being set for 115V and 230V being applied. It is likely that the VDRs will fail short in such circumstances and will then also require replacement.

C1 and C2 are Y capacitors which form an EMC suppression network to common mode signals with common mode choke L1. Connector SK6 provides connection for the analogue windings to the AV PCB. SK7 optionally allows a further transformer to be added to provide the analogue supply in a more expensive model. In such a model SK6 will then not be used and the additional transformer secondary will be plugged directly into the AV PCB.

The mains transformer TX1 is specified to provide 25V DC at 195V Input and maximum load across C3 and give +/- 14.5V DC with 200mA on each rail when rectified on The AV PCB.

The main DC supply (-38V_UR) is formed by DBR1 and C3. L2 and C4 provide EMC suppression to prevent the current pulses drawn by the switching supply from generating EMC interference via the mains lead (Conducted emissions).

Note that the main DC supply -38V is a negative supply. This allows the -19V5 supply for the display to be generated from it and allows the switching PSU to have a beneficial topology.

The mains transformer is designed to blow input fuses F1 and F2 in the event of a short across the main output and the analogue supply to the AV_PCB is fused on the AV_PCB.

The -19V5 supply

This is simply formed by and emitter follower TR1 and zener diode DZ1. R1 provides a couple of milliamps through DZ1. DZ1 then forms a 20V reference voltage which biases TR1 base thereby fixing TR1 emitter 0.6V above it to provide around -19.4V. C8 provides some noise filtering.

PSU Sync Circuit.

The PSU is required to be synchronised to a 32KHz, 44KHz, 48KHz and 96KHz clocks.
The sync cct provides a divide by 2cct for the 96KHz signal. The supply is then fed with a 32KHz, 44KHz and 48KHz clock.

The sync cct is formed around the non-retriggerable monostable IC1. IC1A is set to have a time constant of which slightly exceeds the period of the fastest allowable clock (48KHz)
and thus if a slower clock is applied the output appearing on Q is simply the input pulse train. A faster pulse train has every other leading edge inhibited since the non-retrigger time exceeds the period. Thus the divide by two occurs. The second non-retriggerable produces a pulse of near fixed duration. The width of the pulse was set to move the falling edge of the sync pulse away from the falling edge of the gate drive signal in the Switching PSU. In this way the noise glitches associated with the falling edge of the sync pulse do not cause mistriggering of the PWM in the switching PSU. The Q output (pin 5) of IC1 is a square wave signal. This is coupled and level shifted by differentiating network C12 and R4 to the -38V rail. The time constant C12, R4 is chosen so that only the rising and falling edges of the output of IC1 appears across R4 as positive and negative going spikes. The positive going spike is added to the oscillator ramp by D3.

Switch Mode PSU.

The PSU is formed around IC2 and TX2. The topology is uncommon but it is basically a flyback supply with the added complication that the primary of the transformer is made to provide the +12V supply during the off time of the mosfet. In this way the efficiency of the supply is extremely high since all of the energy stored in the transformer leakage inductance which is normally clamped and dissipated is dumped into the 12V supply and used to power the DVD. Hence the strange arrangement of the -38V rail etc.

Control chip IC2 provides gate drive to M1. This power mosfet connects the primary of TX1 across the -38V supply. Note that the primary is shown on the circuit diagram as two windings connected in series. The series arrangement is to minimise leakage inductance and to do this one of the windings is wound on the TX first, then the secondaries are wound on and then the other primary is then wound on last. This arrangement of windings where the secondaries are sandwiched between two half primaries significantly reduces the undesirable leakage inductance.
The primary can thus be considered to be a single winding which starts on pin 6 and ends on pin 3.

When this winding is applied across the supply the current ramps up at a rate given by Vpri/Lpri amps per second. Because of the polarity of the transformer windings all of the secondary side diodes D5, D6, D7 and the +12V diode D4 will be reverse biased. At some point the control cct will decide to turn off the mosfet. When an inductor (in this case the primary of TX1) has been charged up. (I.e. the current has ramped up to some value or other and the flux density has increased) then when the flow of current is interrupted by the mosfet the voltage across the winding reverses so as to allow the flux to return to decay.

When the voltage across the primary winding reverses the diodes to the outputs are all forward biased and the current which was stored in the primary ramps down into the output capacitors through the coupled secondary windings.

At this point the drain of the power mosfet M1 which had previously been near -38V will fly back above the DGND 0V net. The transformer is designed so that when the 5V and 3V3 outputs are at their nominal voltage then the mosfet drain and primary will fly around 13V above DGND and so produce around 12V after the forward drop of D4 across C21. At the end of the switching cycle this behaviour is repeated.

The apparently complicated arrangements of the secondaries for the +3V3 and +5V windings is due to the fact that the +3V3 output is derived from a tap on the 5V winding. The 3V3 winding thus has both of the +5V and +3vV3 output current flowing in it. For this reason it needs to be rated for a much higher current. The +3V3 winding part is thus composed of two winding in parallel as shown in the schematic symbol. The winding which produces the 4V3 output is a floating winding. Whereas the +3V3, +5V and +12V are all develop with respect to DGND.

The switching frequency is dictated by an RC network R9, C14, R10. These components combine with an internal oscillator circuit which function as follows. The voltage reference VREF produces a steady 5V reference. C14 charges through R9 (neglecting the presence of R10 temporarily). When the voltage on the RC pin (pin4) exceeds a threshold then a mosfet internal to IC2 shorts C14 and the cycle is repeated. In this way a ramp waveform appears on the RC pin at the switching frequency of the PSU. When the Voltage on C10 exceeds the RC threshold the cap is discharged and the cycle begins and the PSU switching mosfet is turned ON. The function of R10 is to allow an externally applied spike to be superimposed on the RC pin voltage. The external spike is generated by the sync cct. By adding a spike of a few hundred millivolt amplitude to the RC ramp the circuit can be forced to begin a new cycle at the instant of the spike since this pushes the RC ramp voltage above the required threshold.
If the spike is added at a fixed frequency the PSU will be effectively synchronised to this externally applied clock - as required.

The oscillator is set to free run at a frequency below the minimum sync frequency. In this system the free running frequency is set to around 25KHz. The minimum sync frequency being 32KHz and maximum frequency is 48KHz. Component tolerances will give a spread of free running frequency but the upper limit with all tolerances stacked worst case will be less than 32KHz.

As described the RC ramp switches the power mosfet ON at the beginning of each switch cycle. The mechanism which switches it OFF again near the middle of the cycle - and thus sets the switching mosfet pulse width will now be described.

The about voltage is controlled by varying the pulse width. In this design both the +3V3 and +5V supplies are monitored. This is because in a multiple output switch mode supply only the controlled output is accurately maintained at the correct voltage (with a tolerance of around 1%). The uncontrolled outputs may vary by around +8% max over full line and load variation.

In this design both the +3V3 and +5V outputs are required to have good regulation (<5%) so the feedback is arranged so that rather than having say +5V at 1% and +3V3 at say 8% we actually end up with +3V3 and +5V at around 3% tolerance. In fact the control loops is actually monitoring the average voltage on +3V3 and +5V and regulating this.

The voltage of both supplies is monitored by transistor TR2. The collector current of which is equal to the emitter current as set by R5, R6 (neglecting base current). The emitter resistors are scaled so that each monitored output contributes 50% of the emitter current to TR2.

In IC2 an internal error amplifier has its positive input tied to a 2V5 reference. The negative input of this error amplifier is connected across series network R7, R22 which monitors the collector current of TR2. The error amplifier changes the pulse width of the PSU by swinging its output. In the general style of feedback systems the error amplifier swings its output to make the voltage difference between its inputs = zero. I.e. the voltage on the VFB (pin 2) of IC2 is maintained at 2.5V which in turn sets the current through R22+R7 which in turn sets the output voltages on +3V3 and +5V.

Internal to IC2 the output of the voltage error amplifier is actually compared with the output of another amplifier which looks across primary current sense resistor R14. The voltage across R14 is filtered by network R13, C18 to remove the narrow leading edge spike caused by the leakage inductance of TX2. When the voltage at the output of the current sense amplifier exceeds the voltage at the output of the voltage error amplifier then the power mosfet is switched off. This will be around 1/3 duty cycle for an input voltage of 36V on C4.

This mode of operation is called current mode control and has a number of advantages over the more obvious PWM method of comparing the output of the voltage error amplifier with a ramp waveform and switching the mosfet off when the ramp voltage exceeds the voltage on the E/A output - i.e. a conventional PWM approach. The current feedback method has instantaneous response to input voltage variation since lower input voltage will automatically force the ramp waveform on R14 (from Vin across Lpri of TX2) to be more shallow which will instantly force a longer mosfet On-time. By contrast the conventional PWM method would require an error in the output voltage to occur before the mosfet ON-time could be increased.

In addition we get pulse by pulse current limiting for free since the chip contains a simple cct which turns the mosfet off if the current sense input voltage exceeds 1V irrespective of what the error amplifier is doing. Thus a short circuit on the output of the supply will cause the supply to power limit and the output voltages of all of the supplies to fall which should prevent catastrophic failure.

The mosfet is driven from the output of the IC through a 22R resistor. This resistor value is chosen to be compromise between small value for rapid turn ON and turn -OFF of M1 and high value for soft turn ON and low EMC.

IC2 is powered through the network R11, DZ2, C16, C17. This network provides a 10V supply for the controller with values calculated to maintain regulation at minimum input line voltage (=195Vac when set to 230Vac). The IC draws approximately 20mA in normal operation.

Network R8, C15 are feedback loop compensation components. The connection is actually between the internal E/A output node and the negative input of the E/A. C13 provides decoupling for the voltage reference.

The thee main outputs (+3V3, +5V, +12V) have small value inductors inserted in series with the outputs (L3, L4, L5). These provide excellent attenuation of switching voltage spikes (in combination with the following capacitors) in an attempt to keeps the noise on the supplies as low as possible. Similarly the series networks R15, C19 = 1K +1nF; R17, C25; R18, C30; R19, C36 are snubbing networks which are also used to limit switching noise spikes.

The 4V3 output is semi-regulated by the simple emitter follower / zener network TR3, DZ3.
This arrangement reduces the output voltage variation to well within the required range. Fuse F5 is for current limiting because the wire on the 4V3 supply is only rated for low currents and a short cct on this output would cause high current to flow in the winding which would otherwise overheat the transformer.

Output Voltage Specification

The specification for the PSU over full range of input voltages / load currents.

Supply	tolerance	Min V	Nom V	Max V
	%	V	V	V
3V3	5	3.135	3.3	3.465
5V	5	4.75	5	5.25
12V	10	10.8	12	13.2
4V3	5	4.085	4.3	4.515
19V5	5	18.525	19.5	20.475

Voltage across C3

	Nominal	Tol	min	nom	max
	V	%	V	V	V
V (C3)	27.5	5	26.13	27.50	28.88

Free running frequency

	Nominal	Tol %	Min	Nom	Max
	KHz		KHz	KHz	KHz
Frequency	27	10	24.30	27.00	29.70

L878 AV Circuit

Summary
This board is used in the DV27 and DV88 DVD players. It takes the outputs of the DSP board and produces all the video and audio outputs of the system (the exception being the progressive scan output on the DV27, which is on a separate card).
The board features 2 mono DACs for stereo analogue audio, an audio clock oscillator, data re-clocking, and video buffers. There is also a power supply circuit for the audio section and separate regulators for sensitive clock supplies.
A key feature of the design is that it is 'DVD-Audio ready'. The DACs and audio clock are capable of supporting various sample rates up to 192kHz, and there are expansion connectors present to allow an additional audio DAC board to be fitted. This will handle the extra 4 channels of surround audio (This is a requirement for DVD-Audio since no digital interface is allowed to connect to external processors).
The DV27 and DV88 DVD-Video players can therefore be migrated in the future to support DVD-Audio. This will be done by replacing the existing DSP board for one that supports DVD-audio, and adding a 2nd DAC board.

Overview
The audio power supply circuit takes an AC feed from the main PSU and provides DC power rails for the DACs and output buffer stage.
The clock circuit provides a selectable clock frequency that can be 4 different frequencies. There is a clock distribution circuit in here that feeds clocks to the DACs, to the re-clocking circuit, the DSP board (for synchronisation), and to an additional DAC board (not fitted at present).
The re-clocking circuit accepts an I2S format audio signals from the DSP board and an SPDIF signal. These are re-latched to the local clock to reduce jitter. The re-clocked I2S is passed on to the DACs, and the re-clocked SPDIF goes on to the coaxial output buffer and optical output.
The DAC circuit provides a stereo analogue audio output on phonos, this is also connected to the SCART AV output. The DACs are operated under software control, this is by an SPI bus from the DSP board.
On the video side, 6 channels of analogue video are received from the DSP board. These are filtered and buffered before going to the outside world. The video signals consist of composite, S-video and 3 lines that are switchable YUV/RGB. These 3 lines go to phono connectors (for YUV) and the SCART (for RGB). The player setup menu has to be set appropriately for one or the other.
The SCART output also has some status signals to control TVs, these are generated from control lines from the DSP board.

Circuit Description
Refer to L878 circuit diagrams

Sheet 1 - Top level
This sheet is the top level of the schematic showing how the other sheets fit together, and some of the interfaces on the board.

SK1 is the audio interface with the DSP board.
Signal descriptions:

CK256FS_DSP	Audio master clock to DSP board
XMUTE	Mute signal from DSP board
ADIN	I2S audio data for L, R
AD2IN	I2S audio data for LS, RS (used on 2nd DAC board)
AD3IN	I2S audio data for C, SUB (used on 2nd DAC board)
BCK_IN	I2S audio bit clock
LRCK_IN	I2S audio word clock
SPDIF_IN	SPDIF audio from DSP board
FSEL1..0	Control lines to select 1 of 4 frequencies of audio master clock
NRESET	Power on reset signal from DSP board, active low.
MD	SPI data to configure audio DACs
MC	SPI clock to configure audio DACs
ML_8716_L	SPI load signal to configure left DAC
ML_8716_R	SPI load signal to configure right DAC
ML_8716_X	SPI load signal to configure surround DACs (on 2nd DAC board)
GAIN	HDCD gain scaling signal, high for HDCD x2 gain

SK3 connects to the 2nd DAC board when this is fitted. The 2nd DAC board can then pick up the signals it needs.

SK11 is also an expansion connector for this 2nd DAC board. This connector is for some of the power supplies it will need.

Sheet 2 - Analogue power
This sheet shows the analogue audio power supply, and also the regulators that are used for sensitive digital supplies and the muting circuit.

AC power comes in on SK4. In the DV88 player this comes from a winding on the transformer on the PSU board. On the DV27, it will come from a separate torroidal transformer (as in the FMJ CD23).
D2,3,4 and 10, with capacitors C1, C3 form a bridge rectifier to generate unregulated DC supplies +UR and -UR. These are the regulated down to +12V and -12V by Z1 and Z4 respectively. The resulting rails +12VA and -12VA are used by the output buffer stage.
The +12V rail is used to supply the DAC supply regulators Z2 and Z3. These provide separate supplies for the 2 mono DACs, +5V_DAC_L and +5V_DAC_R.

SK5 is where all the power arrives for digital circuitry and video. +12V is used by the muting relay and the SCART status circuit, and also feeds 2 x 5V regulators, Z9 and Z5. Z9 produces +5V_CLOCK1 which is used by the clock oscillator. Z5 produces +5V_CLOCK2 which is used by the clock divider and buffer.
+5V also comes in on SK5, this is used by other digital circuitry, and is used to derive +5V_VID via inductor L1. +5V_VID powers the video section.

Z6 is a Toshiba TA317P muting chip, as used in other products. This controls the muting relay RLY2. Z6 will mute the output in several ways. Firstly, it arranges to mute for about 2.5 seconds after power is applied. Secondly, it mutes immediately if the mains is disconnected. This is initiated by the AC sense signal from D5. Finally, it can also mute when the signal XMUTE is taken high. This is controlled by the system CPU so the software can mute if required.

Sheet 3 - Re-clocking
This sheet shows the re-clocking latches Z7, Z8 and Z28. These are clocked by CK256FS_RCK, and simply re-latch the digital signals from the DSP board. The SPDIF signal has been given its own latch chip rather than share with another to avoid any interference from the SPDIF on to the I2S lines.
The re-clocked I2S signals are split so that each DAC has its own set of signals.

Sheet 4 - Clocks
This sheet shows the audio master clock circuit. 2 colpits oscillators are provided with crystal frequencies of 24.576MHz and 22.5792MHz. Only one of these is enabled at any time, this is determined by the state of control line FSEL0. If FSEL0 is low the 22.5792MHz oscillator will be on, if it is high the 24.576MHz oscillator will be on.
The oscillator output may then be divided by 2 by Z10A. Control line FSEL1 is used to select the divided or non-divided version by controlling the output enable of Z14C and Z14D. When selecting the non-divided version, we clear Z10A for good measure to avoid noise.

Thus, 4 different clock frequencies can be selected by FSEL1..0

FSEL1..0	Frequency	Relationship to Fs	Typical use
0	11.2896	44.1K x 256	CD audio
1	12.288	48K x 256	DVD-Video, VCD
2	22.5792	88.2 x 256 (or 176.4 x 128)	DVD-Audio
3	24.576	96K x 256 (or 192 x 128)	DVD-Audio

The resulting signal is buffered before distribution by Z21 and Z14A. There are 5 clock signals distributed:

CK256FS_RCK	For re-clocking circuit
CK256FS_DAC_L	For left DAC
CK256FS_DAC_R	For right DAC
CK256FS_DSP	For DSP board
CK256FS_EXT	For 2nd DAC board (for surround channels of DVD-Audio)

Sheet 5 - Audio DACs
This sheet shows the audio DACs and output buffer stage. Z17 and Z18 are Wolfson WM8716 audio DACs. These are stereo parts that can be operated in a mono mode. They are configured via software so that Z17 provides the left channel and Z18 provides the right channel.
The DACs are configured individually by having separate load signals on the SPI bus. This is required because one DAC has to be told to be the left DAC, and one has to be the right. The additional DACs on the 2nd DAC board also have their own load signal as they will be used in stereo mode.
The DAC outputs are differential. These outputs are filtered by the 2nd order butterworth filters with differential inputs. Z19A and its associated components filter the left channel, and Z20A and associated components filter the right channel.
Following the filters are amplifiers with switchable gain. Z19B amplifies the left channel and Z20B amplifies the right channel. For normal use these have a gain of -1. For HDCD they will have a gain of -2. The gain switching is accomplished by analogue switch Z11 which switches in additional resistors. The signal GAIN controls the switch.

It is high for HDCD x2 gain. The stereo analogue output goes out as 2 stereo pairs on SK6. It also goes off to the SCART AV output - SCART_L, SCART_R.

Sheet 6 - Video filters and buffers
On this sheet there are 6 channels of filtering and buffers for the video signals. If we consider the signal path for SVID_Y, C113, L3, C119, and C107 form an elliptical filter, and R1 provides 75R termination. Z23B is an op-amp with a gain of +2, C93/C31 provide AC coupling and R104 is the 75R source termination. This same circuit is duplicated for all the other channels. The CVBS output has 2 source terminators, so that the SCART and composite outputs can both be used simultaneously.

Sheet 7 - Video outputs and SPDIF outputs
This sheet shows all the video output connectors, the SCART status circuit and the SPDIF output.
S-Video goes out on SK8, Composite and YUV component go out on SK7, and the SCART output is on SK9.
The SCART status circuit is a piece of analogue circuitry that takes 2 control lines from the DSP board, and generates 2 status signals for the SCART output.
ENABLE_AV is a control line from the DSP board that is high (3V) whenever the player is not in standby.
16/9 is another control line from the DSP board. This is set high (5V) to indicate 16:9 anamorphic material. At present this is implemented by setting it high when 16:9 TV type is selected in the setup menu.
The output 0/6/12 is designed so that it is 0V when the player is in standby, or 6V when playing 16:9 material, or 12V when playing 4:3 material.
The output AV_CTL is simply ENABLE_AV after an emitter follower.
The spec for these outputs is as follows, typical measurements are given vs the spec:

ENABLE_AV	16:9	0/6/12	(spec)	AV_CTL	(spec)
0	0	0V	0-2V	0V	0-0.4V
1	0	0V			
0	1	6.3V	2-9.5V	2.8V	1-3V
1	1	10.6V	9.5-12V	2.8V	1-3V

The SPDIF output is shown at the bottom of the page. Z26 is used to buffer the signal and 3 gates are used an parallel in order to provide sufficient drive. The resistor values of R7,8,11 and R71 have been chosen such that the output is attenuated to the correct level, and also to provide 75R output impedance. T1 is an isolating transformer with a turns ratio of 1:1.
Z25 is a TOSLINK optical transmitter. This is a 6Mbit./s part, so operation at 96kHz sampling rate is not guaranteed (requires 12Mb/s).

Specifications

Analogue Audio
Output level: 2.2V rms for 0dB signal +/- 0.1V
Frequency response 20Hz to 20kHz (+0.1, -0.5 dB)
THD+N <0.005% for 1kHz 0dB signal, measured 22Hz-22kHz, unweighted
S/N >90dB at 1kHz 0dB, unweighted

Digital Audio
To IEC 958.
Amplitude: 500mV +/- 20% pk-pk into 75R

Video
Composite: 700mV nominal (in PAL) black-peak white into 75R
S-Video: Y 700mV nominal (in PAL) black-peak white (in PAL) into 75R
S-Sideo: C 885mV pk-pk nominal (in PAL) into 75R
Component Y: 700mV nominal (in PAL) black to peak white into 75R.
Component U: 700mV pk-pk nominal for 100% colour bars, into 75R.
Component V: 700mV pk-pk nominal for 100% colour bars, into 75R.

L886 Display Circuit

Summary
This board is used in the DV88 DVD player. It contains the front panel VFD display, buttons, LEDs and remote IR receiver. The board for the FMJ player (DV27) will be electrically the same, but with a different PCB layout, since the 2 players are mechanically different in this area.

Circuit description
Z1 is a Rohm BU2872AK VFD driver IC. It has 4 wire serial interface with the system CPU, comprising the following signals:

SO	Data out (from Rohm chip to CPU)
SI	Data in (from CPU to Rohm chip)
CS	Chip select (driven by CPU)
SCK	Serial clock (driven by CPU)

All the interaction with the system CPU is via this bus, with the exception of the remote IR data, which has its own interface.

The Rohm chip drives the VFD display via SEG1..15 and G1..7. It also has some other functions.
LEDs: The chip has 4 outputs to drive LEDs L1..4. These are used to drive the 2 front panel LEDs, HDCD and On/standby, the latter is a bi-colour LED that is green to indicate on, red to indicate standby. L2 and L3 are used to control the VKK switching circuit.

Button scanning: The rohm chip also scans the front panel buttons. The buttons form a matrix which is scanned by the segment driver lines S3..6. The resulting matrix is read on inputs K2,3,4 on the chip.

Filament supply bias: The filament voltage F1/F2, is supplied as a floating 4V3 DC supply. This is biased to the correct level by zener diode D5, so that F1 is 5V6 above grid voltage VKK. VKK is nominally -19.5V, therefor F1 is normally -13V9, and F2 is normally -9V6.

VKK switching circuit: The Rohm chip has an unfortunate fault in that it does not initialise its display RAM on power up. This results in random patterns being displayed momentarily on power up. To fix this, it was necessary to include the VKK switching circuit comprising Z2, Q5, Q6 and associated components. D type latch Z2A is arranged so as to always power up in a cleared state, by the inclusion of R13/C7 which clear it on power up. The D and CLK inputs of the latch are controlled by the L3 and L4 outputs of the Rohm chip, this allows the system software to set or clear the latch as required. The latch output controls transistor Q6 which switches the VKK supply voltage to the rohm chip. By inhibiting this supply until it is required, we ensure the display always powers up blank, and we switch it on only when we have initialised it correctly, avoiding the random characters.

Remote IR receiver: RX1 is an IR receiver module. The output of this is converted to an open collector type signal by Q3/Q4. This is required because the DV27 FMJ player will feature a remote bus input, which will simply be wire-OR'd with this to provide remote control from the remote bus.

2 3 4 2 5

Frequently Asked Questions

about your ARCAM DVD player…

SH8827FAQ, Issue 1

Introduction

The ARCAM customer services team is available to help you should you experience problems with your DVD player. There are a number of questions, however, that are asked very frequently. To save you the bother of having to call us or your dealer in these instances, we have compiled this list to help you out.
Please note that this list is in addition to the "Troubleshooting" guide be found in the back of the handbook.

Obtaining the player software version and region numbers

Before contacting ARCAM customer services with a question, it is useful to have the software version and player region numbers available. This information is displayed in the top-left corner of the screen when the player is first switched on (or brought out of stand-by). The information is shown for approximately two seconds; the top number is the software version, the lower number is the ARCAM shipping region that the player is set to (not to be confused with DVD region).

Problems with remote controls

Problem	*Possible cause*	*Solution*
The supplied remote control is not working.	The remote control is configured to control a CD player, not the DV88/27.	Press the "DVD/CD" button on the top left corner of the remote control until the "DVD" light is illuminated. (Note that the light will switch off again after a few seconds, but the remote control will remain in the selected mode.)
	The batteries are not installed correctly, or are flat.	Check battery compartment and reinstall batteries if necessary.
The player does not respond to an ARCAM learning remote control.	The remote control has not been programmed correctly.	Reprogram the remote control. If this fails, contact ARCAM customer services for further assistance.
The player does not respond to a non-ARCAM learning remote control.	The remote control has not been programmed to control your ARCAM DVD player.	Reprogram the remote control. If programming from the supplied (ARCAM) remote control, ensure that the ARCAM remote control is configured to DVD and not to CD (see above).
	The remote control does not support "RC5" commands correctly.	This is a fault with the learning remote control. However, contact your dealer or ARCAM customer services to receive a free software upgrade for your DVD player that fixes this problem.
I need discrete on/off codes (or a complete code list) for use with my learning remote.	The system code for the DVD player is 25. The on/off codes are: On = 123 (hex. 0x7b) Off = 124 (hex. 0x7c) A complete list of codes can be found on our website at www.arcam.co.uk	

Problems with video output

Problem	*Possible cause*	*Solution*
Picture is "jerky" when playing region 1 discs.	This occurs when NTSC discs (such as those from the USA) are played in a machine where the output is set to "PAL" (such as those sold in Europe).	Enter the "Setup" menu and change the "TV system" setting to "Auto" (see your user guide).
No progressive video output (DV27/DV88P).	A PAL disc (such as those sold in Europe) is being played.	The player cannot output progressive video from a PAL source. To enjoy progressive video output, NTSC source discs must be played.
No progressive video output (DV88).	There is no progressive video board fitted to your machine.	Contact ARCAM customer services for details on upgrading your player.
"Flashing green bars" down both sides of the screen with some films.	This has been noticed in earlier versions of the software (version 1.6 or earlier).	Contact your dealer or ARCAM customer services to receive a free software upgrade for your DVD player that fixes this problem.
The picture freezes for a moment approximately half way through a film.	This is caused by the player changing layers on a two-layer disc.	There is no fault.

Problem	***Possible cause***	***Solution***
The picture freezes for a moment at random points in a film.	Some versions of the software controlling the disc drive are reported to cause this problem.	Contact your dealer or ARCAM customer services to receive a free software upgrade for your DVD player that fixes this problem.
Can the composite / Svideo outputs be used at the same time as the progressive output?	It is possible to use the interlaced outputs at the same time as the progressive output (providing a progressive scan board is fitted to the player). The most important restriction is that the interlaced component and the SCART outputs cannot be used at the same time.	
The “Zoom” feature does not work.	The “Zoom” feature does not work with all discs.	There is no fault.
“Black bars” are shown at the top and bottom of the screen.	This can occur when a “Wide screen” film is viewed on a 4:3 format television. Even with a 16:9 format television, “black bars” may still be visible. This is because the DVD being viewed, although “Wide screen”, is not in 16:9 format. Many films are in 1:2.35 format, which will not fill completely a 16:9 screen.	
The “Pluge” test cannot be performed.	Prior to version 1.75 of the player software, it was not possible to perform the “Pluge” test.	Contact your dealer or ARCAM customer services to receive a free software upgrade for your DVD player (version 1.75 or later). The “Below Black” menu item can be found at the bottom of the second page of the set-up menu. When performing the pluge test, this item should be set to “Pass Pluge”; ***at all other times***, this item should be set to “Normal” (otherwise video corruption may occur).

Problems with audio output

Problem	***Possible cause***	***Solution***
External digital decoder does not decode the first 2 seconds of audio from a CD/DVD.	Some digital decoder models do not lock quickly enough onto the digital signal output by the DVD player.	This is a fault with the digital decoder. However, contact your dealer or ARCAM customer services to receive a free software upgrade for your DVD player that will usually fix this problem (version 1.75 or later).
On the analogue outputs, the left (or right) channel is on both outputs.	The analogue outputs have been configured so that one channel is put out through both outputs.	Software version 1.75, or later: On the third page of the “Set-up” menu, change the “Analog Out” item to “Normal”.
“Pops” or “crackles” are heard through the amp-lifier when the player is first switched on.	The audio frequency selection lines in the DVD player are not being initialised correctly.	Contact your dealer or ARCAM customer services for a free software upgrade that will fix this problem (version 1.75 or later).

Problems with disc play-back and front-panel display

Problem	***Possible cause***	***Solution***
Player loads disc but will not play, or play-back halts unexpectedly.	There is a fault in the manufacturing of the disc.	Contact ARCAM customer services for a list of discs known to cause problems. Some of the problems can be solved with a free software upgrade for your player.
Some MP3 discs/files cannot be played.	There are some restrictions on the type of MP3 files that the DV88/27 can play.	The files must be recorded with a sample rate of 44.1KHz. The bit-rate must be between 64Kb/s and 192Kb/s. Variable bit-rate is not supported.
The number of tracks displayed for a CD is 1 too many.	The CD contains a data track (it is an “enhanced” CD).	The DV88/27 is designed to mute the audio output if a data track is encountered. This means that your equipment will not be damaged by playing these discs.
The player takes a long time to identify a CD.	Since this is a DVD player (primarily), it checks for discs in the following order: DVDs, SVCDs, VCDs, CDs. Therefore it takes longer to identify a CD than any other disc type.	
The front-panel display is not illuminated.	The front-panel display has been switched off.	The front panel supports 3 different levels of illumination. Press the “DISP” button on the remote control to select your preferred level.
The disc drive generates more noise when a DVD is being played.	When playing DVDs, the drive spins significantly faster than when CDs are being played. A result of this is that extra noise may be generated under certain circumstances, typically when disc menus are being displayed. Drive noise level normally drops significantly when play-back of the film itself begins.	

L817SW release notes

Software release notes for v1.76

The changes that differentiate versions 1.75 and 1.76 of the DV88/27 software:

- The DTS code has been fixed.
  Version 1.75 of the software will not play disks with a DTS sound track.

Software release notes for v1.75

The changes that differentiate versions 1.74 and 1.75 of the DV88/27 software:

- Pluge (below black) menu item.
  Until now, it has not been possible to perform a “pluge” test using the DV88/27. A "Below Black" menu item has been added (to the bottom of menu two), which has the options “Normal”, for normal viewing of material, and “Pass Pluge” for when the pluge test is being performed.
- FSEL lines now initialised.
  The FSEL lines were not being initialised quickly enough previously, which could lead to pops or crackles when the player was first switched on. This is now fixed.
- Toggle-bit in remote codes.
  The dependence on the toggle bit in our RC5 remote codes has been removed. This means that the unit should be controllable using crappy learning remotes.
- "LOAD" brings the player out of standby.
  Pressing the "LOAD" button on the front panel when the player is in standby mode brings the player out of standby and opens the draw.
- CD skip-back works at 1 second.
  It had been noted that the skip-back when a CD is being played did not work if pressed at exactly 1-second into a track. This is now fixed.
- Single channel mono now available on analogue outputs.
  Some VCDs have a different language on the left and right channels. A menu option has been added (“Analog output”, page 3) that allows the selection of the left or right channel only (as mono output). ***Note that this setting applies to the analogue output regardless of the disk type.***
- Quicker initiation of digital output.
  Previously, the AVR100/200 did not have time to synchronise with the digital output before the audio starting, meaning that the first 2-seconds of audio may have been lost. The digital output is now started 2-seconds before the audio when CDs are played.
- CR9000 support.
  The support for the CR9000 learning remote has changed.
  The “arrow” keys must be reprogrammed to emit “arrows”, not the commands shown on the keys (such as “stop”, “pause”), as previously.
- Clock output enable on progressive scan board.
  The clock output has been enabled on the progressive scan board. This may cause some boards to start working that previously did not.
- Player must be reset after the self-test has been run.
  After the self-test has been run, the player will accept no further input until it has been reset.

Software release notes for v1.74

The changes that differentiate versions 1.73 and 1.74 of the DV88/27 software:

- Fault in the player self-test corrected.
- Discrete on/off remote codes added
  For users with learning remote controls, discrete codes for on and off are available (on = 123 (0x7b), off = 124 (0x7c)).

Software release notes for v1.73

The changes that differentiate versions 1.72 and 1.73 of the DV88/27 software:

- File "atapife.c" reverted to version used in 1.4 to reduce reliability problems.
  (This fixes "The Mask of Zorro" problem.)

Software release notes for v1.72

The changes that differentiate versions 1.71 and 1.72 of the DV88/27 software:

- Block read count set to 8.
  (An attempt to reduce the number of audio/video dropouts).

DV27 machines for sale require this version of software (or later).

Software release notes for v1.71

The changes that differentiate versions 1.7 and 1.71 of the DV88/27 software:

- "LOAD" button on the front panel works when in DVD menus.
  The draw can be opened when in a DVD menu.

This version of software (or later) is acceptable for in-house DV27 machines.

Software release notes for v1.7

The changes that differentiate versions 1.6 and 1.7 of the DV88/27 software:

- Download countdown implemented and download speed improved.
- CD playback: rewind through track boundaries possible; fast forward when in repeat mode works correctly (playback restarts from the track beginning); fast forward when not in repeat mode starts playback from the beginning of the next track.
- Progressive scan code added to main version (this code issue will detect a progressive scan board and initialise it).
- "USE_TOY_STORY_FIX" flag added to Makefile. The "Toy Story" fix code can be added for customers particularly wanting that behaviour, but is not included by default.
- Front-Panel keys can now be used to navigate around DVD menus. PLAY = "OK", STOP = "DOWN", PAUSE = "UP", SKIPL/REWIND = "LEFT", SKIPR/FORWARD = "RIGHT".
- OSD Language support added, accessed through the "OSD Lang" option in menu 3. Supported languages are English, French, Spanish and German.
- Block read count set to 31.
  (An attempt to reduce the number of audio/video dropouts).

Software release notes for v1.6

The changes that differentiate versions 1.5 and 1.6 of the DV88/27 software:

- Remote control fault found in issue 1.5 fixed.
- CD rewind through track boundaries possible.

Software release notes for v1.5

The changes that differentiate versions 1.4 and 1.5 of the DV88/27 software:

- Problems playing "Toy Story" and "Fantasia" bonus disks fixed.
  This version of the software will play the “Toy Story” and “Fantasia” bonus disks without problem, but may give problems with other disks instead.

NOTE: issue 1.5 may give problems with the remote control.

Software release notes for v1.4SEp

This is a pre-release version of 1.4 on a single machine for a friend of Steve Reichert. It is functionally the same as issue 1.4. This version was not released via an ECO.

Software release notes for v1.4

The changes that differentiate versions 1.3 and 1.4 of the DV88/27 software:

- New splash screen introduced.
- Digital output when playing disks with MPEG audio encoding has been disabled. All MPEG disks output PCM, even when "bitstream" is selected.
- "Robbie Williams" out-takes sound problem fixed.
- Screen-saver does not activate during software download.
- Screen-saver starts after two minutes (previously three minutes).
- Chapter skip-back fixed.

Software release notes for v1.3SEf

This is a special edition sent to a single dealer in France in order to evaluate the French language support. This version was not released via an ECO and should not appear on any production player.

Software release notes for v1.3SEi

This is a special edition sent to a single dealer in Italy in order to evaluate the Italian language support. This version was not released via an ECO and should not appear on any production player.

Software release notes for v1.3SEp

This is a special edition sent to the DVD compliancy labs in Belgium, in order to test that the MPEG audio encoding problem released in version 1.4 is performed correctly. This version was not released via an ECO and should not appear on any production player.

Software release notes for v1.3SEs

This is a special edition sent to a single dealer in Spain in order to evaluate the Spanish language support. This version was not released via an ECO and should not appear on any production player.

Software release notes for v1.3:

The changes that differentiate versions 1.2 and 1.3 of the DV88/27 software:

- Software download fails if the disk cannot be read - previously it was assumed that the download had occurred correctly. Introduction of test for DVD8.bak.

- Flag CDDSP_VCD is defined in the makefile.
- Outline of progressive scan code added.
- Selftest display changed, with tests for progressive scan components added.
- Addition of French language support (not yet enabled for the user).
- Highlights removed from OSD text.
- "Below black" output disabled (to fix Bug's life playback problem).

NOTE: issue 1.3 may give problems with rewinding CDs through a track boundary.

Software release notes for v1.2:

The changes that differentiate versions 1.1 and 1.2 of the DV88/27 software:

- Correction of title highlight placements when running NTSC => PAL disks.
- Default subtitle setting changed from AUTO to OFF.
- Default digital output changed from STEREO PCM to BITSTREAM.

Software release notes for v1.1:

The changes that differentiate versions 1.0 and 1.1 of the DV88/27 software:

- Bookmarking is implemented so that the bookmarks are stored after the disk is removed from the player, and restored when the disk is re-introduced. Up to 100 disks can be stored, each with up to 3 bookmarks.
- The 'Play' button now causes playback to occur when the unit has been in 'step' mode.
- The aspect ratio of the material being played is detected and the SCART output line is set accordingly. (Note that this is only effective when the player has been set to 16x9 playback.)
- Implement WSS on line 23 to indicate aspect ratio 4:3, 4:3 with 16:9 letterbox, or 16:9 anamorphic.
- Correction of menu highlight placements when running NTSC => PAL disks.

ARCAM

DV88 Progressive Scan Upgrade Instructions

CAUTION
THE ENCLOSED PRINTED CIRCUIT BOARD IS STATIC SENSITIVE AND PRECAUTIONS MUST BE TAKEN TO ENSURE THAT IT IS NOT DAMAGED BY STATIC CHARGES. A PROPERLY GROUNDED WRIST STRAP IS RECOMMENDED.

THIS PROCEDURE IS ONLY TO BE CARRIED OUT BY A SUITABLY QUALIFIED TECHNICIAN. DELICATE SOLDERING IS REQUIRED.

1. Player software

The DVD player must have software version 1.74 or above in order to support progressive scan. Check the player software version which is displayed on the TV screen momentarily after power up. There are 2 numbers displayed one above the other. The software version is shown at the top. Ignore the other number. If the version is 1.74 or above then you do not need to update the software, so ignore the rest of this section. If it is below 1.74 then use the supplied software update disc to update the software. There are actually 2 discs provided - one for the player software and one for the drive firmware. Only the player software needs to be updated to support progressive scan, but you might as well update the drive firmware while you are at it.

Updating drive firmware

Follow this procedure exactly:

1. Turn the power on.
2. Wait for the ‘no disc’ message to appear on the display.
3. Press the LOAD button to open the tray.
4. Put the DVS firmware CD in the tray.
5. Press the LOAD button to close the tray. The firmware will now load from the CD into RAM. This takes about 30 seconds.
6. Wait until the tray opens. When it does, take the CD out of the tray. The flash memory will now be erased and the new firmware will be loaded from RAM into the flash ROM. This will take a further 30 seconds approximately.
7. Wait until the tray closes. This signals that the flash update is complete.
8. Switch the power off for 5 seconds and then on again to reboot the player.

Updating player software

Follow this procedure exactly:

1. Turn the power on.
2. Wait for the ‘no disc’ message to appear on the display.
3. Press the LOAD button to open the tray.
4. Put the DV88 software CD in the tray.
5. Press the LOAD button to close the tray. The player software will now load from the CD into RAM. This usually takes about 5 minutes but may take up to half an hour. You may see corruption of the TV picture during this time. This is normal.
6. Wait until the tray opens. When the tray opens, take the CD out of the tray. The flash memory will now be erased and the new software will be loaded from RAM into the flash ROM. It will take about one minute.
7. Wait until the tray closes. This signals that the flash update is complete. There is no need to reboot. The software version should be shown on the TV screen momentarily every time the player is powered up.

The DVD player will now have the required software to support the progressive scan board.

2. Fitting the progressive scan board

Note: When handling the PCB and working on the unit, ensure anti static precautions are taken.

Ensure the power lead is removed from the IEC inlet at the rear of the unit.

Remove the lid by removing the screws attaching the lid to the rear panel (T10 TORX driver required), and the 2 screws each side that attach the lid to the chassis (T15 TORX driver required). The lid slides out to the rear.

Remove 2 of the screws from the DSP board. The DSP board is the rectangular board that is fitted in the centre of the unit along side the DVD drive. The 2 screws that need to be removed are the 2 towards the rear of the unit. A T10 TORX driver will be required for this. Now fit the 2 x 30mm hex pillars in place of the 2 screws. A 5mm hex driver will be required for this. These pillars are used to support the progressive scan PCB.

Remove the vinyl blanking gasket that is stuck to the outside of the rear panel covering the holes for the progressive scan board. This blanking gasket is located above the SCART connector. If the player does not have a blanking gasket because there are no holes to cover, contact Arcam as you will need a new rear panel.

Take the smaller vinyl blanking gasket that is supplied with the upgrade kit, remove the backing and adhere it to the outside of the rear panel so that it covers the hole labelled ‘VGA’.
Fit the 3 round black plastic blanking plugs in the 3 holes in the rear panel labelled ‘C/S’, V/S’ and ‘H-SYNC’. Push them into the holes from the outside.
You should be left with 3 holes in the middle labelled ‘Pr/R’, ‘Y/G’ and ‘Pb/B’. There should also be hole labelled ‘REMOTE IN’ left uncovered.

Remove the progressive scan board from its bag and fit it into the DVD player. The 3 phono connectors will fit in the 3 holes in the rear panel labelled ‘Pr/R’, ‘Y/G’ and ‘Pb/B’. The jack socket will fit in the hole labelled ‘REMOTE IN’. The 2 mounting holes at the rear should line up with the 2 pillars you have just fitted. Do not change the settings of the 8 way switch on the board. It should be set with switch 6 on and all others off.

Attach the progressive scan board to the rear panel using the self tapping T10 TORX screws provided. The number of screws required here will depend on the version of rear panel fitted. The latest version of panel will have holes that allow 5 screws to be fitted to attach the board to the rear panel - 2 into the phono connectors and 3 into the screening can. Earlier rear panels have holes only for 2 screws which will screw into the connectors.

Attach the progressive scan board to the 2 hex pillars using the 2 x 6mm M3 T10 TORX screws.

3. Fitting the cables

The board should now be in position and the next task is to fit the cables.

Fit the 22 way flex foil between CN4 on the DSP board and SK1 on the progressive scan board. Ensure that it is fitted with the contact surfaces facing the correct way - on the progressive scan board the contact surfaces of the cable will face the rear of the unit.

Fit the 8 way cable between SK2 on the progressive scan board and SK8 on the power supply board.

Check the silk screen on the DSP board to identify the issue. If it is an issue 3 board or above, then the remaining 4 way cable is fitted between SK3 on the progressive scan board and CN11 on the DSP board. If however the board is below issue 3, then some highly delicate soldering work will be called for.

4. Soldering the 4 way cable to the DSP board (for DSP boards below issue 3 only)

Take the 4 way cable supplied in the upgrade kit and cut one of the connectors off close to the connector.
Plug the remaining connector into SK3 on the progressive scan board.
Make a careful mental note about which wire is pin 1 on the connector. Pin 1 is identified by a circle just visible on the silk screen. It is the pin closest to the 'SK3' legend on the silk screen (see diagram 1)

You will need to solder 3 of the wires to points on the DSP board. These points are located near the bottom left corner of the Zoran Vaddis III IC (the upper right corner of the chip when viewed from the front of the unit). Diagram 2 shows the vias to connect to.

Pin 1	V Sync	Connect to via shown in diagram 2
Pin 2	GND	Connect to one end of C19 (or the via near it) as shown in diagram 2
Pin 3	H Sync	Connect to via shown in diagram 2
Pin 4		Not connected.

Diagram 1 - Pin numbers on 4 way connector SK3 on progressive scan board

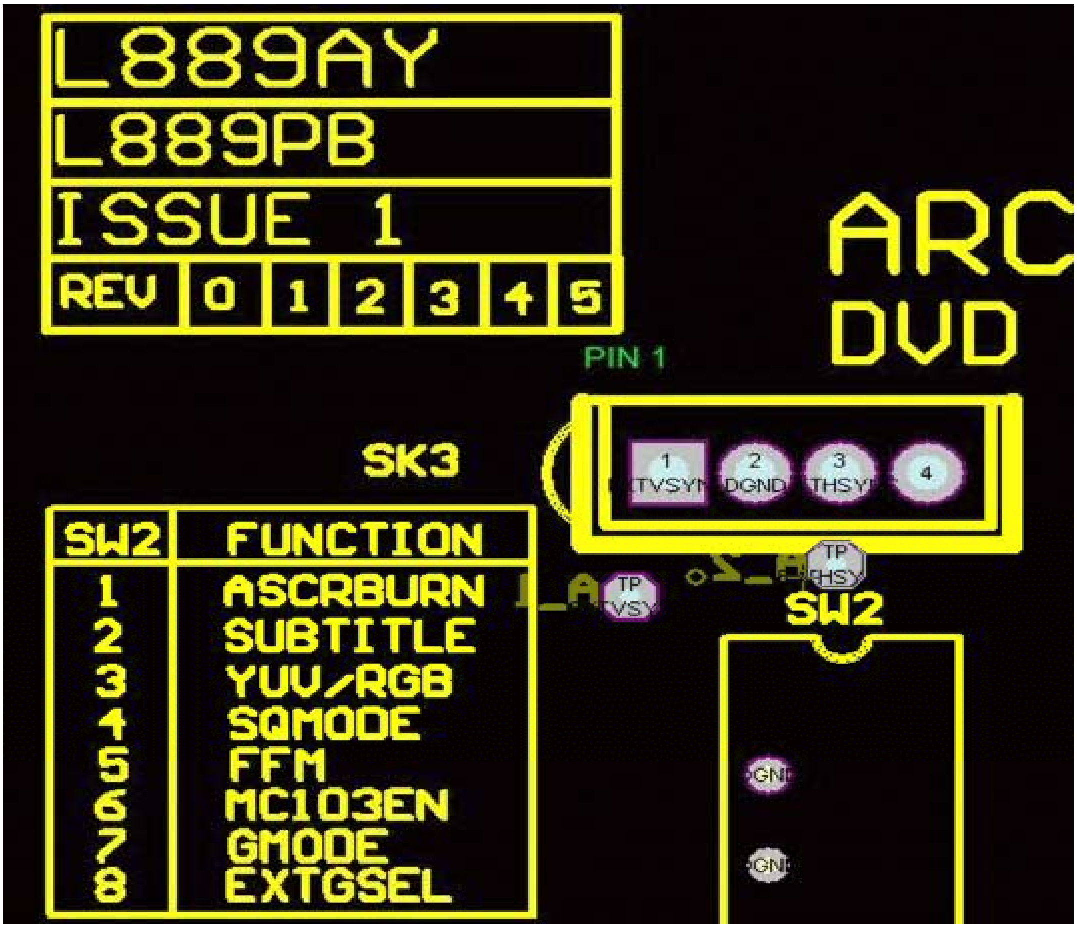
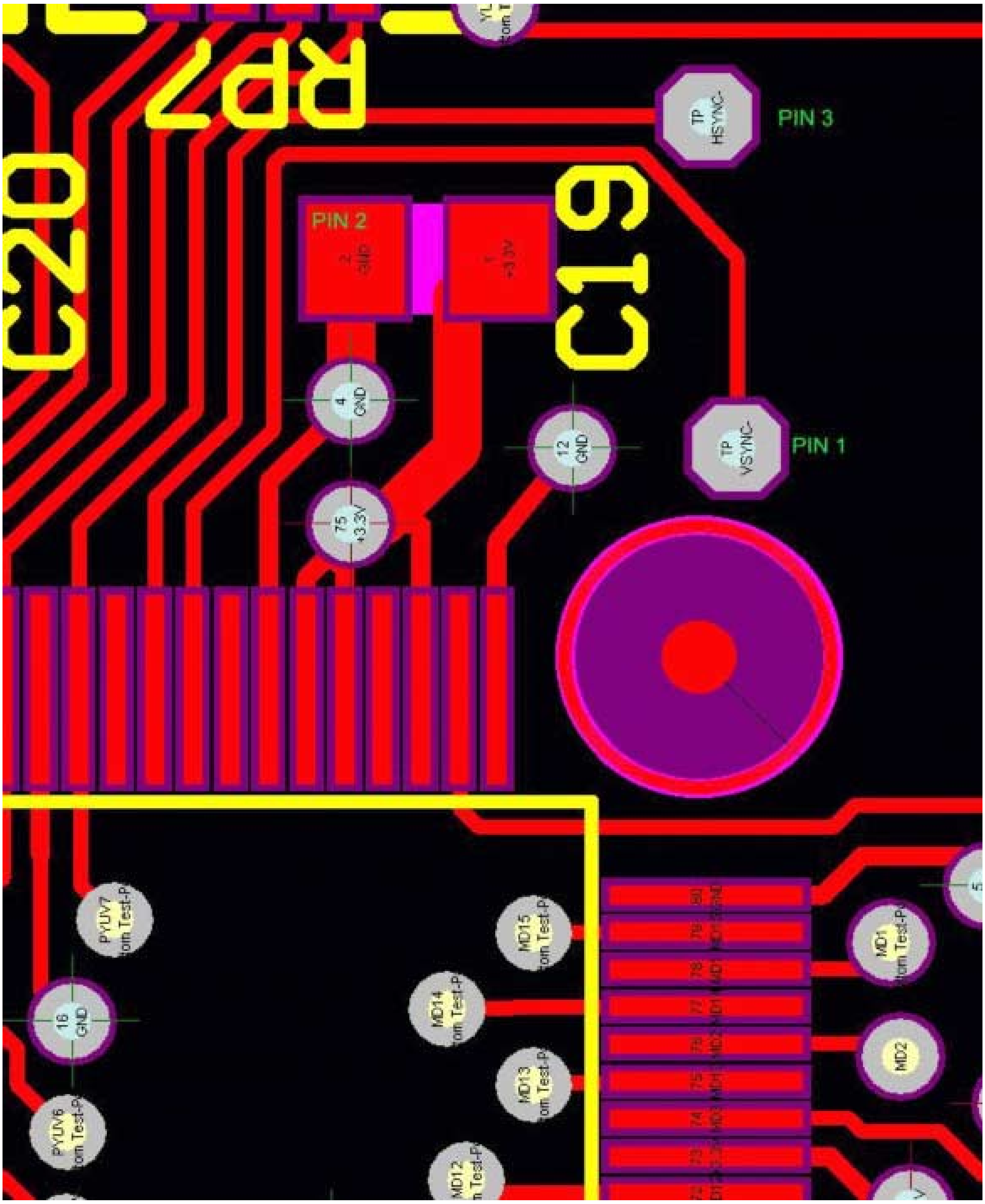


Diagram 2 – points to solder to on DSP board



DV88 Service Guide

Fault diagnostics

Fault Condition	Action
No power	Check mains fuse Check power supply rails
Fails to read Disc	Clean laser optic with cleaning disc Check unit set to the correct region for the disc Check – laser assembly / mechanism ATAPI connector Check for dry joints on DSP board connectors CN3, CN4 and AV board connectors SK1, SK2
Unstable picture colours	Check for dry joints on DSP board connectors CN3, CN4 and AV board connectors SK1, SK2
Wobbly picture or screensaver	Check DSP crystal Y2 – 27Mhz Check for failure of U8
Picture freezes	Check AV board crystals X1, X2 Check for dry joints on DSP board connectors CN3, CN4 and AV board connectors SK1, SK2
No audio or digital output	Check that Z4 is not touching the rear panel Check AV board fuses F1, F2 Check T1 on AV board Check for dry joints on DSP board connectors CN3, CN4
Unit stays in standby	Replace U3 on the DSP board and Z1 on the display board
Display fails to work	Check display has not been turned off via the remote Check display flex foil is fitted correctly Check Q3 to Q6 on the display board Check for dry joints around Z1 on the display board
No progressive scan output	Is the Progressive scan board fitted Check the flex foil is correctly fitted Check in the setup menu that the progressive board is enabled Check unit has latest software version Region 2 PAL discs will not give progressive output (due to current licensing rules)
Drawer fails to open	Check drawer is not jammed Check connecting ribbon and PSU lead to mechanism Check display flex foil Check that load button is not jammed
No HDCD LED	Check LED light pipe is fitted correctly Check that the HDCD position on the front panel is not obscured by paint on the inside of the panel

Hints & tips

- Issue 3 AV board onwards uses WM8740 DACs these are not interchangeable with the WM8716 as used on early versions of the board.
- Due to excessively noisy mechanisms, anti-vibration mounts were fitted as standard from serial number D88V04987.
- Drive noise – this model uses an ATAPI DVD drive, due to the speed the drive rotates you will hear the disc rotating especially at the start of any disc.

Mechanisms used	Serial number range	Latest firmware issued
LK	D88V01000 to D88V01199	LK18
LO	D88V01200 to D88V05622	LO14
LT	D88V05623 to date	LT21

CONFIDENTIAL

NOT FOR DISCLOSURE TO THE PUBLIC

Market Options

DVD -Video has been designed to incorporate regional coding for software copyright reasons, whereby the player is set to permit the replay of only discs from the region in which it has been marketed and sold. The region coding to which the DV88 has been factory set is marked on its rear panel. If a user tries to play a disc from a non matching region, then the player will refuse to play it and the words A invalid region A will appear on the on-screen display.

Occasions will arise where customers wish to move from one continent to another and to play DVDs purchased in the new regional area on his or her DV88. For such customers it is possible to change the DV88's regional code setting and default video standard using the supplied CR-314 remote control. The procedure is set out below.

<u>It is important to keep this information confidential in order to comply with the terms of the DVD CSS (Content Scramble System) licence.</u>

Region Change
Open the tray, enter 1,1,1,1 on the remote, then enter a 2 digit number from 01 to12 for the DVD region 1 to 12. This will only set the DVD disc region the unit will play, it will not change the video parameters.

Market Options
Open the tray, enter 1,2,3,4 on the remote, then enter a 2 digit number from 01 to12 for the Arcam region 1 to 12. This sets parameters such as DVD region, video standard.
We have defined several >Arcam shipping regions= which are explained in the following table. Note that the video parameters will be changed.

<u>How to check which software and firmware the player has.</u>

1:Switch both the TV/ Projector and DVD Player on so the Arcam Screen Saver can be viewed.

2:Press the "Set Up" button on the remote control.

3:Key in the following numbers, 4 7 9 2 this will then put the player into the *Engineering Menu*.

4:Place the cursor over "Version" and hit "OK" on the remote control.

5:The players current software and firmware version will then be displayed.

6:Hit "OK" to go back to the *Engineering Menu* and "Set Up" to exit.

N.B. In the *Engineering Menu* a Self Test can be performed as well, please note that not all items may have a tick against. This indicates the lack of a Progressive Scan Module and not a player fault. Please exit menu and re-boot player before operating.

The software version and Arcam shipping region are displayed on the TV screen at power up.

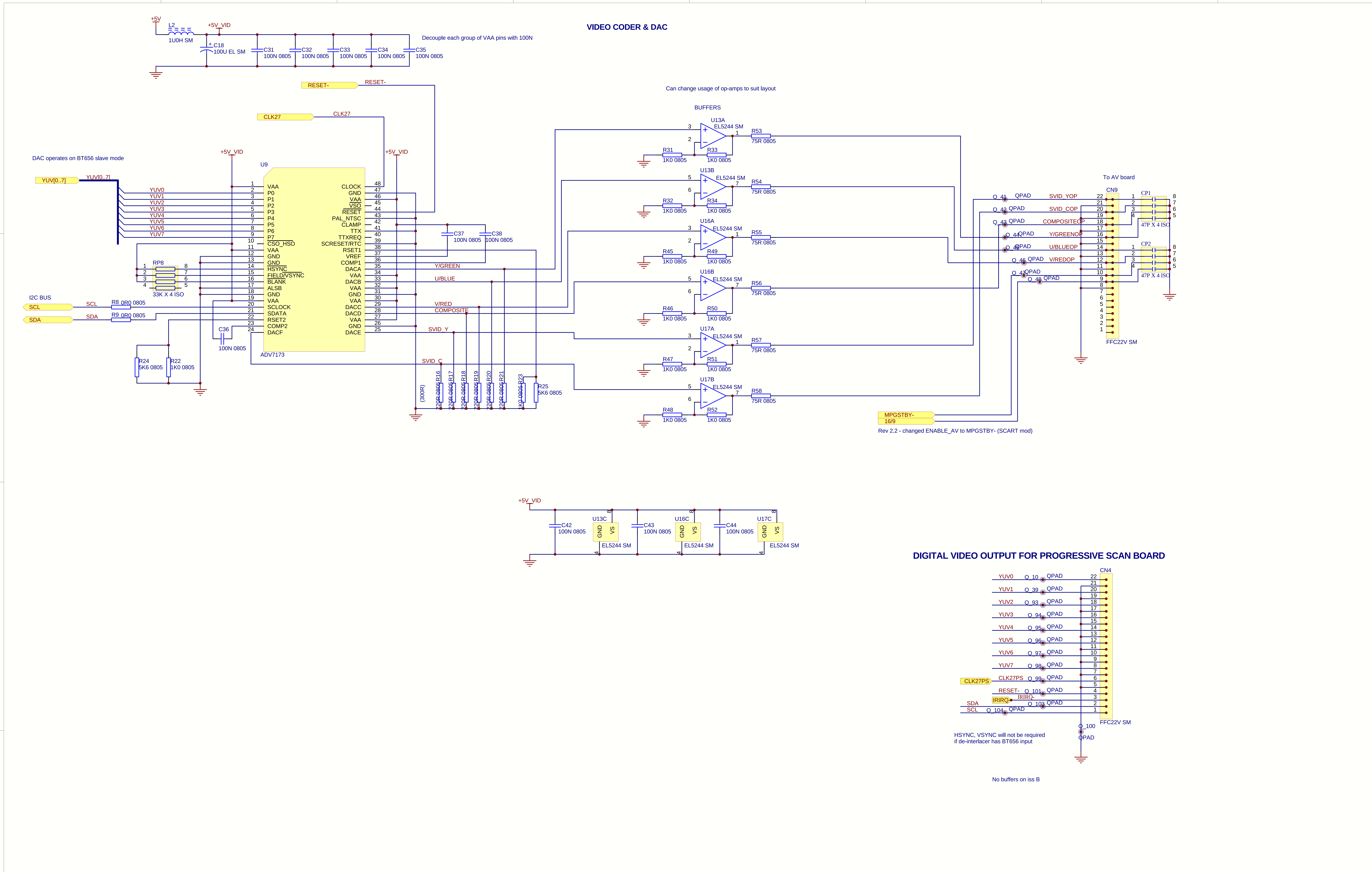
Voltage Settings
For 115/230 VAC operation this is set by the selector switch on the back of the unit.
For 100 VAC units a different transformer is fitted.

Market Options

Arcam Shipping Regions

Arcam Region	Countries	DVD Region	Video	Black level	YUV/RGB	Voltage
_01_	Canada	1	NTSC	IRE = 7.5	YUV	115V
	United States					
	Puerto Rico					
_02_	Western Europe	2	PAL	IRE = 0	RGB	230V
	Poland					
	Balkans					
	South Africa					
	Turkey					
	Middle East					
_03_	Indonesia	3	PAL	IRE = 0	RGB	230V
	Hong Kong					
	Thailand					
	Malasia					
	Singapore					
_04_	Australia	4	PAL	IRE = 0	RGB	230V
	New Zealand					
	Most of south pacific					
_05_	Russia	5	PAL	IRE = 0	RGB	230V
	Former Russian states					
	India					
_06_	China	6	PAL	IRE = 0	RGB	230V
_07_	Japan	2	NTSC	IRE = 0	YUV	100V
_08_	South Korea	3	NTSC	IRE = 7.5	YUV	230V
_09_	Taiwan	3	NTSC	IRE = 7.5	YUV	115V
_10_	Argentina	4	PAL-N	IRE = 0	YUV	230V
_11_	Brazil	4	PAL-M	IRE = 7.5	YUV	230V
_12_	Chile	4	NTSC	IRE = 7.5	YUV	230V

AMPCT4 is in Simons library
ASC0 I/F
Front Panel I/F
NF
SSC I/F
Not fitted for production
Main Power Supply
L875C2_4.0.SCH
DSP
L875C3_4.0.SCH
MPEG DECODER
L875C4_4.0.SCH
VIDEO DAC
ATAPI interface
L875c5_4.0.sch
ATAPI added to issue B
Pin 11 REFCLK not used - grounded
Regulator not fitted (3V3 comes direct from PSU)
U22
LM1086 3.3V SM
PCB
L875PB_4
DRAWING TITLE
DSP BOARD - Top Level
23425
Circuit Diagram
Notes:
A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB
01_1139
CL
08/08/01
REMOVED CN2 & CN3, PCB WIDTH CHANGED
4.0
ECO No.
INITIALS
DATE
DESCRIPTION OF CHANGE
ISSUE
Filename
J:\Change_Control\ECO_AGENDA\01_1139 L875PB MODS cliff\L875_4.0.ddb - Documents\L875C1.sch
Date Printed
5-Sep-2001
Drawn by:
PG
Sheet 1 of 5
DRAWING NO. L875C1



DRAWING TITLE					
DSP BOARD - VIDEO DAC					
23425	Circuit Diagram				
A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB	Notes:	01_1139	CL	08/08/01	REMOVED CN2 & CN3, PCB WIDTH CHANGED 4.0
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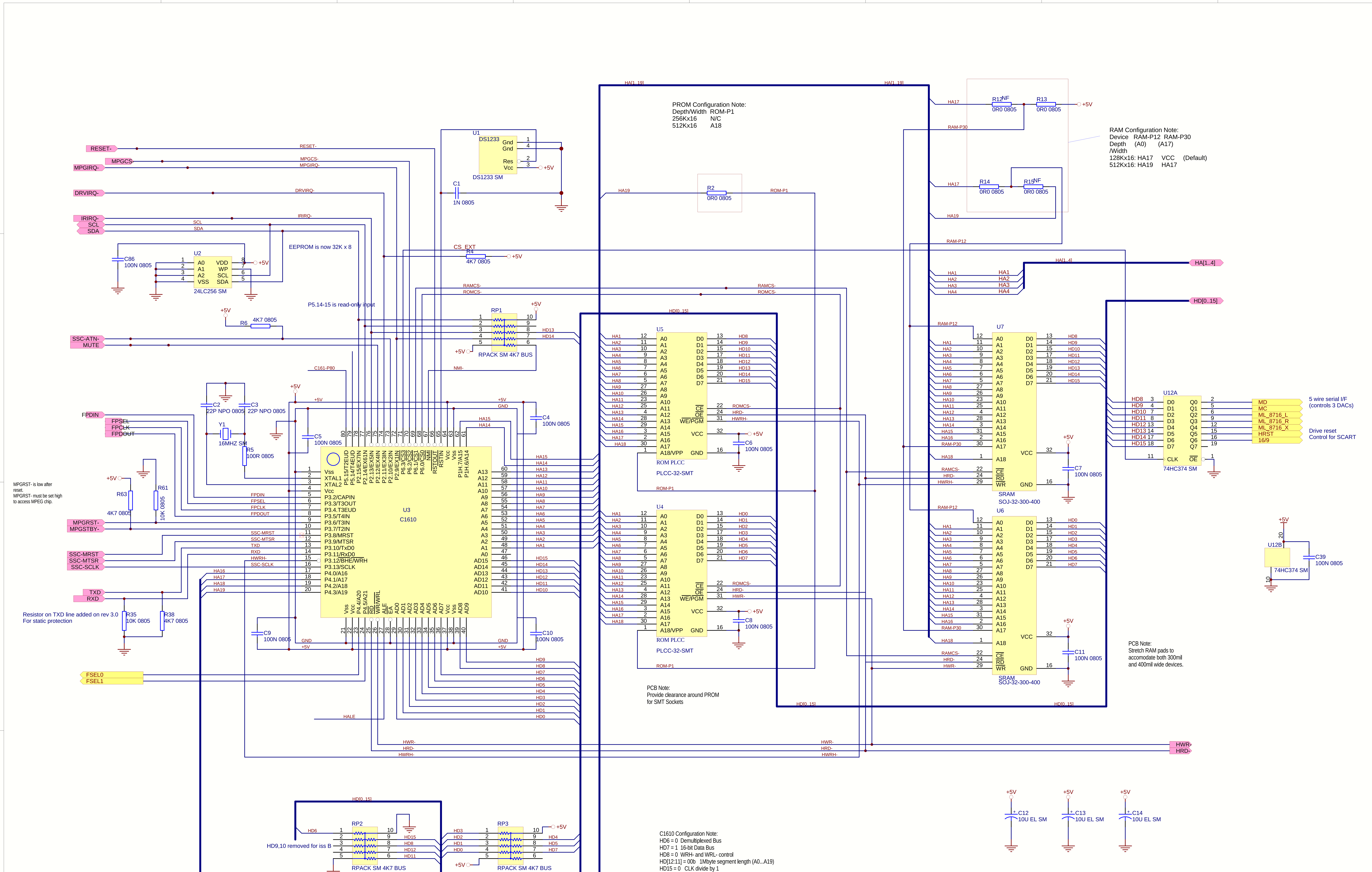
	Filename J:\Change_Control\ECO_AGENDA\01_1139 L875PB MODS cliff\L875_4.0.ddb - Documents\	Date Printed 5-Sep-2001	Drawn by: PG	Sheet 4 of 5	DRAWING NO. L875C4



DRAWING TITLE
DSP BOARD CPU

23425

Circuit Diagram

Notes:

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

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
01_1139	CL	08/08/01	REMOVED CN2 & CN3, PCB WIDTH CHANGED	4.0

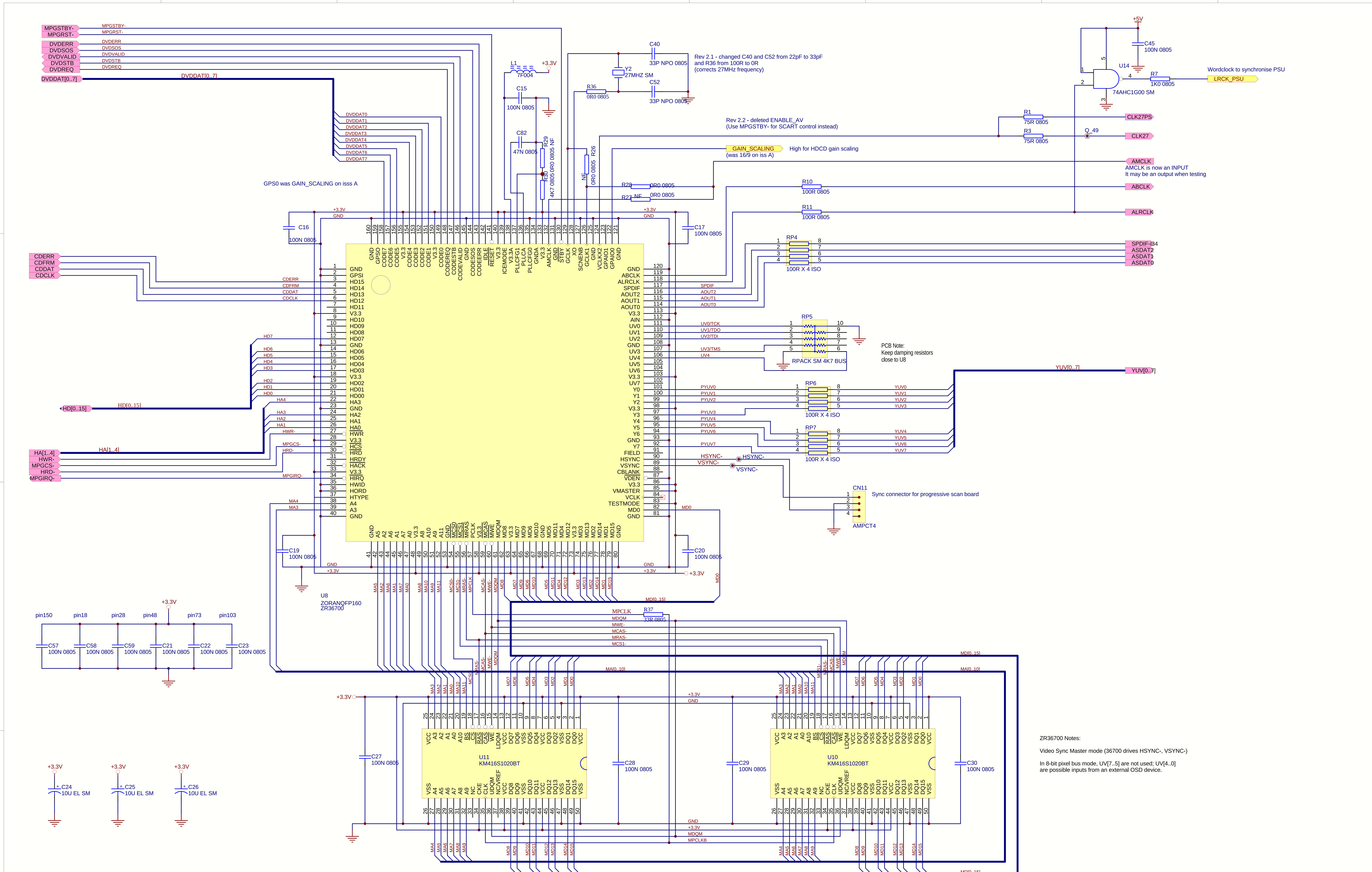
Filename: J:\Change_Control\ECO_AGENDA\01_1139 L875PB MODS cliff\L875_4.0.ddb - Documents\L875C2.SCH

Date Printed: 5-Sep-2001

Drawn by: PG

Sheet 2 of 5

DRAWING NO. L875C2



DRAWING TITLE

DSP BOARD - DVD PROC

23425

Circuit Diagram

Notes:

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

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
01_1139	CL	08/08/01	REMOVED CN2 & CN3, PCB WIDTH CHANGED	4.0

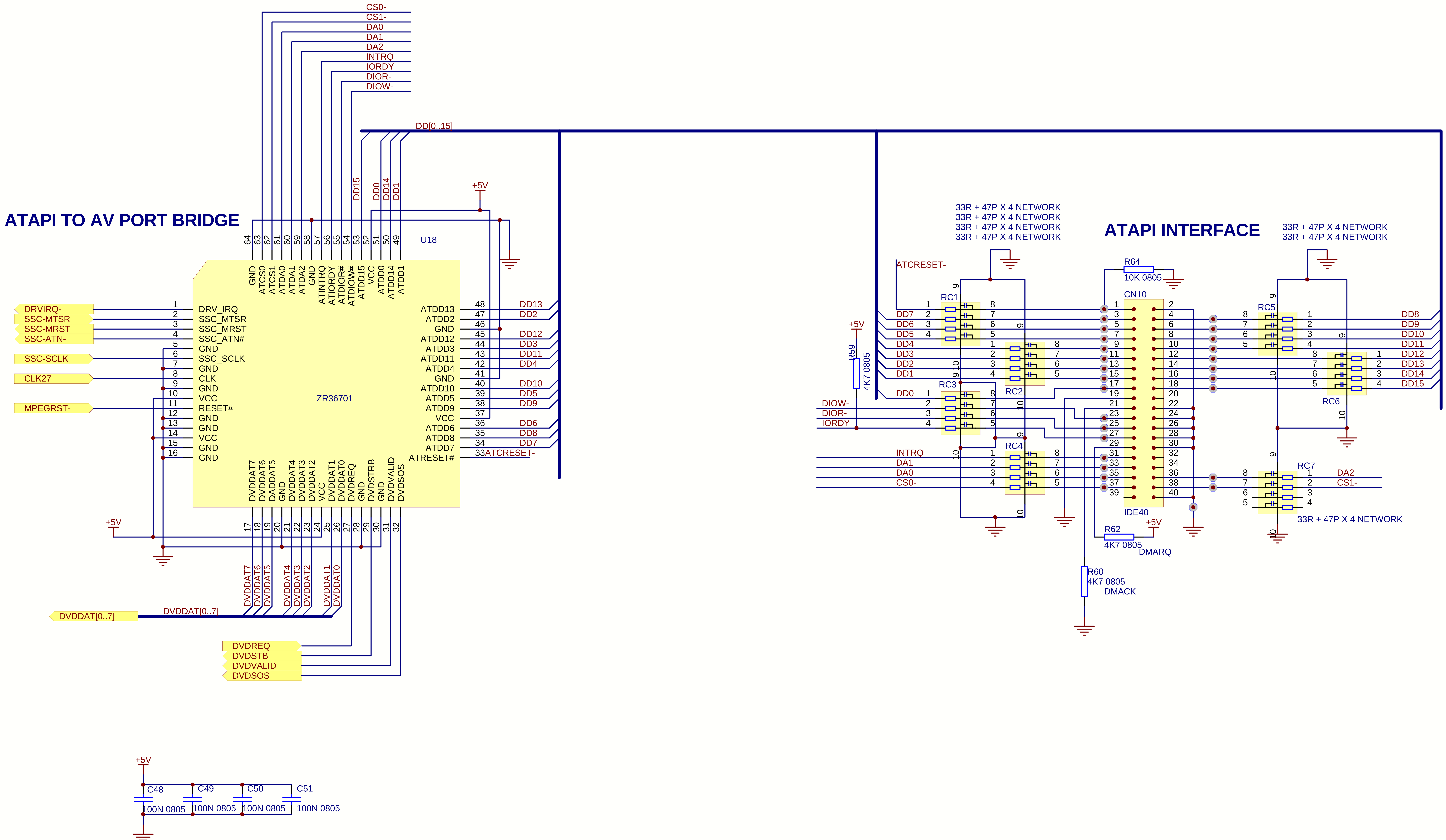
Filename: J:\Change_Control\ECO_AGENDA\01_1139 L875PB MODS cliff\L875_4.0.ddb - Documents\L875C3.SCH

Date Printed: 5-Sep-2001

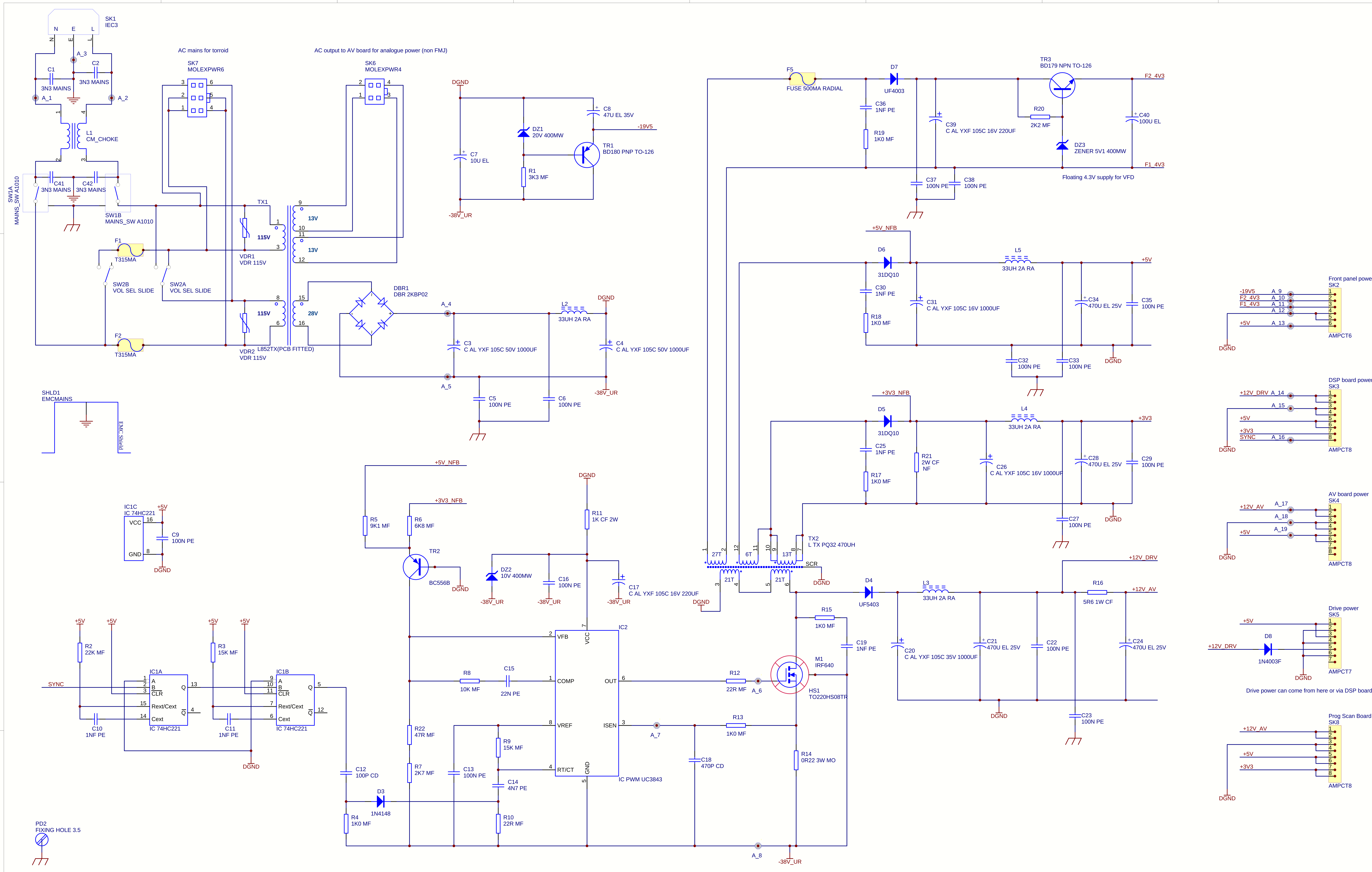
Drawn by: PG

Sheet 3 of 5

DRAWING NO. L875C3



DRAWING TITLE DSP BOARD - ATAPI interface					
23425	Circuit Diagram				
A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB	Notes:	01_1139	CL	08/08/01	REMOVED CN2 & CN3, PCB WIDTH CHANGED — 4.0
		ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE — ISSUE
	Filename J:\Change_Control\ECO_AGENDA\01_1139 L875PB MODS cliff\L875_4.0.ddb - Documents\L875C5.Sch	Date Printed 5-Sep-2001		Drawn by: PG	Sheet 5 of 5 — DRAWING NO. L875C5



DRAWING TITLE

DVD PSU PCB DVD PSU

23425

Circuit Diagram

Notes:

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

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
01_1137	CL	28/08/01	Added C41 & C42. SW1 now A1010. Deleted MS1	4.0
00_1109	wf	11/10/00	runout sheet re issue at 2.3 using NF	2.3
00_1084	KL	15/09/00	Added MS1 and SP1	2.2
	KL	01/08/00	Production Release	1

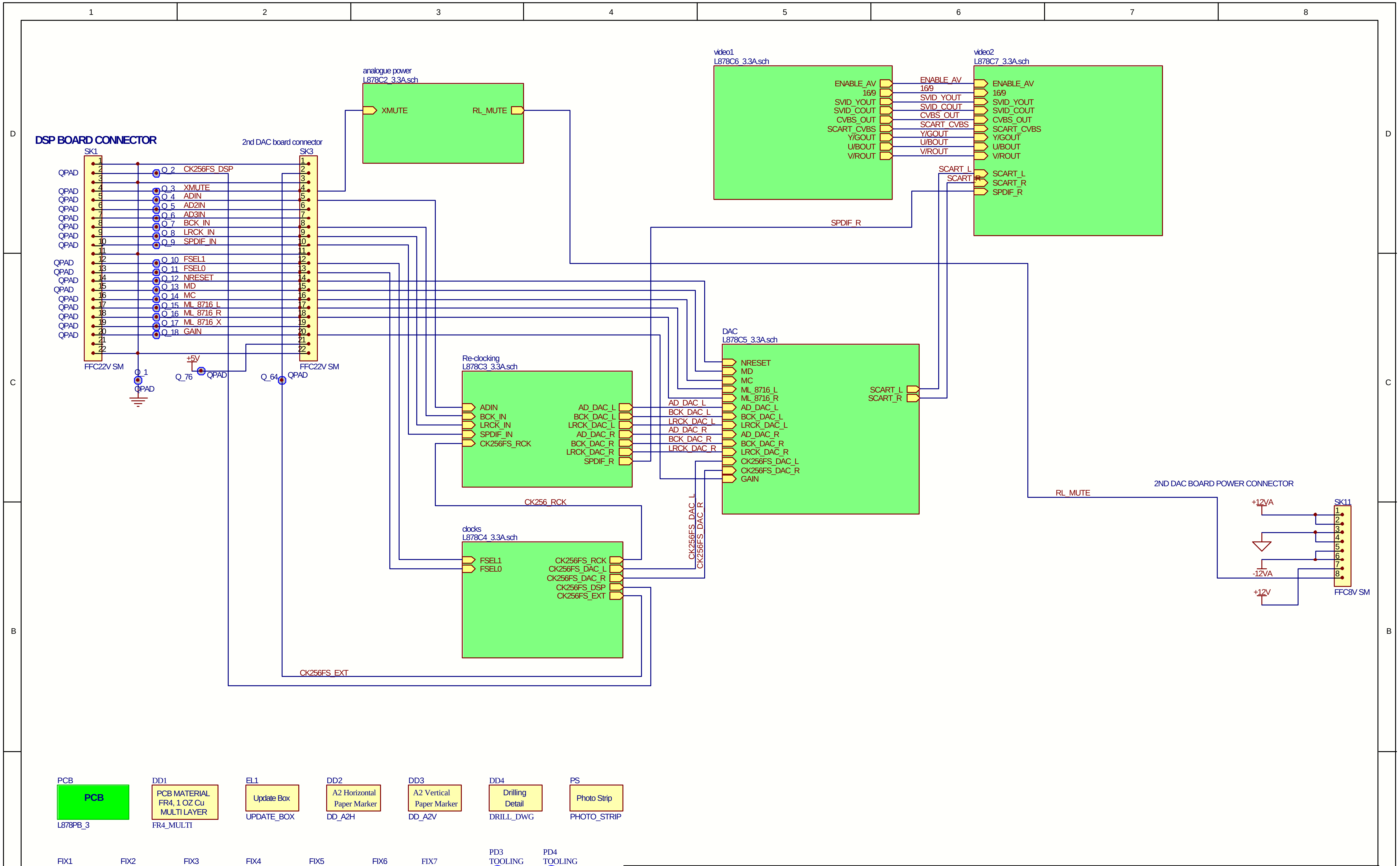
Filename J:\Change_Control\ECO_AGENDA\01_1137 UPDATES TO L877PB\L877PB_4.ddb - Documents

Date Printed 19-Sep-2001

Drawn by: KL

Sheet 1 of 1

DRAWING NO. L877CT



DRAWING TITLE
DVD AV PCB - Top level

23425

Circuit Diagram

Notes:

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

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
02_E000	PG	07/01/02	Admin change - cap voltages corrected on BOM	3.3A
	PG	13/11/01	C155 changed to 100R	3.3
01_1047	PG	15-03-01	Diodes changed from 3B22D to 3BS1D	3.2
01_1000	PG	02/01/01	Change R9,R10 from 10R to 22R	3.1
00_1136	PG	24/11/00	Iss 3 PCB with 8740 DACs	3.0

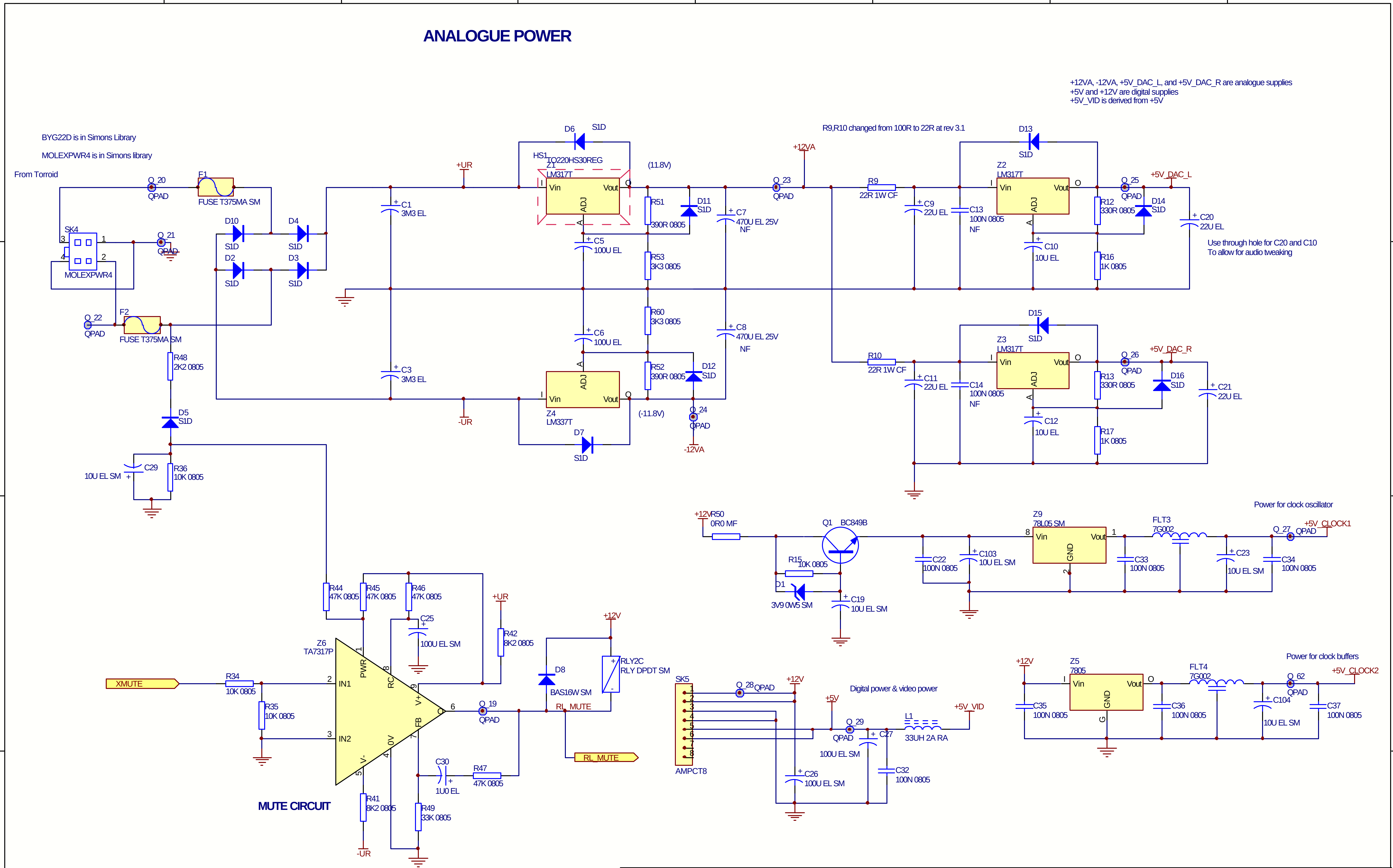
Filename
J:\Change_Control\ECO_AGENDA\02_E000 L878 cap voltage correction\L878_3.3A.ddb - Documents\L878C1_3.3A.prj

Date Printed 7-Jan-2002

Drawn by: PG

Sheet 1 of 7

DRAWING NO. L878C1



DRAWING TITLE DVD AV PCB - Power					
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		PG	13/11/01	C155 changed to 100R	3.3
23425 — Circuit Diagram	01_1047	PG	15-03-01	Diodes changed from 3B22D to 3BS1D	3.2
Notes:	01_1000	PG	02/01/01	Change R9,R10 from 100R to 22R	3.1
	00_1136	PG	24/11/00	Issue 3 PCB with 8740 DACs	3.0
	ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE

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

Filename: J:\Change_Control\ECO_AGENDA\02_E000 L878 cap voltage correction\L878_3.3A.ddb - Documents\L878C2_3.3A.sch

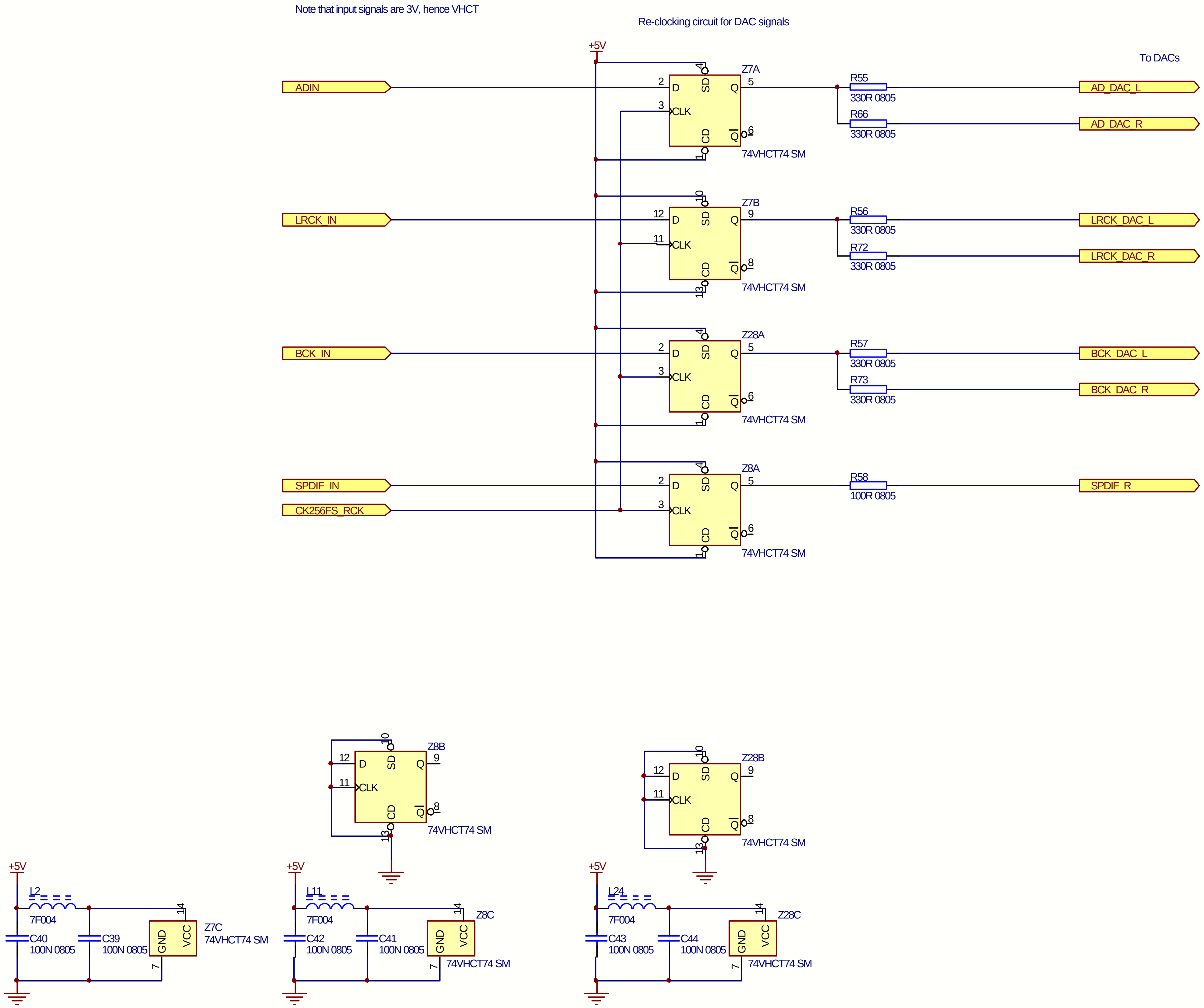
Date Printed: 7-Jan-2002

Drawn by: PG

Sheet 2 of 7

DRAWING NO. L878C2

RE_CLOCKING

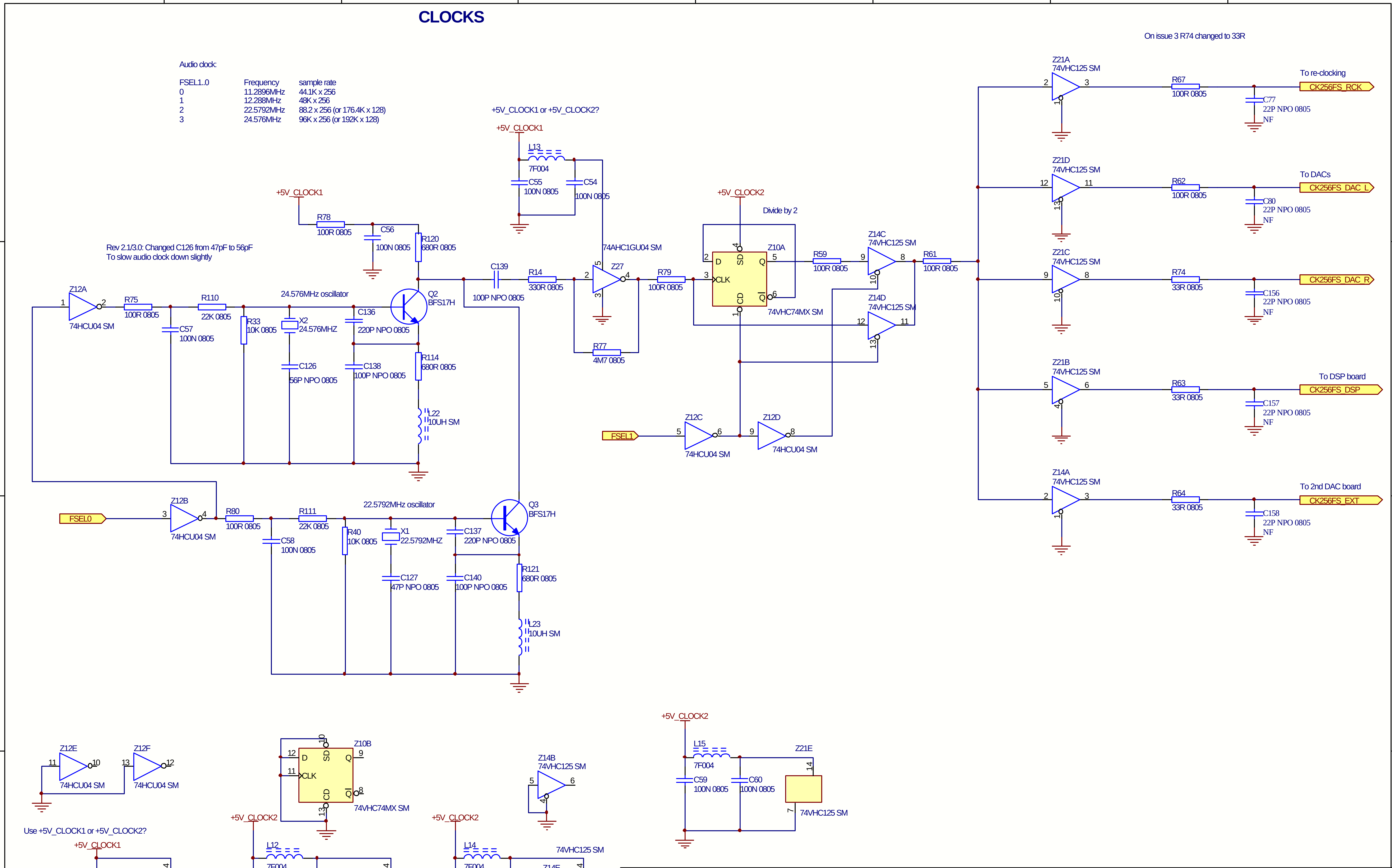


DRAWING TITLE DVD AV PCB - Reclocking	02_E000	PG	07/01/02	Admin change - cap voltages corrected on BOM	3.3A
		PG	13/11/01	C155 changed to 100R	3.3
23425 / Circuit Diagram	01_1047	PG	15-03-01	Diodes changed from 3B22D to 3BS1D	3.2
A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB / Notes:	01_1000	PG	02/01/01	Change R9,R10 from 100R to 22R	3.1
	00_1136	PG	24/11/00	Issue 3 PCB with 8740 DACs	3.0
	ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE

Filename: J:\Change_Control\ECO_AGENDA\02_E000 L878 cap voltage correction\L878_3.3A.ddb - Documents\L878C3_3.3A.sch

Date Printed: 7-Jan-2002 | Drawn by: PG | Sheet 3 of 7 | DRAWING NO. L878C3

CLOCKS



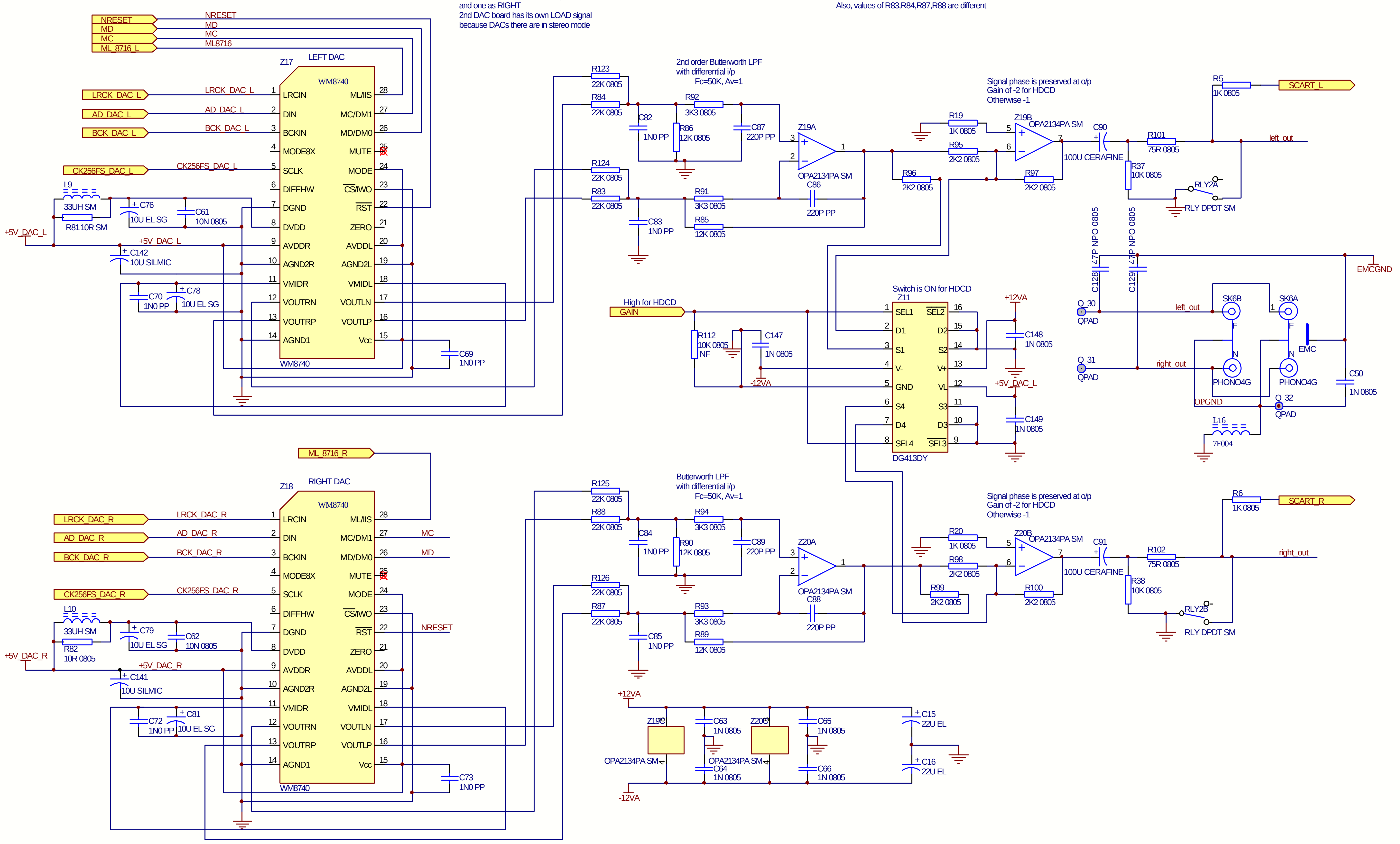
DRAWING TITLE DVD AV PCB - Clocks	02_E000	PG	07/01/02	Admin change - cap voltages corrected on BOM	3.3A
		PG	13/11/01	C155 changed to 100R	3.3
23425 / Circuit Diagram	01_1047	PG	15-03-01	Diodes changed from 3B22D to 3BS1D	3.2
A & R Cambridge Ltd. Pembroke Avenue Denny Industrial Centre Waterbeach Cambridge CB5 9PB / Notes:	01_1000	PG	02/01/01	Change R9,R10 from 100R to 22R	3.1
	00_1136	PG	24/11/00	Issue 3 PCB with 8740 DACs	3.0
	ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE

Filename J:\Change_Control\ECO_AGENDA\02_E000 L878 cap voltage correction\L878_3.3A.ddb - Documents\L878C4_3.3A.sch
Date Printed 7-Jan-2002
Drawn by: PG
Sheet 4 of 7
DRAWING NO. L878C4

DAC

DACs operate in mono differential mode
Control is via SPI bus
Different LOAD signals are required because 1 is configured as LEFT and one as RIGHT
2nd DAC board has its own LOAD signal because DACs there are in stereo mode

IMPORTANT NOTE: Issue 3 board uses WM8740 DACs
Issue 2 and earlier use WM8716 DACs
Also, values of R83,R84,R87,R88 are different

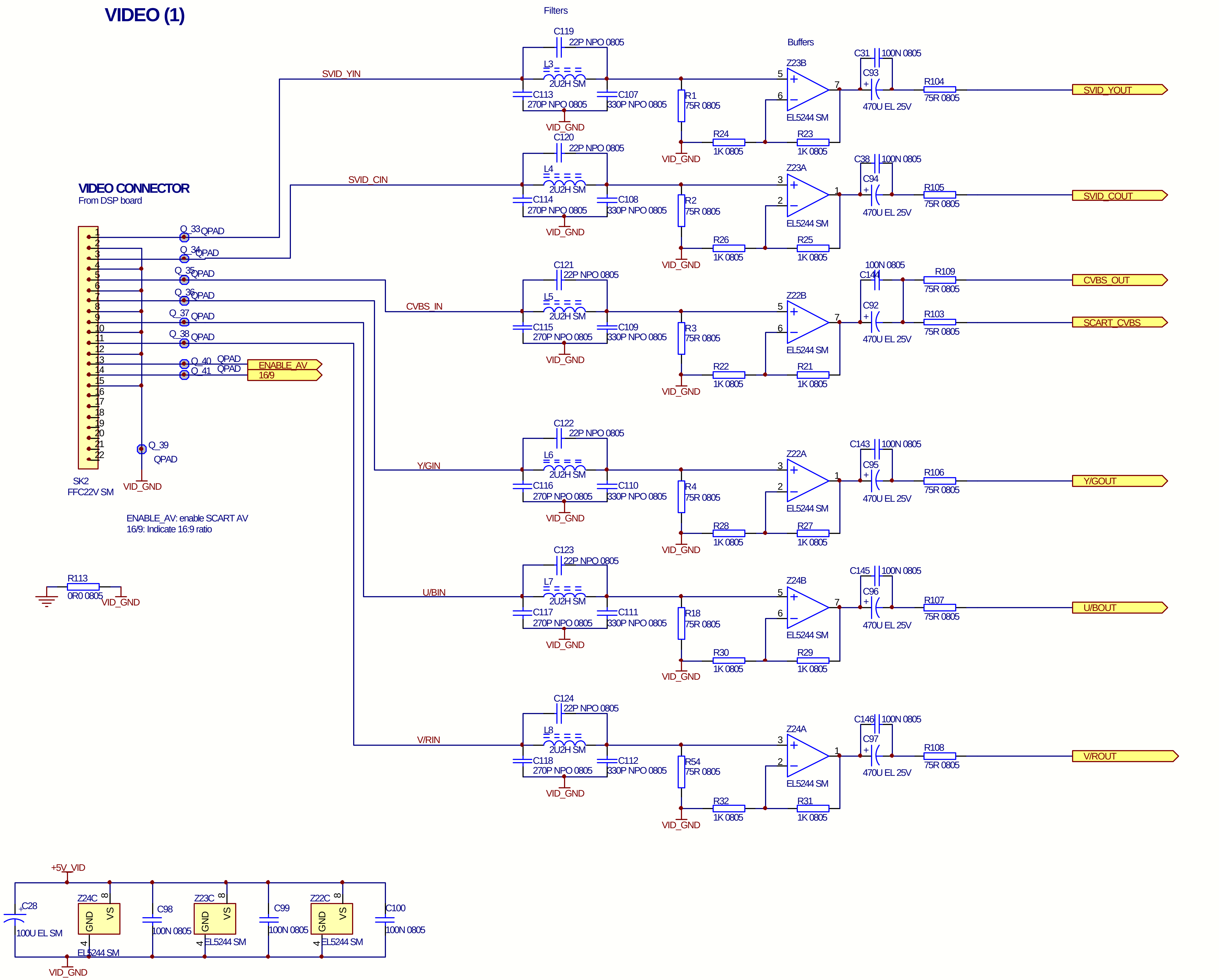


DRAWING TITLE DVD AV PCB - DACs	02_E000	PG	07/01/02	Admin change - cap voltages corrected on BOM	3.3A
	01_1047	PG	13/11/01	C155 changed to 100R	3.3
23425	01_1000	PG	15-03-01	Diodes changed from 3B22D to 3BS1D	3.2
Circuit Diagram	00_1136	PG	02/01/01	Change R9,R10 from 100R to 22R	3.1
Notes:	00_1072	PG	24/11/00	Issue 3 PCB with 8740 DACs	3.0
	ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE

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

Filename J:\Change_Control\ECO_AGENDA\02_E000 L878 cap voltage correction\L878_3.3A.ddb - Documents\L878C5_3.3A.sch
Date Printed 7-Jan-2002
Drawn by: PG
Sheet 5 of 7
DRAWING NO. L878C5

VIDEO (1)



DRAWING TITLE					
DVD AV PCB - Video (1)	02_E000	PG	07/01/02	Admin change - cap voltages corrected on BOM	3.3A
		PG	13/11/01	C155 changed to 100R	3.3
23425 / Circuit Diagram	01_1047	PG	15-03-01	Diodes changed from 3B22D to 3BS1D	3.2
A & R Cambridge Ltd. Notes:	01_1000	PG	02/01/01	Change R9,R10 from 100R to 22R	3.1
Pembroke Avenue	00_1136	PG	24/11/00	Issue 3 PCB with 8740 DACs	3.0
Denny Industrial Centre	ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE

Waterbeach
Cambridge CB5 9PB

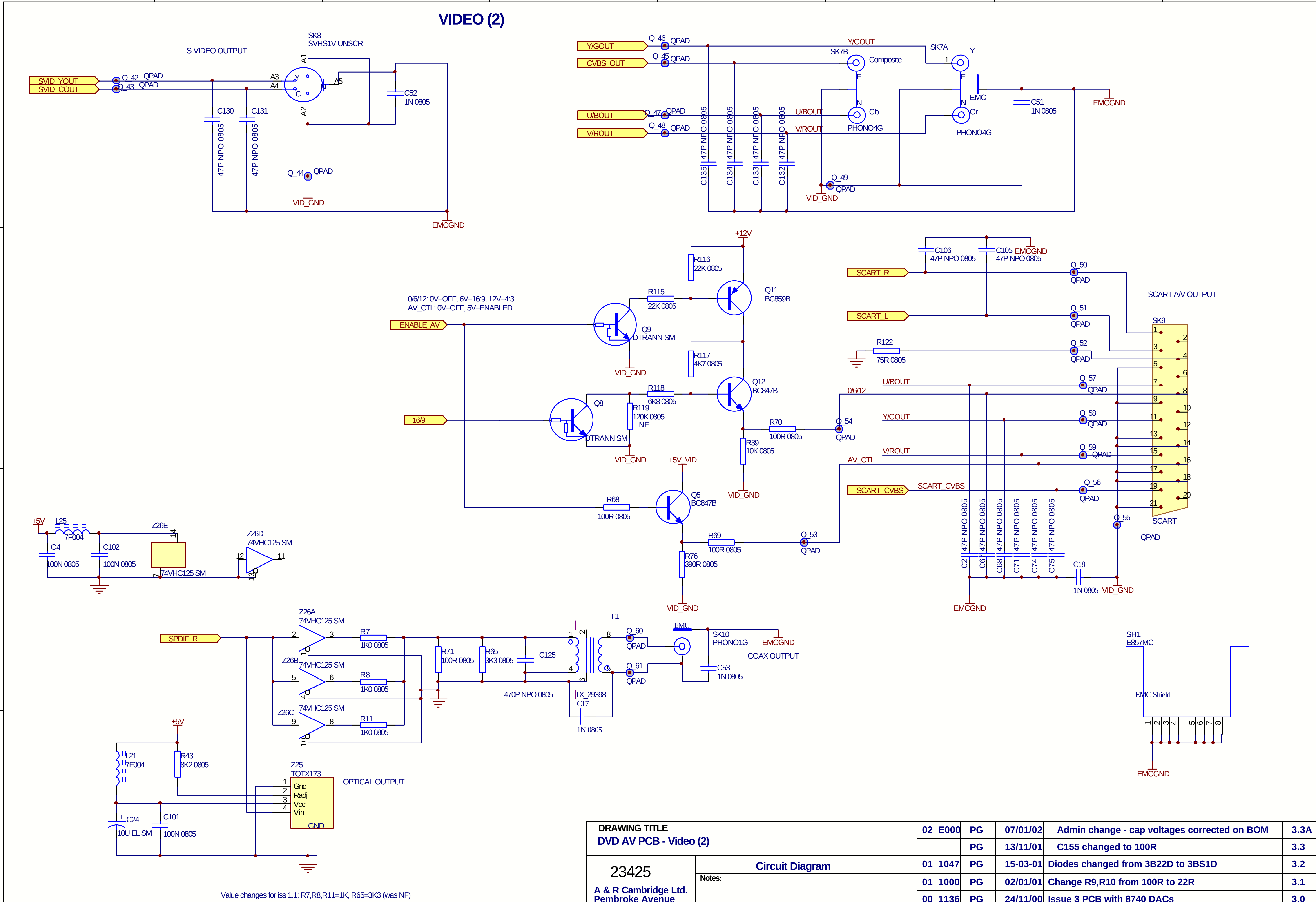
Filename: J:\Change_Control\ECO_AGENDA\02_E000 L878 cap voltage correction\L878_3.3A.ddb - Documents\L878C6_3.3A.sch

Date Printed: 7-Jan-2002

Drawn by: PG

Sheet 6 of 7

DRAWING NO. L878C6



DRAWING TITLE
DVD AV PCB - Video (2)

23425

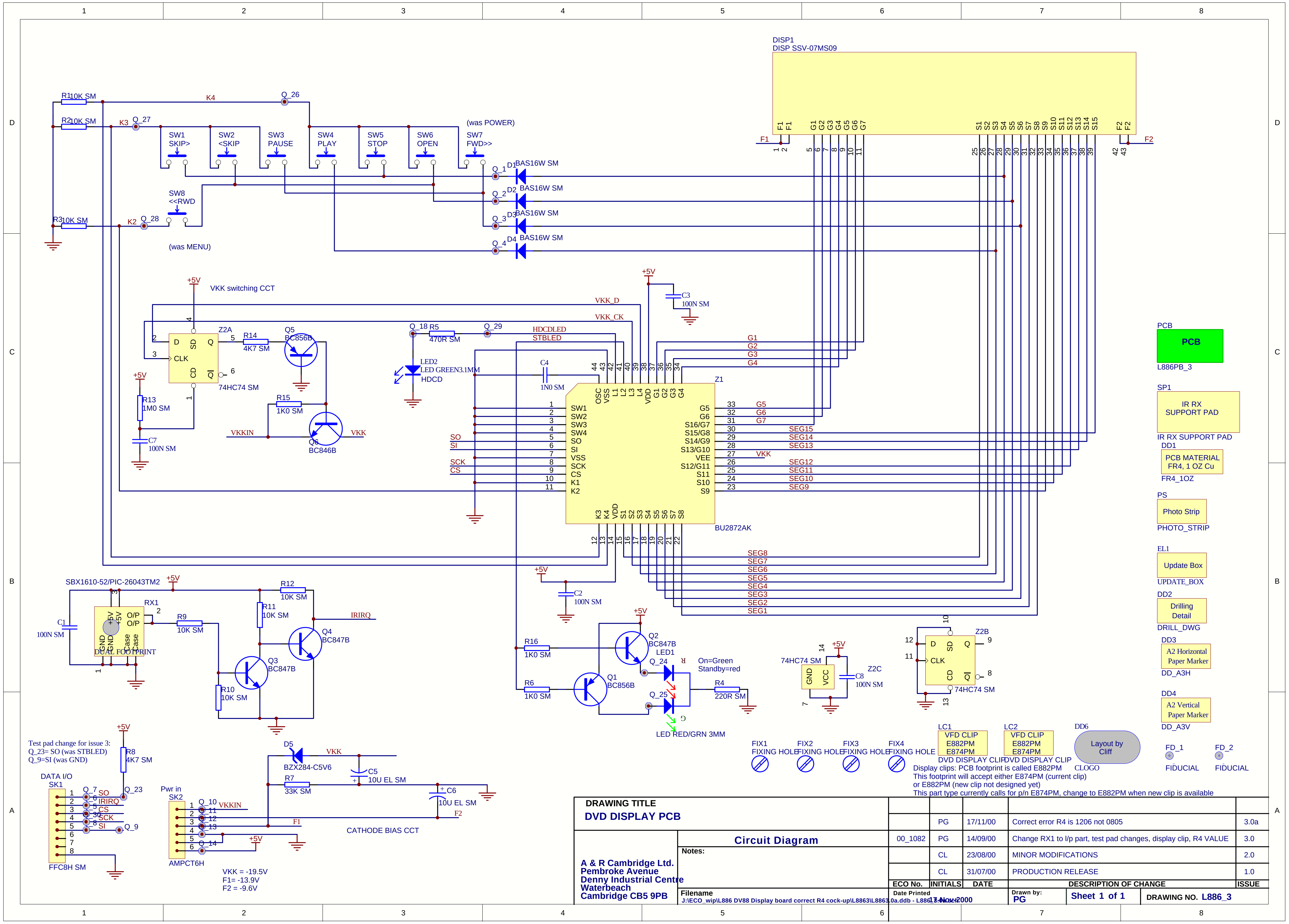
Circuit Diagram

Notes:

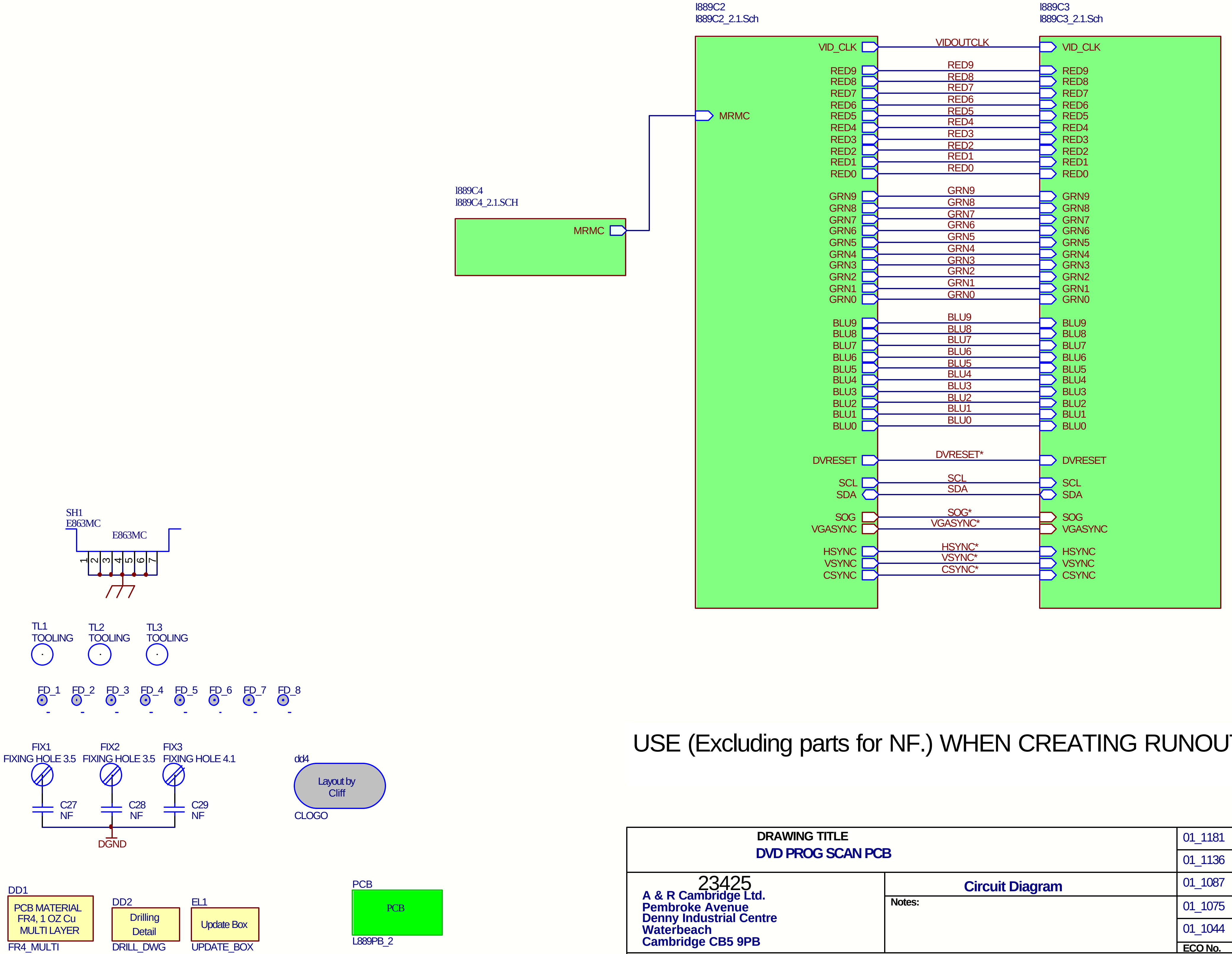
A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
02_E000	PG	07/01/02	Admin change - cap voltages corrected on BOM	3.3A
	PG	13/11/01	C155 changed to 100R	3.3
01_1047	PG	15-03-01	Diodes changed from 3B22D to 3BS1D	3.2
01_1000	PG	02/01/01	Change R9,R10 from 100R to 22R	3.1
00_1136	PG	24/11/00	Issue 3 PCB with 8740 DACs	3.0

Filename J:\Change_Control\ECO_AGENDA\02_E000 L878 cap voltage correction\L878_3.3A.ddb - Documents\L878C7_3.3A.sch
Date Printed 7-Jan-2002
Drawn by: PG
Sheet 7 of 7
DRAWING NO. L878C7



ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
	PG	17/11/00	Correct error R4 is 1206 not 0805	3.0a
00_1082	PG	14/09/00	Change RX1 to I/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



USE (Excluding parts for NF.) WHEN CREATING RUNOUT SHEET

DRAWING TITLE
DVD PROG SCAN PCB

23425
A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

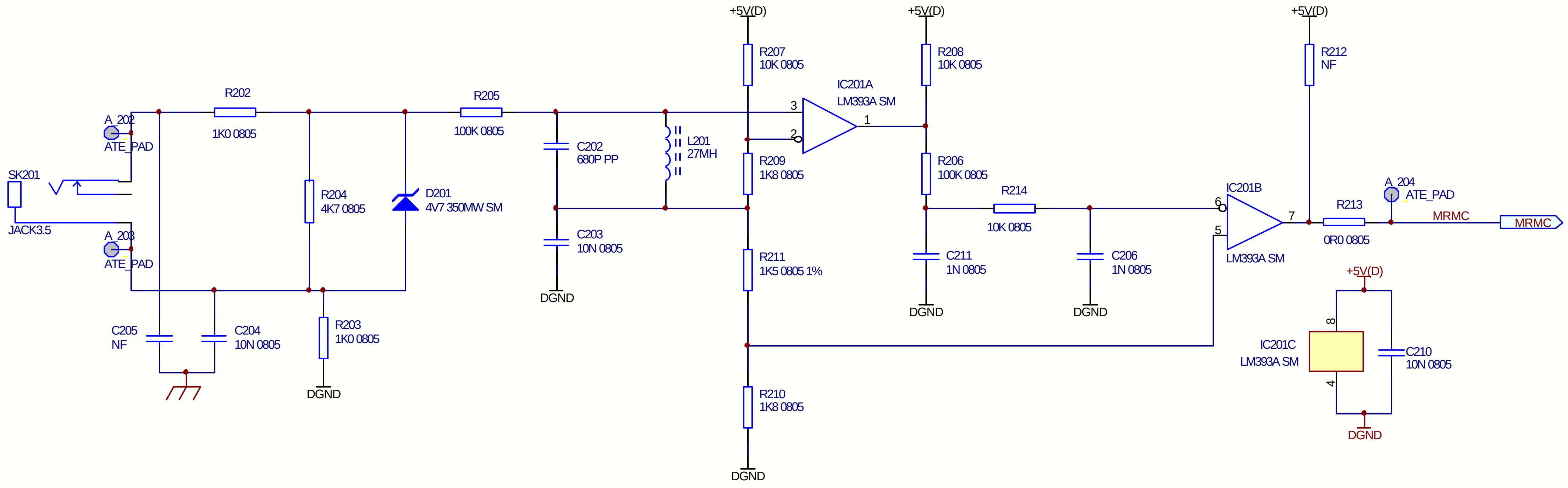
Circuit Diagram

Notes:

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
01_1181	PG	29/10/01	C206 & C211 CHANGED TO 1nF	2.1
01_1136	WAF	27/07/01	PCB UPDATED TO FIT MECH	2.0
01_1087	MGM	8/5/01	(ADMIN CHANGE ONLY) CHANGE E017AY TO L017AY	1.2A
01_1075	PG	23-04-01	Changed C206 to 470pF	1.2
01_1044	PG	14-03-01	Minor component changes	1.1

Filename
J:\Change_Control\ECO_pending\Prog scan remote bus fix\L889_2.1.ddb - Documents\L889C1_2.1.PRJ

Date Printed 29-Oct-2001
Drawn by: KAL
Sheet 1 of 4
DRAWING NO. L889



DRAWING TITLE
DVD PROG SCAN PCB

23425
A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB

Circuit Diagram

Notes:

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
01_1181	PG	29/10/01	C206 & C211 CHANGED TO 1nF	2.1
01_1136	WAF	27/07/01	PCB UPDATED TO FIT MECH	2.0
01_1087	MGM	8/5/01	(ADMIN CHANGE ONLY) CHANGE E017AY TO L017AY	1.2A
01_1075	PG	23-04-01	Changed C206 to 470pF	1.2
01_1044	PG	14-03-01	Minor component changes	1.1

Filename
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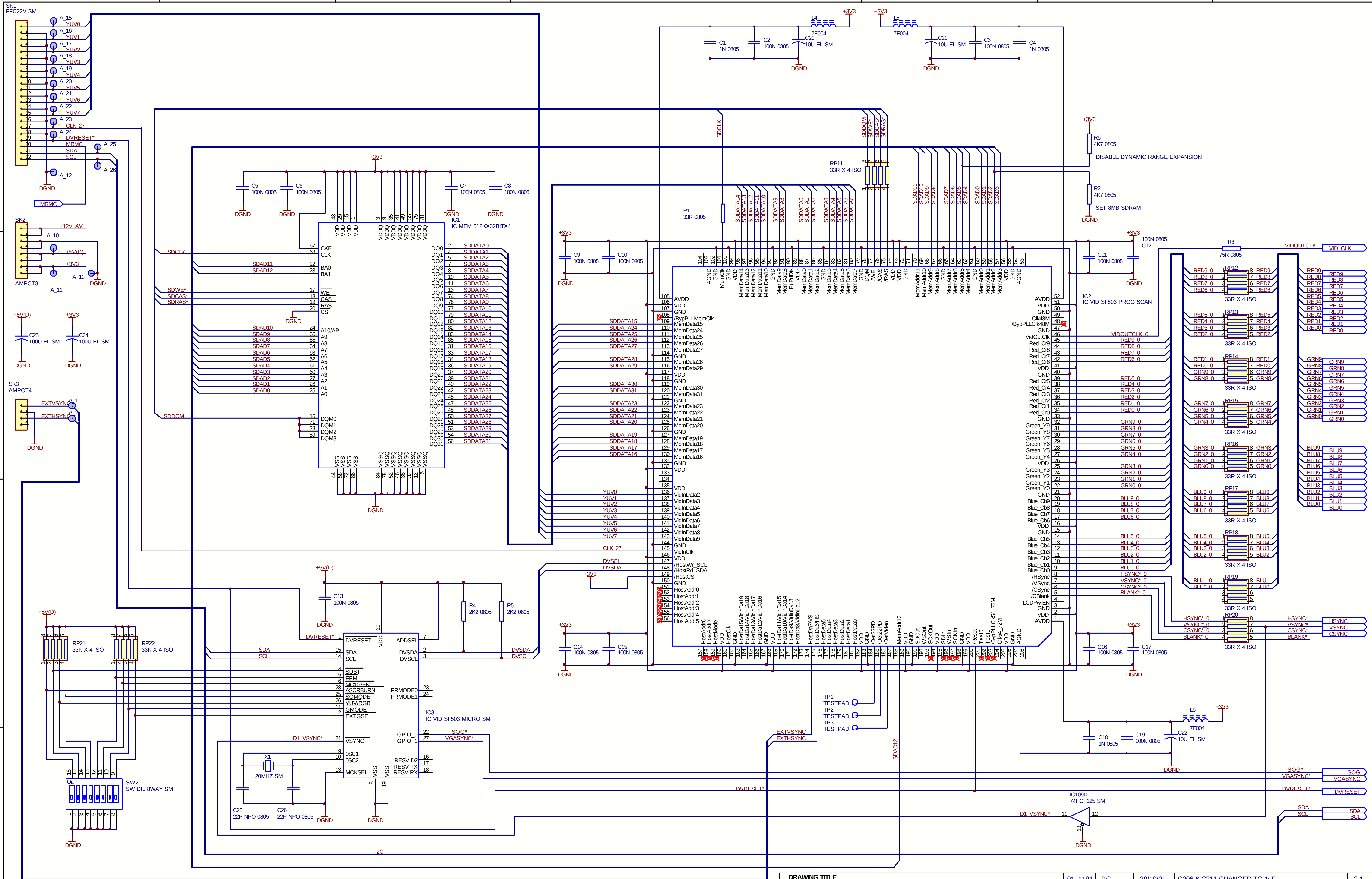
Date Printed 29-Oct-2001 | Drawn by: KAL | Sheet 4 of 4 | DRAWING NO. L889



SW No.	FUNCTION	SW SET TO ON (INPUT = LOW)
1	ANTI SCREEN BURN MODE	ENABLED
2	CHECK SUBTITLE MODE	CHECK FOR OUT OF SEQUENCE SUBTITLES
3	YUV / RGB COLOURSPACE SELECT	YUV MODE ENABLED
4	SQUEEZE MODE	ENABLED
5	FORCE FILM MODE	FORCE ASSUME SOURCE IS FILM
6	MICRO CONTROLLER ENABLE	ENABLE MICRO SOFTWARE ASSIST
7	GAME MODE	GAME MODE ENABLED
8	EXTERNAL GAME MODE SELECT	EXTERNAL DETECT

DRAWING TITLE

DVD PROG SCAN PCB

23425

Circuit Diagram

Notes:

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

ECO No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
01_1181	PG	29/10/01	C206 & C211 CHANGED TO 1nF	2.1
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01_1044	PG	14-03-01	Minor component changes	1.1

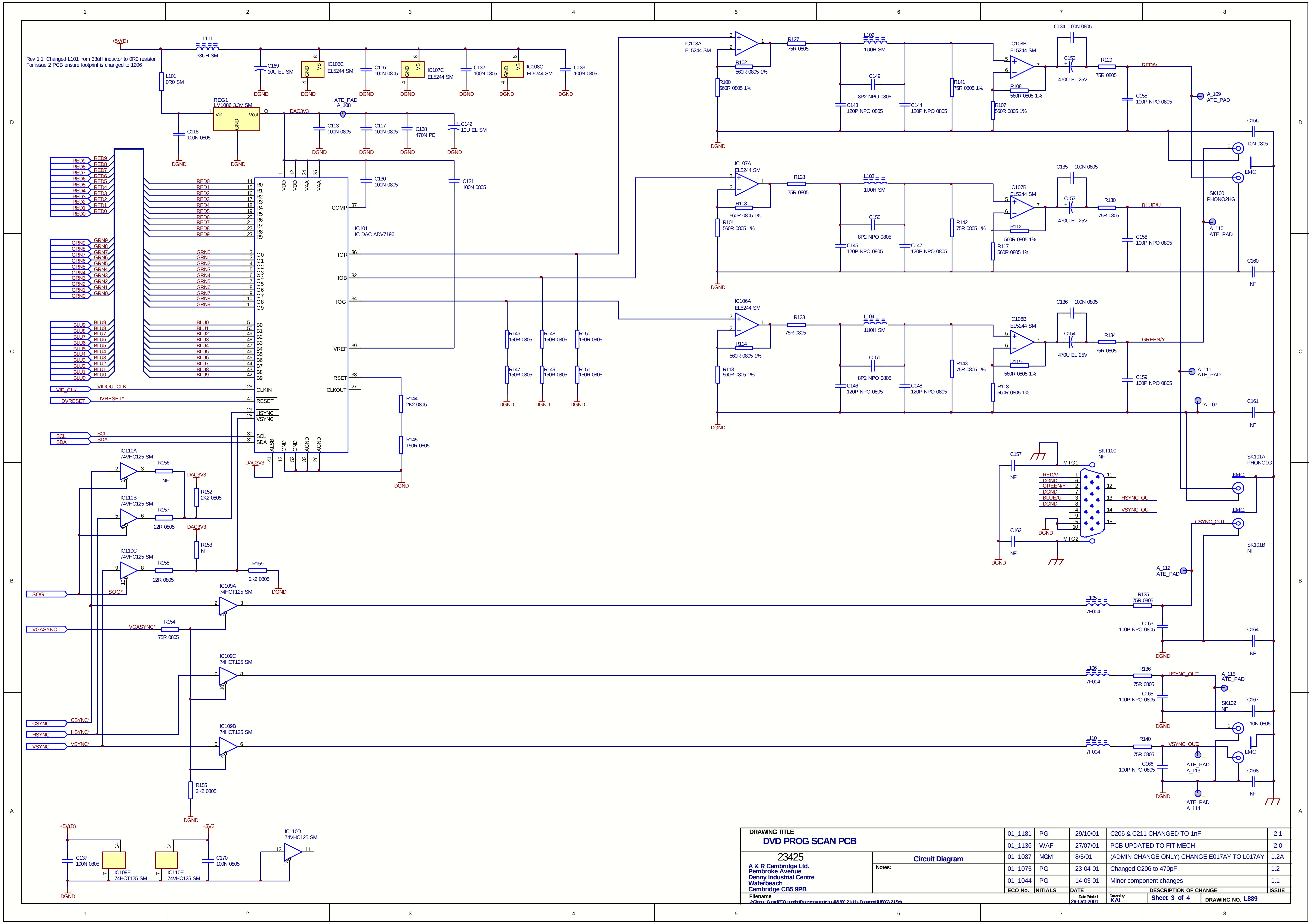
Filename

Date Printed 29-Oct-2001

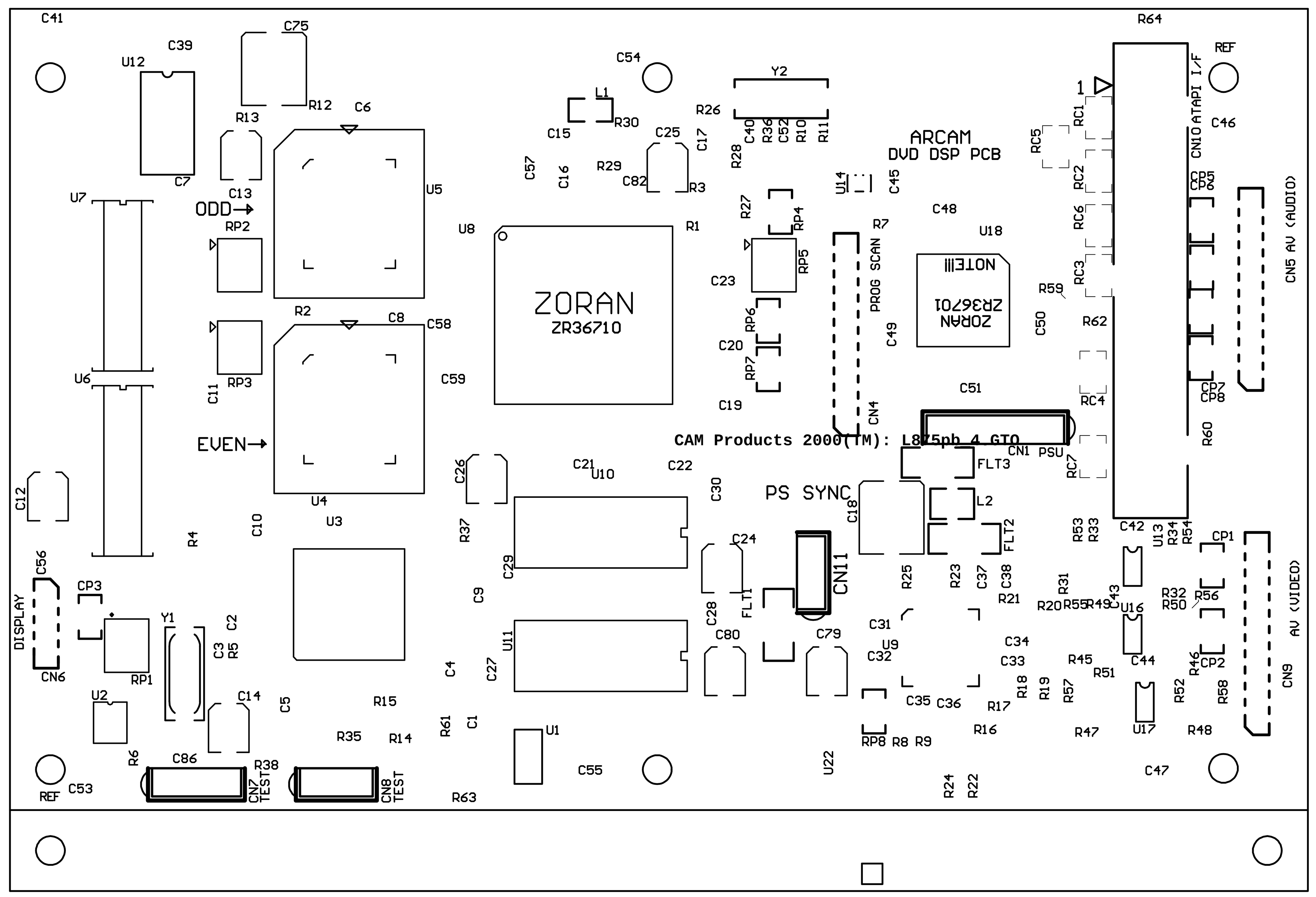
Drawn by: KAL

Sheet 2 of 4

DRAWING NO. L889



Rev 1.1: Changed L101 from 33uH inductor to 0R0 resistor
For issue 2 PCB ensure footprint is changed to 1206
+5V(D)
L111 33UH SM
L101 0R0 SM
REG1 LM1086 3.3V SM
DAC3V3
IC101 IC DAC ADV7196
IC106C EL5244 SM
IC107C EL5244 SM
IC108C EL5244 SM
IC108A EL5244 SM
IC108B EL5244 SM
IC107A EL5244 SM
IC107B EL5244 SM
IC106A EL5244 SM
IC106B EL5244 SM
RED/V
BLUE/U
GREEN/Y
SK100 PHONO2HG
SK101A PHONO1G
SK101B NF
SK102 NF
SKT100 NF
HSYNC_OUT
VSYNC_OUT
CSYNC_OUT
IC110A 74VHC125 SM
IC110B 74VHC125 SM
IC110C 74VHC125 SM
IC110D 74VHC125 SM
IC110E 74VHC125 SM
IC109A 74HCT125 SM
IC109B 74HCT125 SM
IC109C 74HCT125 SM
IC109E 74HCT125 SM
VID_CLK
DVRESET
SCL
SDA
SOG
VGASYNC
CSYNC
HSYNC
VSYNC
DGND
DRAWING TITLE
DVD PROG SCAN PCB
23425
A & R Cambridge Ltd.
Pembroke Avenue
Denny Industrial Centre
Waterbeach
Cambridge CB5 9PB
Circuit Diagram
Notes:
01_1181 PG 29/10/01 C206 & C211 CHANGED TO 1nF 2.1
01_1136 WAF 27/07/01 PCB UPDATED TO FIT MECH 2.0
01_1087 MGM 8/5/01 (ADMIN CHANGE ONLY) CHANGE E017AY TO L017AY 1.2A
01_1075 PG 23-04-01 Changed C206 to 470pF 1.2
01_1044 PG 14-03-01 Minor component changes 1.1
ECO No. INITIALS DATE DESCRIPTION OF CHANGE ISSUE
Filename
Date Printed 29-Oct-2001
Drawn by: KAL
Sheet 3 of 4
DRAWING NO. L889

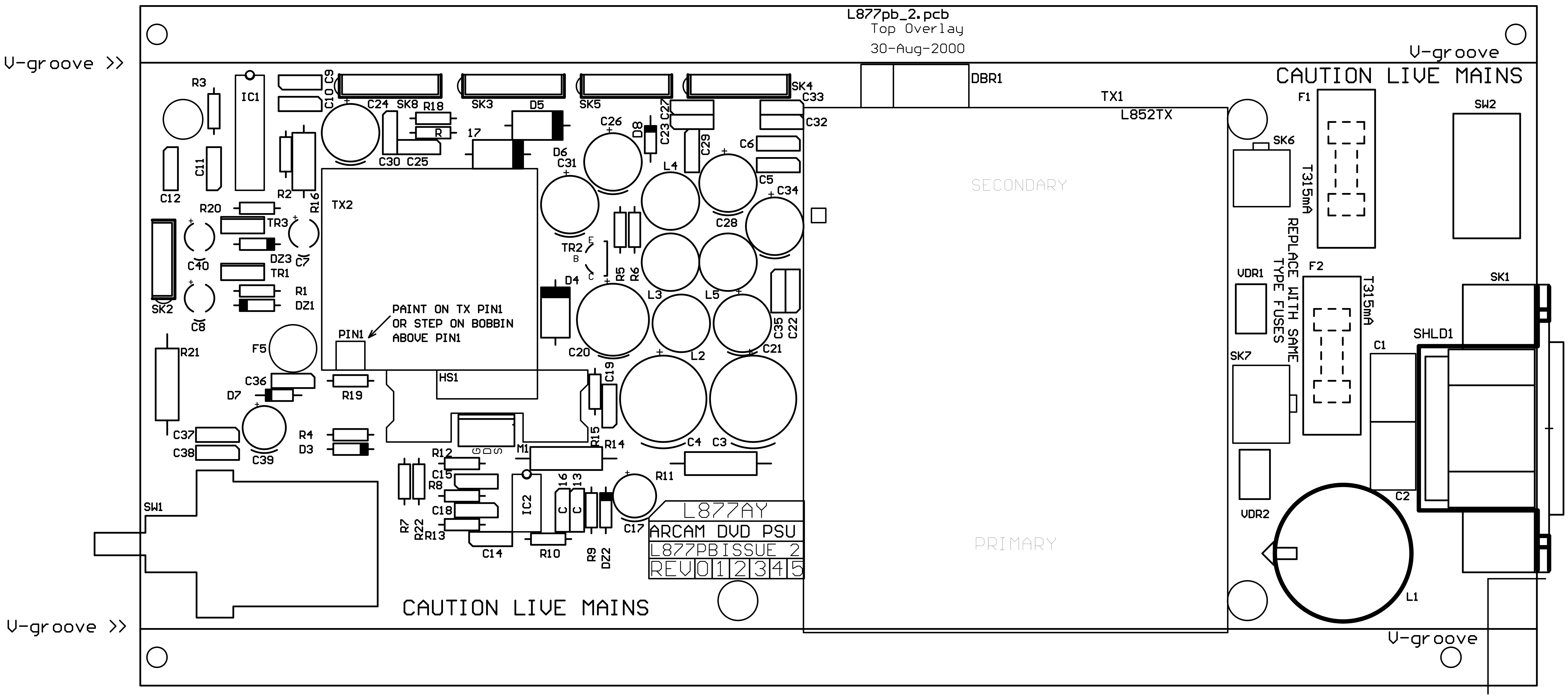


MECHANICAL DATA	

LAYER STACKUP	
L875pb_4.GTO	Top Overlay

MATERIAL	FR4	NOTES:–
COPPER WEIGHT	1oz	1/ Manufacture in accordance with IPC–A–600F Class 1.
HOLE SIZES	FINISHED (SEE NOTE 2)	2/ Always use NC drill file as reference.
ROUTING	SEE NOTE 3	3/ All routing 2.0mm unless otherwise shown on drill drawing.
LAYERS	FOUR (SEE NOTE 4)	4/ Pre–preg between layers 1&2 and 3&4.
MINIMUM WIDTH	8 MIL	5/ Photo image resist.
MINIMUM GAP	7 MIL	6/ Mark month/year of manufacture on ident layer.
RESIST	GREEN (SEE NOTE 5)	7/ Scoring denoted by →→→– on drill drawing.
IDENT	WHITE	GENERAL TOLERANCES
VENDOR CODES	SEE NOTE 6	PCB Dims. +/– 0.2mm
FINISH	SILVER	Routing +/– 0.1mm All holes +/–0.08mm
SCORING	SEE NOTE 7	ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED

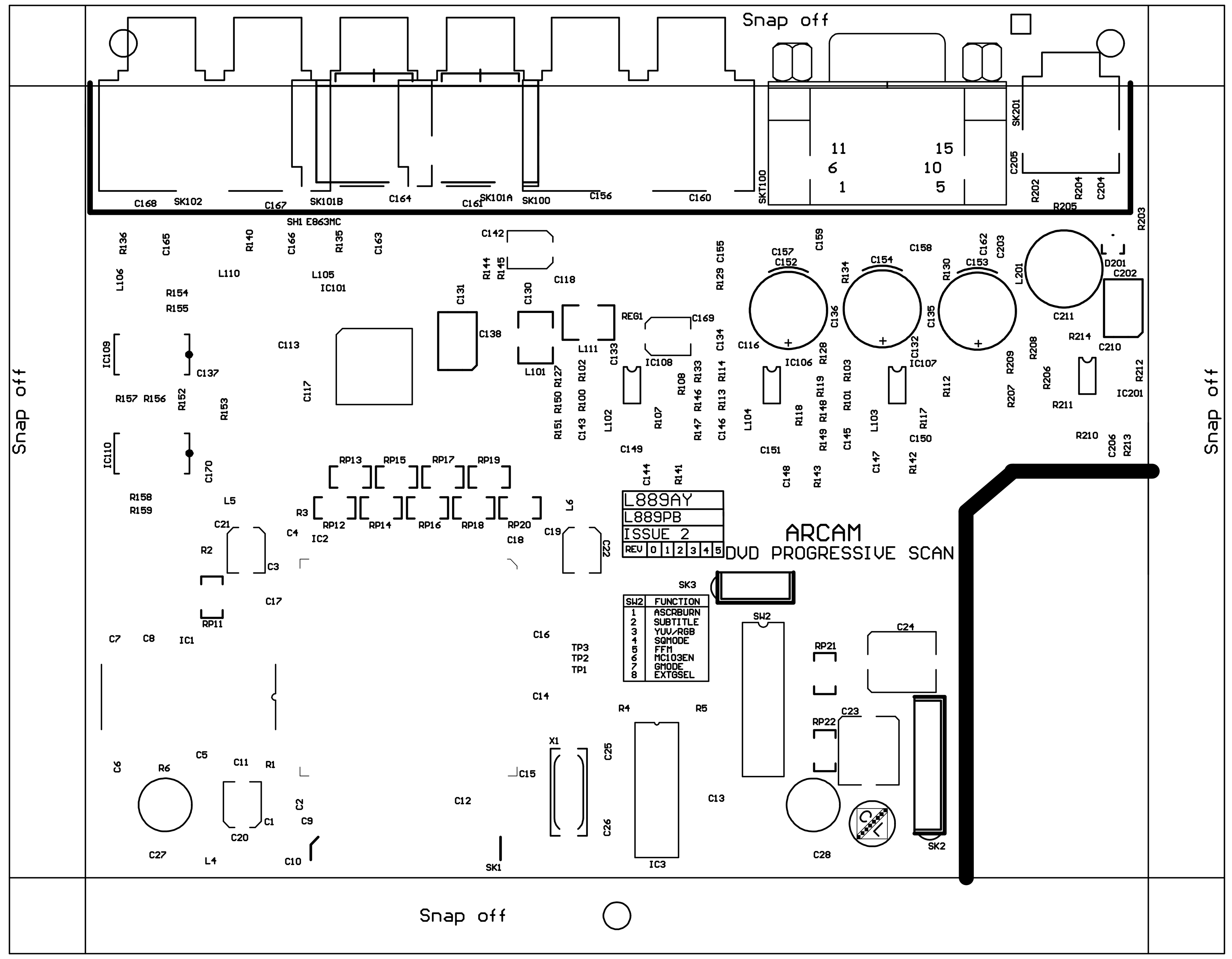
DRAWING TITLE	DVD DSP BOARD Top Overlay	––	––	––	––	––
		––	––	––	––	––
ARCAM	Filename: L875pb_4.pcb	––	––	––	––	––
	DRAWING NO.	––	––	––	––	––
A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB	L875PB	01_1139	CL	08/08/01	CN2 &3 REMOVED, PCB WIDTH CHANGE	4
		E.C.O. No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
	Contact Engineer: CLIFF LAWRENCE	Contact Tel: +44 (0) 1223 203294		Printed: 5–Sep–2001		Sheet 2 of 12


L877pb_2.pcb
Top Overlay
30-Aug-2000
V-groove >>
V-groove >>
V-groove
V-groove
CAUTION LIVE MAINS
CAUTION LIVE MAINS
PAINT ON TX PIN1
OR STEP ON BOBBIN
ABOVE PIN1
PIN1
TX2
TX1
L852TX
SECONDARY
PRIMARY
DBR1
HS1
SHLD1
REPLACE WITH SAME
TYPE FUSES
T315mA
T315mA
F1
F2
F5
SW1
SW2
SK1
SK2
SK3
SK4
SK5
SK6
SK7
SK8
VDR1
VDR2
IC1
IC2
M1
TR1
TR2
TR3
L1
L2
L3
L4
L5
L877AY
ARCAM DVD PSU
L877PBISSUE 2
REV 0 1 2 3 4 5

ASSEMBLY GUIDE

L886pb_3.PCB
Top Overlay
2-Oct-2000

CAM Products 2000(TM): L889PB_2.GTO



MECHANICAL DATA	

LAYER STACKUP	
L889PB_2.GTO	Top Overlay

MATERIAL	FR4	NOTES:–
COPPER WEIGHT	1oz	1/ Manufacture in accordance with IPC–A–600F Class 1.
HOLE SIZES	FINISHED (SEE NOTE 2)	2/ Always use NC drill file as reference.
ROUTING	SEE NOTE 3	3/ All routing 2.0mm unless otherwise shown on drill drawing.
LAYERS	FOUR (SEE NOTE 4)	4/ Pre–preg between layers 1&2 and 3&4.
MINIMUM WIDTH	8 MIL	5/ Photo image resist.
MINIMUM GAP	8 MIL	6/ Mark month/year of manufacture on ident layer.
RESIST	GREEN (SEE NOTE 5)	7/ Scoring denoted by ->>>– on drill drawing.
IDENT	WHITE	GENERAL TOLERANCES
VENDOR CODES	SEE NOTE 6	PCB Dims. +/– 0.2mm
FINISH	SILVER	Routing +/– 0.1mm All holes +/–0.08mm
SCORING	SEE NOTE 7	ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED

DRAWING TITLE	DVD PROGRESSIVE SCAN BOARD	--	--	--	--	--
	Top Overlay	--	--	--	--	--
ARCAM	Filename: L889PB_2.PCB	--	--	--	--	--
	DRAWING NO.	--	--	--	--	--
A & R Cambridge Ltd. Pembroke Avenue Waterbeach Cambridge CB5 9PB	L889PB	01_1136	WAF	27/07/01	UPDATE PCB TO FIT MECH	2
		E.C.O. No.	INITIALS	DATE	DESCRIPTION OF CHANGE	ISSUE
	Contact Engineer: (YOUR NAME)	Contact Tel: +44 (0) 1223 203200		Printed: 5–Sep–2001	Sheet 2 of 12	

TITLE DVD DV88 DISPLAY BOARD			
DWG. No. L886RS	ISSUE 3.0a	ECO No	DATE 17/11/00
DRAWN BY PG	RUN-OUT SHEET		SHEET 1 of 1

Part	Qty	Iss	Description	Designators
1A122	1		RES SM W4 1% 220R 1206	R4
1A147	1		RES SM W4 1% 470R 1206	R5
1A210	3		RES SM W4 1% 1K0 1206	R6 R15 R16
1A247	2		RES SM W4 1% 4K7 1206	R8 R14
1A310	7		RES SM W4 1% 10K 1206	R1 R2 R3 R9 R10 R11 R12
1A333	1		RES SM W4 1% 33K 1206	R7
1A510	1		RES SM W4 1% 1M0 1206	R13
2J210	1		MLC 1N0 50V X7R 10% 0805	C4
2J410	5		MLC 100N 50V X7R 10% 0805	C1 C2 C3 C7 C8
2M610	2		ELST 10U 50V SM	C5 C6
3AS16W	4		DIODE SS SM BAS16W	D1 D2 D3 D4
3C4C5V6	1		ZENER 5V6 OW4 SM SOD110	D5
3D006	1		LED RED/GREEN 3MM L-93WEGW	LED1
3D007	1		LED GREEN 3.1MM SLR-37MG3F	LED2
4A846B	1		TRANS LF SS N SM BC846B	Q6
4A847	3		TRANS LF SS N SM BC847B	Q2 Q3 Q4
4A856B	2		TRANS LF SS P SM BC856B	Q1 Q5
5H2872	1	A	IC FL DRIVER BU2872AK	Z1
5K7474	1		IC HCMOS SM 74HC74	Z2
8K2506	1		6 WAY AMP CT CONN R/A	SK2
8K8408	1		8 WAY FFC CONN SM H 1MM	SK1
A1505	8		TACT SWITCH SM SDTM-610-NTR	SW1 SW2 SW3 SW4 SW5 SW6 SW7 SW8
B1014	1		DISP DVD SVV-07MS09	DISP1
B2107	1		REMOTE RX PIC-26043TM2 38KHZ	RX1
E822AP	1		IR RX SUPPORT PAD	SP1
E874PM	2		VFD display clip	LC1 LC2
L886PB_3	1	X	PRINTED CIRCUIT BOARD	PCB

******** Prototype or pre-production parts used:

5H2872	1	A	IC FL DRIVER BU2872AK	Z1

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

L886PB_3	1	X	PRINTED CIRCUIT BOARD	PCB

****
********************** Additions Since issue 3.0 ***********************
****

Part	Qty	Iss	Description	Designators
1A122	1		RES SM W4 1% 220R 1206	R4

****
********************** Deletions Since issue 3.0 ***********************
****

TITLE DVD DV88 DISPLAY BOARD			
DWG. No. L886RS	ISSUE 3.0a	ECO No	DATE 17/11/00
DRAWN BY PG	RUN-OUT SHEET		SHEET 2 of 1

Part	Qty	Iss	Description	Designators
1M122	1		RES SM 0805 220R	R4

Document title:DVD AV BOARD			
Document number:L878RS	Issue:3	Revision: 3	ECO number:
Date: 27/11/01	Created by: PG		Page 1 of 3

(Excluding parts for NF.)

Part	Qty	Iss	Description	Designators
1A010	1		RES SM W4 1% 10R 1206	R81
1E022	2		RES CF 1W 22R 5%	R9 R10
1H000	1		RES MF W4 1% 0R0	R50
1M000	1		RES SM 0805 0R0	R113
1M010	1		RES SM 0805 10R	R82
1M033	3		RES SM 0805 33R	R63 R64 R74
1M075	16		RES SM 0805 75R	R1 R2 R3 R4 R18 R54 R101 R102 R103 R104 R105 R106 R107 R108 R109 R122
1M110	14		RES SM 0805 100R	C155 R58 R59 R61 R62 R67 R68 R69 R70 R71 R75 R78 R79 R80
1M133	9		RES SM 0805 330R	R12 R13 R14 R55 R56 R57 R66 R72 R73
1M139	3		RES SM 0805 390R	R51 R52 R76
1M168	3		RES SM 0805 680R	R114 R120 R121
1M210	21		RES SM 0805 1K0	R5 R6 R16 R17 R19 R20 R21 R22 R23 R24 R25 R26 R27 R28 R29 R30 R31 R32 R7 R8 R11
1M222	7		RES SM 0805 2K2	R48 R95 R96 R97 R98 R99 R100
1M233	7		RES SM 0805 3K3	R53 R60 R65 R91 R92 R93 R94
1M247	1		RES SM 0805 4K7	R117
1M268	1		RES SM 0805 6K8	R118
1M282	3		RES SM 0805 8K2	R41 R42 R43
1M310	9		RES SM 0805 10K	R15 R33 R34 R35 R36 R37 R38 R39 R40
1M312	4		RES SM 0805 12K	R85 R86 R89 R90
1M322	12		RES SM 0805 22K	R83 R84 R87 R88 R110 R111 R115 R116 R123 R124 R125 R126
1M333	1		RES SM 0805 33K	R49
1M347	4		RES SM 0805 47K	R44 R45 R46 R47
1M547	1		RES SM 0805 4M7	R77
2D122	4		PPRO 220P 5% 63V RA	C86 C87 C88 C89
2D210	8		PPRO 1N0 5% 63V RA	C69 C70 C72 C73 C82 C83 C84 C85
2J210	21		MLC 1N 50V X7R 10% 0805	C17 C18 C50 C51 C52 C53 C63 C64 C65 C66 C147 C148 C149 C150 C151 C152 C153 C154 C159 C160 C161
2J310	2		MLC 10N 50V X7R 10% 0805	C61 C62
2J410	37		MLC 100N 50V X7R 10% 0805	C4 C22 C31 C32 C33 C34 C35 C36 C37 C38 C39 C40 C41 C42 C43 C44 C45 C46 C47 C48 C49 C54 C55 C56 C57 C58 C59 C60 C98 C99 C100 C101 C102 C143 C144 C145 C146
2L022	6		MLC 22P 100V NPO 5% 0805	C119 C120 C121 C122 C123 C124
2L047	17		MLC 47P 100V NPO 5% 0805	C2 C67 C68 C71 C74 C75 C105 C106 C127 C128 C129 C130 C131 C132 C133 C134 C135
2L056	1		MLC 56P 100V NPO 5% 0805	C126
2L110	3		MLC 100P 100V NPO 5% 0805	C138 C139 C140

Document title:DVD AV BOARD			
Document number:L878RS	Issue:3	Revision: 3	ECO number:
Date: 27/11/01	Created by: PG		Page 2 of 3

2L122	2	MLC 220P 100V NPO 5% 0805	C136 C137
2L127	6	MLC 270P 100V NPO 5% 0805	C113 C114 C115 C116 C117 C118
2L133	6	MLC 330P 100V NPO 5% 0805	C107 C108 C109 C110 C111 C112
2L147	1	MLC 470P 100V NPO 5% 0805	C125
2M610	6	ELST 10U 50V SM	C19 C23 C24 C29 C103 C104
2M710	4	ELST 100U 25V SM	C25 C26 C27 C28
2N510	1	ELST 1U0 50V 20% RA	C30
2N610	2	ELST 10U 50V	C10 C12
2N622	6	ELST 22U 63V	C9 C11 C15 C16 C20 C21
2N710	2	ELST 100U 25V	C5 C6
2N747	6	ELST 470U 25V RA	C92 C93 C94 C95 C96 C97
2N833	2	ELST 3M3 25V	C1 C3
2P610	4	ELST 10U 35V STARGET	C76 C78 C79 C81
2P610CS	2	ELEC 10U 25V SILMIC	C141 C142
2P710AC	2	ELEC 100U 50V CERAFINE	C90 C91
3AS16W	1	DIODE SS SM BAS16W	D8
3BS1D	13	RECT S1D 1A 200V SM	D2 D3 D4 D5 D6 D7 D10 D11 D12 D13 D14 D15 D16
3CW53V9	1	ZENER 3V9 0W5 SM SOD123	D1
4A847	2	TRANS LF SS N SM BC847B	Q5 Q12
4A849B	1	TRANS LF SS N SM BC849B	Q1
4A859B	1	TRANS LF SS P SM BC859B	Q11
4D10KN	2	DIGITAL TRANS NPN SM 10KX2	Q8 Q9
4D17H	2	TRANS NPN SM BFS17H	Q2 Q3
5A8740	2	Wolfson 192K 24bit DAC	Z17 Z18
5B2134	2	IC OPAMP DUAL SM OPA2134PA	Z19 Z20
5B5244	3	IC OP AMP DUAL EL5244 SM	Z22 Z23 Z24
5D317T	3	IC VREG POS LM317T	Z1 Z2 Z3
5D337	1	IC VREG POS LM337T	Z4
5D7805	1	IC VREG POS 7805	Z5
5D78L05S	1	IC VREG POS 78L05 SM	Z9
5K7404	1	IC HCMOS SM 74HCU04	Z12
5K74125V	3	IC HCMOS SM 74VHC125	Z14 Z21 Z26
5K7474V	1	IC VHCMOS SM 74VHC74MX	Z10
5K7474VT	3	IC VHCMOS SM 74VHCT74	Z7 Z8 Z28
5KA1U04	1	IC AHC SN74AHC1GU04	Z27
5M7317	1	IC COMPARITOR TA7317P	Z6
5S413DY	1	IC QUAD SPST CMOS SW SO16	Z11
5T172T	1	OPTO TRANSMITTER TOSLINK TOTX173	Z25
7A29398	1	DIGITAL AUDIO TRANSFORMER	T1
7B010	2	10UH IND SM NL322522T-100J	L22 L23
7B033	2	33UH IND SM 1812 180mA	L9 L10
7B822	6	2UH2 IND SM NL322522T-2R2J	L3 L4 L5 L6 L7 L8
7C033	1	33UH IND 2A RA 34-62086	L1
7F004	10	FERRITE BD 1206 BL31A700S	L2 L11 L12 L13 L14 L15 L16 L21 L24 L25
7G002	2	EMI FILTER SM NFM61R30T472	FLT3 FLT4
7X036	1	CRYSTAL 24.576MHz HC49 PARALLEL	X2
7X039	1	CRYSTAL 22.5792MHz HC49 PARALLEL	X1
8D221	1	PHONO SKT SINGLE EMC GOLD	SK10
8D225	2	PHONO SKT 4-WAY EMC GOLD	SK6 SK7
8D2271	1	SVHS 1 WAY VERTICAL	SK8
8D300	1	PCB R/A SCART SKT	SK9
8K2304	1	MOLEX MINI FIT 4 WAY	SK4
8K2408	1	8-WAY AMP CT CONN	SK5
8K8308	1	8 WAY FFC CONN SM V 1MM	SK11
8K8322	3	22-WAY FFC CONN SM 1mm	SK1 SK2 SK3
A215	1	RELAY DPDT 12V SM	RLY2
C3371	2	FUSE R452 T375mA	F1 F2
E857MC	1	DVD AV PCB EMC SHIELD	SH1
F007	1	HEATSINK TO220 CLIP 30	HS1

Document title:DVD AV BOARD			
Document number:L878RS	Issue:3	Revision: 3	ECO number:
Date: 27/11/01	Created by: PG		Page 3 of 3

L878PB_3 1 X PRINTED CIRCUIT BOARD PCB

******** Obsolete, absent, redundant, or incorrect issue in PDM:
L878PB_3 1 X PRINTED CIRCUIT BOARD PCB

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

Part	Qty	Iss	Description	Designators
1M110	1		RES SM 0805 100R	C155

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

Part	Qty	Iss	Description	Designators
2J210	1		MLC 1N 50V X7R 10% 0805	C155

TITLE: DVD DSP BOARD			
DWG. No. L875RS	ISSUE 4.0	ECO No 01_1139	DATE 05/09/01
DRAWN BY CL	RUN-OUT SHEET		SHEET 1 of 2

(Excluding parts for NF.)

Part	Qty	Iss	Description	Designators
1M000	7		RES SM 0805 0R0	R2 R8 R9 R13 R14 R28 R36
1M033	1		RES SM 0805 33R	R37
1M075	8		RES SM 0805 75R	R1 R3 R53 R54 R55 R56 R57 R58
1M110	3		RES SM 0805 100R	R5 R10 R11
1M122	6		RES SM 0805 220R	R16 R17 R18 R19 R20 R21
1M210	15		RES SM 0805 1K0	R7 R22 R23 R31 R32 R33 R34 R45 R46 R47 R48 R49 R50 R51 R52
1M247	8		RES SM 0805 4K7	R4 R6 R30 R38 R59 R60 R62 R63
1M256	2		RES SM 0805 5K6	R24 R25
1M310	3		RES SM 0805 10K	R35 R61 R64
1V110B	3		RES SM 100R X 4ISO	RP4 RP6 RP7
1V333B	1		RES SM 33K X 4ISO	RP8
1V347	4		RES PACK SM 4K7 BUS	RP1 RP2 RP3 RP5
1VA20022	7		RES SM 33R + 47P X 4	RC1 RC2 RC3 RC4 RC5 RC6 RC7
2J210	7		MLC 1N 50V X7R 10% 0805	C1 C41 C46 C47 C53 C54 C55
2J347	1		MLC 47N 50V X7R 10% 0805	C82
2J410	41		MLC 100N 50V X7R 10% 0805	C4 C5 C6 C7 C8 C9 C10 C11 C15 C16 C17 C19 C20 C21 C22 C23 C27 C28 C29 C30 C31 C32 C33 C34 C35 C36 C37 C38 C39 C42 C43 C44 C45 C48 C49 C50 C51 C57 C58 C59 C86
2L022	2		MLC 22P 100V NPO 5% 0805	C2 C3
2L033	2		MLC 33P 100V NPO 5% 0805	C40 C52
2L110	1		MLC 100P 100V NPO 5% 0805	C56
2M610	6		ELST 10U 50V SM	C12 C13 C14 C24 C25 C26
2M710	2		ELST 100U 25V SM	C18 C75
2W047X4	6		CAP SM 47P X 4 ISO	CP1 CP2 CP5 CP6 CP7 CP8
2W110X4	1		CAP SM 100P X 4 ISO	CP3
5B5244	3		IC OP AMP DUAL EL5244 SM	U13 U16 U17
5H1233A	1		IC MICRO RESET DS1233 SM	U1
5H161	1		MICRO INFINEON SABC1610-L16M	U3
5H24256	1		IC SERIAL EEPROM SM 24LC256	U2
5H28040	2		FLASH SST 28SF040-120-4C-NH	U4 U5
5H4161020	1		SAMSUNG KM416S1020CT-G10	U11
5H71024	2		SRAM IDT 71024-S20Y	U6 U7
5K74374	1		IC HCMOS SM 74HC374	U12
5KA100	1		IC AHC SN74AHC1G00	U14
5L36701	1		IC ZR36701 ATAPI AV BRIDGE	U18
5L36710	1		ZR36710	U8
5V7172	1		IC VIDEO CODER ADV7172KST	U9
7B810	1		1UH0 IND SM NL322522T-1R0J	L2
7F004	1		FERRITE BD 1206 BL31A700S	L1
7G002	2		EMI FILTER SM NFM61R30T472	FLT2 FLT3

TITLE: DVD DSP BOARD			
DWG. No. L875RS	ISSUE 4.0	ECO No 01_1139	DATE 05/09/01
DRAWN BY CL	RUN-OUT SHEET		SHEET 2 of 2

7X038	1		CRYSTAL 27MHZ PARALLEL SM	Y2
7X040	1		XTAL 16MHZ SM GSX49-4	Y1
8K2404	2		4-WAY AMP CT CONN	CN8 CN11
8K2408	1		8-WAY AMP CT CONN	CN1
8K8308	1		8 WAY FFC CONN SM V 1MM	CN6
8K8322	3		22-WAY FFC CONN SM 1mm	CN4 CN5 CN9
8KB40	1		CONN 40 WAY IDC 0.1 HEADER	CN10
8S032P	2		IC SOCKET PLCC32 SM	U4 U5
L875PB_4	1	X	PRINTED CIRCUIT BOARD	PCB

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

****
*********************** Additions Since Last Issue ***********************
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Part	Qty	Iss	Description	Designators
L875PB_4	1	X	PRINTED CIRCUIT BOARD	PCB

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*********************** Deletions Since Last Issue ***********************
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Part	Qty	Iss	Description	Designators
L875PB_3	1	X	PRINTED CIRCUIT BOARD	PCB

TITLE DVD PSU BOARD			
DWG. No. L877PB	ISSUE 4.0	ECO No 01_1137	DATE 19/09/01
DRAWN BY CL	RUN-OUT SHEET		SHEET 1 of 2

(Excluding parts for NF.)

Part	Qty	Iss	Description	Designators
1C210	1		RES CF 2W 1K 5%	R11
1E856	1		RES CF 1W 5R6 5%	R16
1H022	2		RES MF W4 1% 22R	R10 R12
1H047	1		RES MF W4 1% 47R	R22
1H210	6		RES MF W4 1% 1K0	R4 R13 R15 R17 R18 R19
1H222	1		RES MF W4 1% 2K2	R20
1H227	1		RES MF W4 1% 2K7	R7
1H233	1		RES MF W4 1% 3K3	R1
1H268	1		RES MF W4 1% 6K8	R6
1H291	1		RES MF W4 1% 9K1	R5
1H310	1		RES MF W4 1% 10K	R8
1H315	2		RES MF W4 1% 15K	R3 R9
1H322	1		RES MF W4 1% 22K	R2
1Q922	1		RES MO 3W 5% 0R22 KOASPR3	R14
1Z115	2		VDR 115V 10J V180ZA1	VDR1 VDR2
2A110	1		CERD 100P 50V -20% +80% RA	C12
2A147	1		CERD 470P 63V 20% RA	C18
2K210	6		PEST 1NF 63V 10%	C10 C11 C19 C25 C30 C36
2K233	4		SUPPR CAP 3N3 250V	C1 C2 C41 C42
2K247A	1		PEST 4N7 63V 10%	C14
2K322	1		PEST 22N 63V 10%	C15
2K410	14		PEST 100N 63V 10%	C5 C6 C9 C13 C16 C22 C23 C27 C29 C32 C33 C35 C37 C38
2N610	1		ELST 10U 50V	C7
2N647	1		ELST 47 35V	C8
2N710	1		ELST 100U 25V	C40
2N747	4		ELST 470U 25V RA	C21 C24 C28 C34
2Z722A	2		220UF 16V 105C LOWZ YXF Series	C17 C39
2Z810A	2		1000UF 16V 105C LOWZ YXF Series	C26 C31
2Z810C	1		1000UF 35V 105C LOWZ YXF Series	C20
2Z810D	2		1000UF 50V 105C LOWZ YXF Series	C3 C4
3A4148	1		SSDIODE 1N4148 75V	D3
3B2KBP02	1		BRIDGE RECTIFIER 2KBP02 2A 200V	DBR1
3B31DQ10	2		RECTIFIER 31DQ10 3.3A 100V	D5 D6
3B4003	1		RECTIFIER 1N4003F 1A 200V	D8
3B4003F	1		ULTRAFAST RECTIFIER DIODE UF4003 1A	D7
3B5403F	1		ULTRAFAST RECTIFIER DIODE UF5404 3A	D4
3C05104	1		Diode 5V1 400mW	DZ3
3C11004	1		ZENER 10V 400MW	DZ2
3C20004	1		ZENER 20V 400MW	DZ1
4A556	1		TRANS LF SS P BC556B	TR2
4B179	1		NPN Driver transistor	TR3

TITLE DVD PSU BOARD			
DWG. No. L877PB	ISSUE 4.0	ECO No 01_1137	DATE 19/09/01
DRAWN BY CL	RUN-OUT SHEET		SHEET 2 of 2

4B180	1	PNP Driver transistor	TR1
4K640	1	TRANS PWR MOSFET IRF640	M1
5D3843	1	IC UC3843N PSU CONTROLLER	IC2
5J74221	1	DUAL MONOSTABLE MULTIVIBRATOR	IC1
7C033	4	33UH IND 2A RA 34-62086	L2 L3 L4 L5
7E030	1	Mains common mode choke	L1
8A001	1	IEC MAINS CONN PCB INS PX	SK1
8K2304	1	MOLEX MINI FIT 4 WAY	SK6
8K2306	1	MOLEX MINI FIT HCS 6 WAY	SK7
8K2406	1	6-WAY AMP CT CONN	SK2
8K2407	1	7 WAY AMP CT CONN	SK5
8K2408	3	8-WAY AMP CT CONN	SK3 SK4 SK8
8M101	1	EARTH LEAD	EL
8S004	2	FUSEHOLDER 20mm PCB	F1 F2
A1010	1	SW PUSH MAINS DPST TV-8	SW1
A1404	1	VOLTAGE SELECTOR SLIDE SWITCH	SW2
C11316	2	FUSE 20mm 315mA T S504315ma	F1 F2
C41506	1	FUSE BUSSMAN BK/ETF SERIES	F5
E5402	1	MAINS EMC SHIELD	SHLD1
F006	1	HEATSINK CLIP TO220 13/8.6 DC/W	HS1
F008	1	HEATSINK TO220 8.6 DEGC/W	HS1
F022	2	INS COVER PCB FUSEHOLDER	F1 F2
F082	1	TO-220 SIL PAD	SP1
HP007	2	COPPER RIVET TCP/D48 BS	SK1 SK1
L852TX	1	DVD TORROIDAL TX AD3483T	TX1
L877PB_4	1	PRINTED CIRCUIT BOARD	PCB
L878TX	1	TEST INDUCTOR	TX2

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******************** Additions Since L877RS Issue 2 *********************
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Part	Qty Iss	Description	Designators
2K233	2	SUPPR CAP 3N3 250V	C41 C42
L877PB_4	1	PRINTED CIRCUIT BOARD	PCB
A1010	1	SW PUSH MAINS DPST TV-8	SW1

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******************** Deletions Since L877RS Issue 2 *********************
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Part	Qty Iss	Description	Designators
E66901	1	MAINS SWITCH SPACER	MS1
L877PB_2	1	PRINTED CIRCUIT BOARD	PCB
A1007	1	SWITCH PUSH MAINS OPST SDS3P	SW1

TITLE DVD PROGRESSIVE SCAN BOARD			
DWG. No. L889RS	ISSUE 2.0	ECO No 01_1136	DATE 04/09/01
DRAWN BY CL	RUN-OUT SHEET		SHEET 1 of 2

(Excluding parts for NF.)

Part	Qty	Iss	Description	Designators
1A000	1		RES SM W4 1% 0R0 1206	L101
1M000	1		RES SM 0805 0R0	R213
1M022	2		RES SM 0805 22R	R157 R158
1M033	1		RES SM 0805 33R	R1
1M075	14		RES SM 0805 75R	R3 R127 R128 R129 R130 R133 R134 R135 R136 R140 R141 R142 R143 R154
1M115	7		RES SM 0805 150R	R145 R146 R147 R148 R149 R150 R151
1M156	12		RES SM 0805 560R	R100 R101 R102 R103 R107 R108 R112 R113 R114 R117 R118 R119
1M210	2		RES SM 0805 1K0	R202 R203
1M215	1		RES SM 0805 1K5	R211
1M218	2		RES SM 0805 1K8	R209 R210
1M222	6		RES SM 0805 2K2	R4 R5 R144 R152 R155 R159
1M247	3		RES SM 0805 4K7	R2 R6 R204
1M310	3		RES SM 0805 10K	R207 R208 R214
1M410	2		RES SM 0805 100K	R205 R206
1V033B	10		RES SM 33R X 4ISO	RP11 RP12 RP13 RP14 RP15 RP16 RP17 RP18 RP19 RP20
1V333B	2		RES SM 33K X 4ISO	RP21 RP22
2D168	1		PPRO 680P 5% 63V RA	C202
2J210	3		MLC 1N 50V X7R 10% 0805	C1 C4 C18
2J310	5		MLC 10N 50V X7R 10% 0805	C156 C167 C203 C204 C210
2J410	29		MLC 100N 50V X7R 10% 0805	C2 C3 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C16 C17 C19 C113 C116 C117 C118 C130 C131 C132 C133 C134 C135 C136 C137 C170
2K447	1		PEST 470N 63V 10%	C138
2L022	2		MLC 22P 100V NPO 5% 0805	C25 C26
2L110	6		MLC 100P 100V NPO 5% 0805	C155 C158 C159 C163 C165 C166
2L112	6		MLC 120P 100V NPO 5% 0805	C143 C144 C145 C146 C147 C148
2L147	2		MLC 470P 100V NPO 5% 0805	C206 C211
2L882	3		MLC 8P2 100V NPO 5% 0805	C149 C150 C151
2M610	5		ELST 10U 50V SM	C20 C21 C22 C142 C169
2M710	2		ELST 100U 25V SM	C23 C24
2N747	3		ELST 470U 25V RA	C152 C153 C154
3CW34V7	1		ZENER 4V7 OW 35 SM SOT23	D201
5B5244	3		IC OP AMP DUAL EL5244 SM	IC106 IC107 IC108
5D10863S	1		IC VREG LM1086CS-3.3	REG1
5H6432	1		SDRAM 512K X 32BIT X 4	IC1

TITLE DVD PROGRESSIVE SCAN BOARD			
DWG. No. L889RS	ISSUE 2.0	ECO No 01_1136	DATE 04/09/01
DRAWN BY CL	RUN-OUT SHEET		SHEET 2 of 2

5K74125T	1	IC 74HCT125 SM	IC109
5K74125V	1	IC 74VHC125 SM	IC110
5M393AD	1	IC COMPARITOR SM DUAL LM393A	IC201
5V0103	1	SII503 Progressive Scan IC	IC2
5V7196	1	IC DAC TRIPLE 10BIT VIDEO DAC	IC101
7B033	1	33UH IND SM 1812 180mA	L111
7B810	3	1UH0 IND SM NL322522T-1R0J	L102 L103 L104
7D327	1	27mH INDUCTOR	L201
7F004	6	FERRITE BD 1206 BL31A700S	L4 L5 L6 L105 L106 L110
7X041	1	XTAL 20MHZ SM GSX49-4	X1
8D221	1	PHONO SKT SINGLE EMC GOLD	SK101A
8D228	1	MIN JACK SINGLE 3.5mm	SK201
8D230	1	PHONO SKT 2-WAY HOR EMC GOLD	SK100
8K2404	1	4-WAY AMP CT CONN	SK3
8K2408	1	8-WAY AMP CT CONN	SK2
8K8322	1	22-WAY FFC CONN SM 1mm	SK1
A1601	1	SW DIL 8WAY SM	SW2
E863MC	1	DVD PROG SCAN PCB SCREEN	SH1
L017AY	1	DVDO Prog Scan Microcontroller	IC3
L889PB_2	1	PRINTED CIRCUIT BOARD	PCB

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******************** Additions Since L889RS Issue 1 *********************
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Part	Qty	Iss	Description	Designators
L889PB_2	1		PRINTED CIRCUIT BOARD	PCB

****
******************** Deletions Since L889RS Issue 1 *********************
****

Part	Qty	Iss	Description	Designators
L889PB_1	1		PRINTED CIRCUIT BOARD	PCB

SHEET **1** OF **3**	DRG DESC. DV88 GENERAL ASSY	DRG NO. E963RS / WD88V 8

DATE	ECO NO.	DESCRIPTION OF CHANGE	ISS
24/4/01	01_1080	Change dvd mech was b2011 now b2013	10
12/6/01	01_1110	ADD EARTH LABELS	11
24/7/01	01_1131	ADD F214	12

ITEM	240V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
A	L815RC					REMOTE CONTROL		1

ITEM	240V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
			C11316			FUSE	FOR FUSE & SPARE	2
			E802SL			100V LABEL		1
			L885TX			TRANSFORMER	L852TX FITTED AS STANDARD AT SUB CON	1
				E828CP	E827CP	COVER PLATE		1
				E899AY	E998AY	DVD DRAWER FRONT ASSY		1
				E970AY	E987AY	FRONT PANEL ASSEMBLY		1
				HA4V06S	HA4V06B	M4 X 6mm SCREW		4
	B2013					DVD MECH		1
	E026AY					CHASSIS DVD / CD SUB PANEL		1
	E802AP					DAMPING PAD 15X6X3MM	L878AY AT Z17,Z18,C90,C91,C1,C3,RLY1 x1, x3	6.5
	E805MI					DVD MAINS INSULATOR		1
	E814BG					DVD PROG SCAN BLANKING GASKET		1
	E815BG					DVD 2ND AUDIO BLANKING GASKET		1
	E820AY					REAR PANEL ASSEMBLY		1
	E840MC					DVD MECH MOUNTING BRACKET (DVS)		2
	E864MC					EMC FINGER STRIP CURVED	SUB PANEL	19.5m
	E865MC					EMC FINGER STRIP TOOTHED	CHASSIS REAR & FRONT	21.5m
	E870PM					MAINS BUTTON		1
	E879PM					FOOT		4
	E879SL					CONFIGURATION LABEL		1
	E894SL					DVD LICENSING LABEL		1
	E910MC					DVD DAMPING PLATE		1
	E911MC					DVD DAMPING PAD	TO FIT E910MC INTO E812CH	1

SHEET **2** OF **3**	DRG DESC. DV88 GENERAL ASSY	DRG NO. E963RS / WD88V 8	
DATE	ECO NO.	DESCRIPTION OF CHANGE	ISS
24/4/01	01_1080	Change dvd mech was b2011 now b2013	10
12/6/01	01_1110	ADD EARTH LABELS	11
24/7/01	01_1131	ADD F214	12

ITEM	240V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
	E925SL					DVD PSU 240V FUSE LABEL INHOUSE	ON L887AY NEXT TO FUSES	2
	F164					TAPE 3509 BK 3M TESA 5MM WIDE		1
	F208					ANTI-VIBRATION MOUNT	TO FIT B2011 TO E840MC	4
	F214					WHITE 12MM DOUBLE SIDED STICKY TAPE	STICK ADAPTOR TO MECH FRONT	120MM
	HA3A06A					M/C PAN SUPA M3x06 STZP		4
	HA3L10B					M3 x 10mm SOCKET HEAD CAP SCREW STBK	PS PCB TO CHASSIS POS=N NEXT TO SWITCH	1
	HA3V10A					M3 x10mm MACHINE SCREW	MOTHER PCB FXGS	31
	HA4A12B					M/C PAN SUPA M4X12 STBK		1
	HE6V06B					No. 6 x 6mm SELF TAPPER	FASCIA FXGS SCART	6
	HF4V09B					No. 4 x 9mm SELF TAPPER	RR PAN, COVER	19
	HJ3A00A					NUT M3 FULL STZP	TO FIT B2011 TO F208 - LOCK M3 THREAD OF UT WITH NAIL POLISH AT ASSEMBLY	4
	HJ4A00A					NUT M4 FULL STZP		1
	HL4AF	?				M4 FIBER WASHER		1
	HL4SA					WASHER M4 IN LOCK STZP		1
	K5408					light pipe sleeving		1
	L817ESW					5H28040 [IC FLASH SST] + L817ESW	L875AY U4	1
	L817OSW					5H28040 [IC FLASH SST] + L817OSW	L875AY U5	1
	L843CA					DVD CABLE ASS PSU TO DISP	PSU-DISP	1
	L844CA					DVD CABLE ASS PSU TO DSP	PSU-DSP	1
	L845CA					DVD CABLE ASS PSU TO MECH	PSU - MECH	1
	L846CA					DVD CABLE ASS PSU TO AV	PSU - AV	1
	L847CA					DVD CABLE ASS DSP TO DISPLAY	DSP -DISP	1
	L848CA					DVD CABLE ASS AV TO DSP	AV - DSP	2
	L853CA					DVD CABLE ASS AC POWER	AC POWER	1

SHEET **3** OF **3**	DRG DESC. DV88 GENERAL ASSY	DRG NO. E963RS / WD88V 8	
DATE	ECO NO.	DESCRIPTION OF CHANGE	ISS
24/4/01	01_1080	Change dvd mech was b2011 now b2013	10
12/6/01	01_1110	ADD EARTH LABELS	11
24/7/01	01_1131	ADD F214	12

ITEM	240V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
	L854CA					DVD CABLE MECH IDC	MECH - DSP	1
	L875AY	WD88V 1A				DVD DSP PC ASSEMBLY		1
	L877AY	WD88V 2A				DVD PSU PCB ASSEMBLY		1
	L878AY	WD88V 4A				DVD AV PCB ASSEMBLY		1
	L886AY	WD88V 3A				DVD DISPLAY PCB ASSEMBLY		1
	SL025					LASER WARNING	FOR REAR PANEL	1
	SL158					EARTH SYMBOL LABEL	ON OUTSIDE OF CHASSIS WHERE EATHE EAD IS ATTACHED	1

SHEET **1** OF **1**	DRG DESC. **DV88 PROGRESSIVE SCAN UPGRADE KIT**	DRG NO. **E037RS**

DATE	ECO NO.	DESCRIPTION OF CHANGE	ISS
27/04/01	**-**	**PRODUCTION RELEASE**	**1**
2/5/01	**-**	**PRODUCTION RELEASE SJOULD HAVE HAD L844CA**	**1A**

ITEM	240V	115V	100V	SILVER	BLACK	DESCRIPTION	WHERE USED	QTY
	L889AY					PROGRESSIVE SCAN PCB ASSEMBLY	DSP CN10 TO DVD MECH	1
	L857CA					DVD CABLE ASSY FLEX FOIL	DSP SK1 TO PROG SCAN CN4	1
	L859CA					DVD CABLE ASSY 4-WAY	DSP SK3 TO PROG SCAN CN11	1
	E817BG					VGA CONNECTOR BLANKING GASKET	USED ON REAR PANEL	1
	H029					30mm x M3 TAPPED PILLAR (8mm STUD END)	TO FIT PCB	2
	HF4V09B					TORX SCREW No.4 x 9mm, BLACK	FIT PCB ASSY INTO REAR PANEL	5
	HA3V06A					M/C SCREW M3 x 6mm, STEEL ZINC PLATE	SECURE PCB TO PILLARS	2
	F200					PLASTIC GROMMET, BLACK	HOLE BLANKING ON REAR PANEL	3
	L844CA					DVD CABLE ASS PSU TO DSP	PSU SK8 TO PROG SCAN SK2	1
	E824PK					PACKING BOX		1
	U069					ANTI-STATIC PLASTIC BAG		1
	E865SL					ACCESSORY BOX LABEL	TO STICK ON OUTSIDE OF E824PK	1
	E923SL					CARTON LABEL	TO STICK OVER “ALPHA” TEXT ON E865SL	1
	L932AY					SOFTWARE & FIRMWARE UPGRADE DISKS	(CONSISTS OF L930AY, L931AY & DISC BOX)	1
	SH105E					UPGRADE KIT FITTING INSTRUCTIONS		1
	SH098 (E)					DV88 PROG SCAN INSTRUCTIONS INSERT	HANDBOOK ADDENDUM	1