ARCAM

D250/D270 CD UNITS
SERVICE MANUAL

ARCAM DELTA D250/D270 SERVICE MANUAL

Issue 1 Paul Newton August '93

Arcam Drawing No. HO4/0019

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CIRCUIT DESCRIPTION

The Delta CD players D250 and D270 share common boards with the only difference between the two being the output board which for the D270 is an audio output board and for the D250, which is the transport only version, an output board providing the coaxial and optical digital outputs.

AUDIO BOARD (D270 only)

Digital filter and DAC

The WORD SELECT (WSAB), CLOCK (CLK) and DATA (DAAB) from the engine board are sent to the oversampling filter Z309 YSF210. WSAB is divided by 4 by the 'D' type flip flops in Z306 outputs from filter are then fed to the DAC Z308 (PCM69).

The master clock for the filter and DAC is provided by the 16.9344 MHz crystal X301 and its associated components.

To provide a 11.28MHz to drive the engine board the 16.9344MHz clock is divided down by 6 by Z302-b, Z303b and Z304a+b to produce a 2.83MHz square wave.

This is clipped and the signal passed through a 11.2897MHZ crystal which acts as a filter allowing only the 4th harmonic of the 2.8MHz through to produce a 11.2896MHz clock. This is reshaped by Z305 before passing to the engine board. This has to be done like this to ensure the engine clock is synchronized to the master clock.

The digital output signal (DOBM) is derived from the engine board and via exclusive or gates Z303 and coupling transformers L303, 303 provides a balanced output on two phono sockets.

Audio Section

Z1-A is configured to amplify the current source output from the DAC to produce a voltage level output. C5 in the feedback loop acts as the first stage of anti-alias filtering. A passive low pass filter, R6 and C8, provides another stage of anti-aliasing filter. The passive filter network C6,R7 and C7 may be switched into the signal path when Q1 is switched on. This is done when de-emphasis is required.

Z1-B buffers the output from the second stage filter/de-emphasis to drive audio line outputs directly.

D.C. Servo

To avoid the use of electrolytic capacitors in the audio signal path, Z401 is configured as a d.c. servo integrator to ensure that the audio line output is always kept at a mean d.c. level of 0V. The d.c. error signal controls a current source, Q2, which applies current to the current node at the input of Z1-A so as to ensure no d.c. voltage offset at the line outputs.

Power Supplies

The transformer board contains 2 transformers, one for the audio board supplies and the other for the digital supplies.

The output from the digital transformer is used to provide 6 smoothed and regulated supplies at +27V, +/-9V and three +5V supplies for the DAC, clock and engine.

The audio transformer is smoothed and rectified to give +/-12V and a +5V supply for the DAC also.

The mute circuit, based around Z210 is powered from the AC winding and half wave rectified and smoothed.

DIGITAL BOARD (D250 only)

The data from the engine board arriving at SK301? is already in the correct format to send to an external DAC e.g. the Black Box. The main task of the digital output board is to remove jitter from the data then to buffer the data to drive a coaxial cable at the correct level and also drive the optical TOSLINK output. A crystal oscillator is also on this board. This is used as a low-jitter reference XTAL clock for the audio data and as a system clock by the decoder board.

A special feature of this board is the ability to override the XTAL clock with an external clock source via a TOSLINK input. This enables the audio data to be synchronized with a reference clock in the external DAC e.g. the Black Box 50.

To minimize any jitter on the clock and audio data signals, every section on this board has its own 5V power supply, hence the large number of voltage regulators and voltage dropping resistors.

Coaxial Outputs

The coaxial outputs are driven by Z1 (LM6221). The level shifter and band pass filter network of R16, R17, C19 and C28 attenuates and level shifts the 0-5V signal from Z2 down to the +/- 0.3V levels required at the outputs. In addition, R16 and C19 form a low pass filter and C28 acts as a d.c. block.

Shift Register

The shift registers, Z2 & Z3, is used to re-synch the audio data signal edges to the XTAL clock. This dramatically reduces any jitter on the data edges of the data from the decoder board. Each of the shift registers has 8 outputs, each being a successive tap on the shift register.

Clock Buffer

The clock signal is used by the decoder board and the shift register. To prevent any interference to the shift register clock signal from any loading effects of the decoder board, two separate CMOS buffers are used, Z1-D and Z1-E.

XTAL clock

The oscillator circuit is based around Z1-F CMOS buffer. This is a standard Pierce oscillator which, as it happens, is also one of the best circuits for producing a low jitter clock. The clock signal is taken from the buffer input rather than the output in the same way on-chip XTAL oscillators work.

Clock override switch and External clock detector

If an external clock signal has been recovered, then the internal clock must be switched off and the new clock signal can replace it. Q1 is used as the switch when this

happens. When the signal detector, D3, D4, C4, R3 and C5 is charged up by the presence of a signal at the output of the CMOS buffer, Z1-C, then Q1 is switched on and connects this signal onto the unbuffered clock link. Because this line is connected to the input of the XTAL oscillator, not the output, the XTAL oscillator is overridden and simply resonates at the external clock frequency.

Frequency multiplier and XTAL filter

The TOSLINK optical link only has a bandwidth of about 5MHz, so it is impossible to send a 11.2896MHz clock signal along it. To overcome this problem, a lower frequency is sent, 11.2896MHz/4 = 2.8224MHz. A frequency multiplier is used to regenerate the 11.2896MHz clock.

The incoming clock signal is assumed to be a square wave, this waveform only contains odd harmonics i.e. f, f*3, f*5 ,etc. The required clock frequency is f*4 which is an even harmonic. To obtain the even harmonics, a pulse shaper is used to generate a rectangular waveform which contains both odd and even harmonics. C1, R1 ensure that positive going pulses at the output of Z1-A, the 2.8224MHz signal, are cut short. D1 restores the 0V level for negative going pulses.

The f*4, 11.2896MHz component is extracted from the resulting pulses by use of an XTAL filter, this signal is then buffered by Z1-C to yield an 11.2896MHz clock signal.

Power Supplies

The transformer board contains 2 transformers, one for the digital board supplies and the other for the digital supplies.

The output from the digital transformer is used to provide 6 smoothed and regulated supplies at +27V, +/-9V and three +5V supplies for the DAC, clock and engine.

The other smaller transformers output is rectified and regulated to give +/- 8V. This voltage is then fed to 4 +5v regulators, (Z5,6,7,8), and a -5v regulator, Z9. Thses regulated supplies are used to power the various ics on the digital board.

SERVO & ENGINE PCB's

Servo Board

The TDA8808(IC 7001) ic is the photo diode signal processors for the laser unit. The TDA8808 amplifies the photo-diode signals and processes the error signals for the focus and radial control network. IC 7003 (TCA0372) is a high power op-amp to drive the radial arm.

Engine Board

The TDA8809 (IC7002) provides control signals for the radial motor. These signals are generated from radial error signals received from the TDA8808 and velocity control signals from the control processor.
IC 7131 (4560) is used to drive the turntable motor and IC7600 (TCA0372) drives the tray motor.
The A chip SAA7310 (IC7100) demodulates the HF signal from the servo board into digital form, performs a series of decoding / error correcting functions on the data using the 64k DRAM (IC7102) as working space. It finally outputs various signals to the digital output generating ic, PCF3523 and also to the audio/digital boards. The A chip also passes the

Q channel data extracted in the decoding process to the servo micro as mentioned earlier. The A chip governs the speed of the turntable motor by comparing the rate of data read off the disc with the master clock frequency then increasing or decreasing the turntable speed for the required data rate.

DISPLAY BOARD

The display board carries the key to the operation of the player the servo microprocessor, XC409032P (P304), which initiates start-up, track jumping and searching in the CDM9. It also has a certain degree of control over the A chip (SAA 7310P). In turn the A chip provides decoded Q channel data (disc time and track no. information) back to the microprocessor. The servo micro is also in two way contact with the keyboard scan/display driver ic, Z601 via the I^2C bus which can request this Q channel data for display purposes. The servo micro can also receive commands from Z601 (e.g. start \stop \go to track). On receipt of this instruction the servo micro carries out the appropriate routines for the instruction.

The appropriate signals are passed to and from these ic's to the audio or digital board via connector SK301.

The meaning of the used signals is as follows:

Si/RD: On/off control for the focus servo system. This line is continuously made low by the SERVO-uP during the stop condition. At starting up, the SERVO-uP forces this line in a high-Z state. In this case the focus servo system is enabled. After some time the Si/RD-signal is made low for a short period to indicate that the focus servo is ready.

TL: Track loss. This signal is made low by the TDA8808 as soon as a track is lost.

REdig: Digital radial error signal (Re2-RE1).

BO:
B1:
B2:
B3: Input control bits for off-, catch-, play-status and DAC-output-current for radial motor.

RE: ½ bit DAC. This signal is normally held high-Z by the SERVO-uP. However when TL goes low the RE line can influence the proportional amplification of the radial servo (improved S-curve).

CRI: Counter reset inhibit. This signal goes low during a real track loss (>600us) or during execution of a jump command. When low, this signal allows the divide-by-588 master counter in the DEMOD timing of the SAA7310 to run free. The signal becomes high during initialization of the "catch" status of the radial servo.

DODS: Drop-out detector suppression. This signal is externally hard wired with the CRI-signal.

QRA:
QDA: Subcode channel.
QCL:

SWAB/SSM: Subcoding word clock and start/stop turntable motor. This line is continuously made low by the SERVO-uP during the stop condition. At starting up the SERVO-uP forces this line to the high-Z state. In this case the turntable motor is started and the subcoding word clock is connected to this line by the SAA7310. If this line is forced low by the SERVO-uP, a motor stop condition will be decoded by the SAA7310 and fed to the turntable motor control logic circuit.

MC: Motor speed control. The SERVO-uP uses this line to measure the turntable motor starting up time. This is necessary for the 8cm/12cm disk identification and for the software controlled brake of the turntable motor.

TTMO: Motor offset and bandwidth switch. At starting up the turntable motor, the SERVO-uP measures the starting up time (cfr. MCES). If this time is small (small moment of inertia), the TTMO line it turned high by the SERVO-uP. If this time is long (high moment of inertia), the TTMO line remains low. As the TTMO line is switched high the DC amplification is lowered and an offset is injected to the turntable motor circuit.

MUTE/MUSB: Digital filter mute signal. This line controls the muting of the digital filter. The MUTE line is made low by the SERVO-uP +/- 32ms before a point to point search is executed, the pause is initialized or the stop function is executed. When the MUTE line is made low, the data samples are decreased smoothly to zero following a cosine curve. 32 coefficients are used to step down the value of the data, each one being used 31 times before stepping onto the next. The MUTE signal is made high by the SERVO-uP as soon as the normal playing state is initialized (pause off, point to point search executed and audio mute off). When the MUTE signal is made high, the data samples are returned to full level again following a cosine curve with the same coefficients as before being used in reverse order.

ATSB: Attenuation. This signal is made low by the SERVO-uP as soon as a "set attenuate on" command or a "jump grooves forward/revers and set attenuate on" command is executed. Then this signal is made low, the data samples are multiplied by a coefficient that provides -12dB attenuation. The ATSB signal is made high again when a "set attenuate off" command or a stop procedure is executed.

Sin: Tray switch. This line is used by the SERVO-uP to control the loading. The Sin signal should be low if the tray is complete in or complete out. In all other cases this line should be high (pulled up). If the tray is complete out and the SERVO-uP detects a change of the Sin signal (from low to high), the tray is pulled inward (push tray).

TRMOT1: Tray motor drive. This line is used by the SERVO-uP activate the tray motor.

When this line is low (-5v) the tray is going inward, when this line is high (0v) the tray is going outward. It the TRMOT line is set to a high-Z state by the SERVO-uP, the tray motor is stopped.

DMUTE: Digital mute. Goes low on mute on signal and does not affect the analogue outputs.

ANI: Analogue inhibit on. Mutes the data to the DAC but does not affect digital output.

DIV4: Divide by 4 signal. When low the fast jump feature is disabled, when high it is enabled. The servo uP controls the DIV4 line of the TDA8809 and if it becomes low the REdig signal is divided by 4 and redirected to the TL input of the servo uP. This is to provide an appropriate bandwidth for a fast jump.

DISASSEMBLY FOR SERVICE

ANTI STATIC PRECAUTIONS MUST BE OBSERVED

1. Remove the cover by removing 2 screws from each side & 4 from the rear panel.

2. Remove the front panel by removing 2 screws from each end of the front.

3. To remove the audio or digital board remove 1 screw from each of the output sockets (& 1 extra screw on the D250). Now release the 4 connecting leads from the side of the board and the digital lead from the engine board. By squeezing the tops of the pcb pillars and pulling the board upwards the board can be removed from the unit.

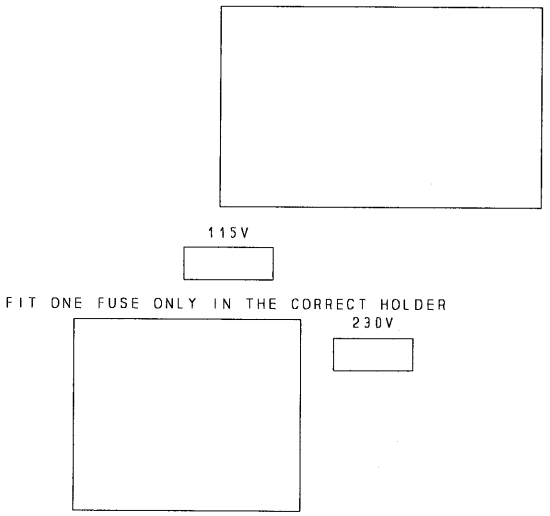
4. The mechanism can be removed by sliding the tray forward to reveal the rear mounting screw. Remove this screw and the two holding the mechanism to the subfront. Release the connector from the pcb under the mechanism and the assembly of mechanism and servo pcb can be removed from the chassis by pulling it out backwards.

5. The engine board is under the audio or digital board dependant on the unit and can be removed once this board has been removed by simply unscrewing the pcb pillars that the audio/digital board was mounted on and lifting out.

CHANGE OF MAINS VOLTAGE

WARNING - the unit **must** be unplugged from the mains when replacing the fuse as the mains inlet and fuse are at mains potential even with the unit switched off.

To change the mains voltage on the D270/250 requires removing the fuse from the original fuseholder and fitting a new fuse to the fuseholder marked with the required voltage (see diagram below).

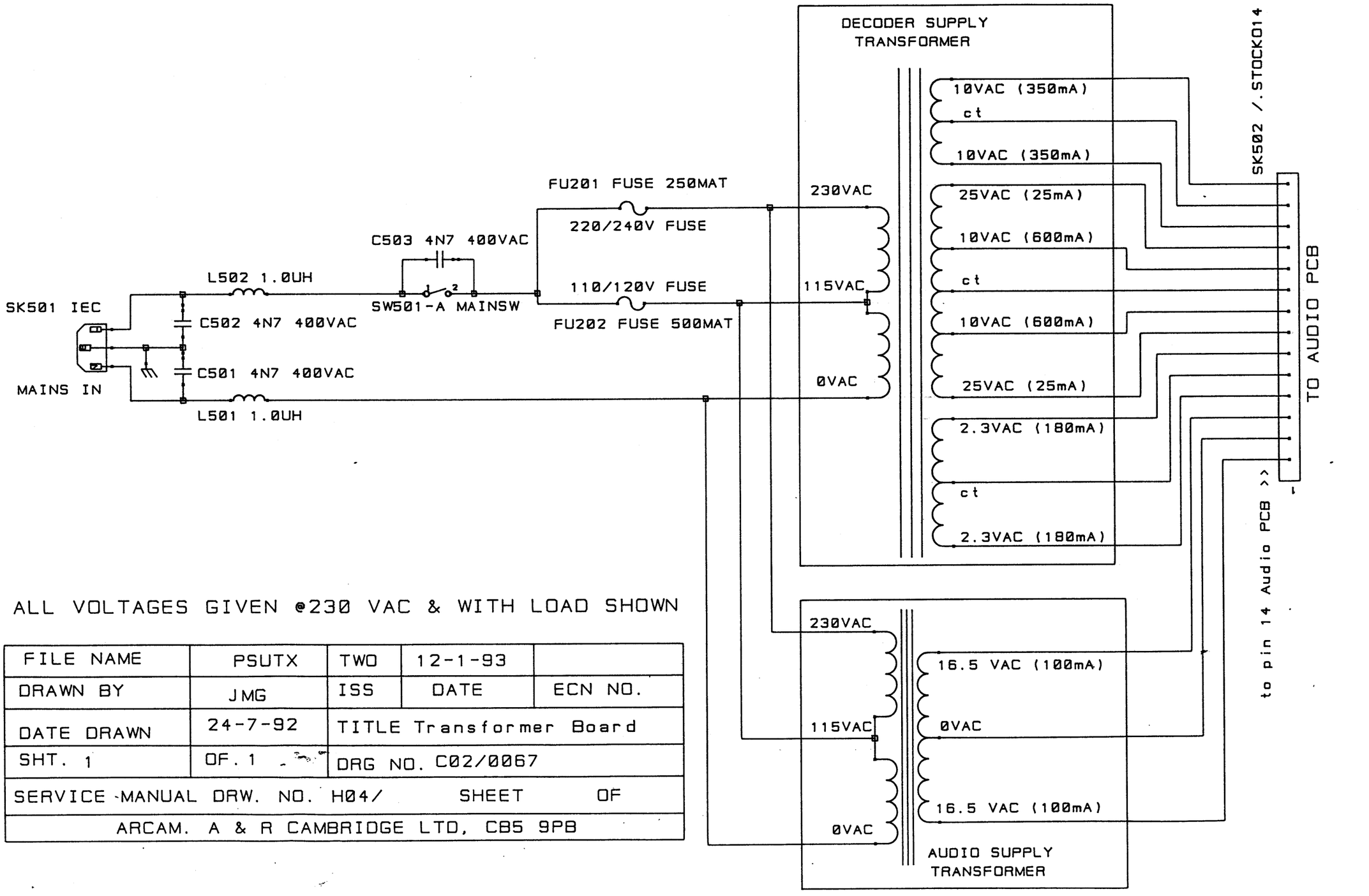


The correct fuses are: 250mA antisurge for 230v
500mA antisurge for 115v

CIRCUIT DIAGRAMS
SERVO PCB
ENGINE PCB
D270 AUDIO BOARD: POWER SUPPLIES
D270 AUDIO BOARD: CLOCK & DAC
D270 AUDIO BOARD: AUDIO OUTPUT STAGE
D250 DIGITAL BOARD: OUTPUT STAGE
D250 DIGITAL BOARD: POWER SUPPLIES
DISPLAY BOARD: SERVO MICROPROCESSOR
DISPLAY BOARD: KEYBOARD SCAN
TRANSFORMER BOARD

1 of 1 C02 0067

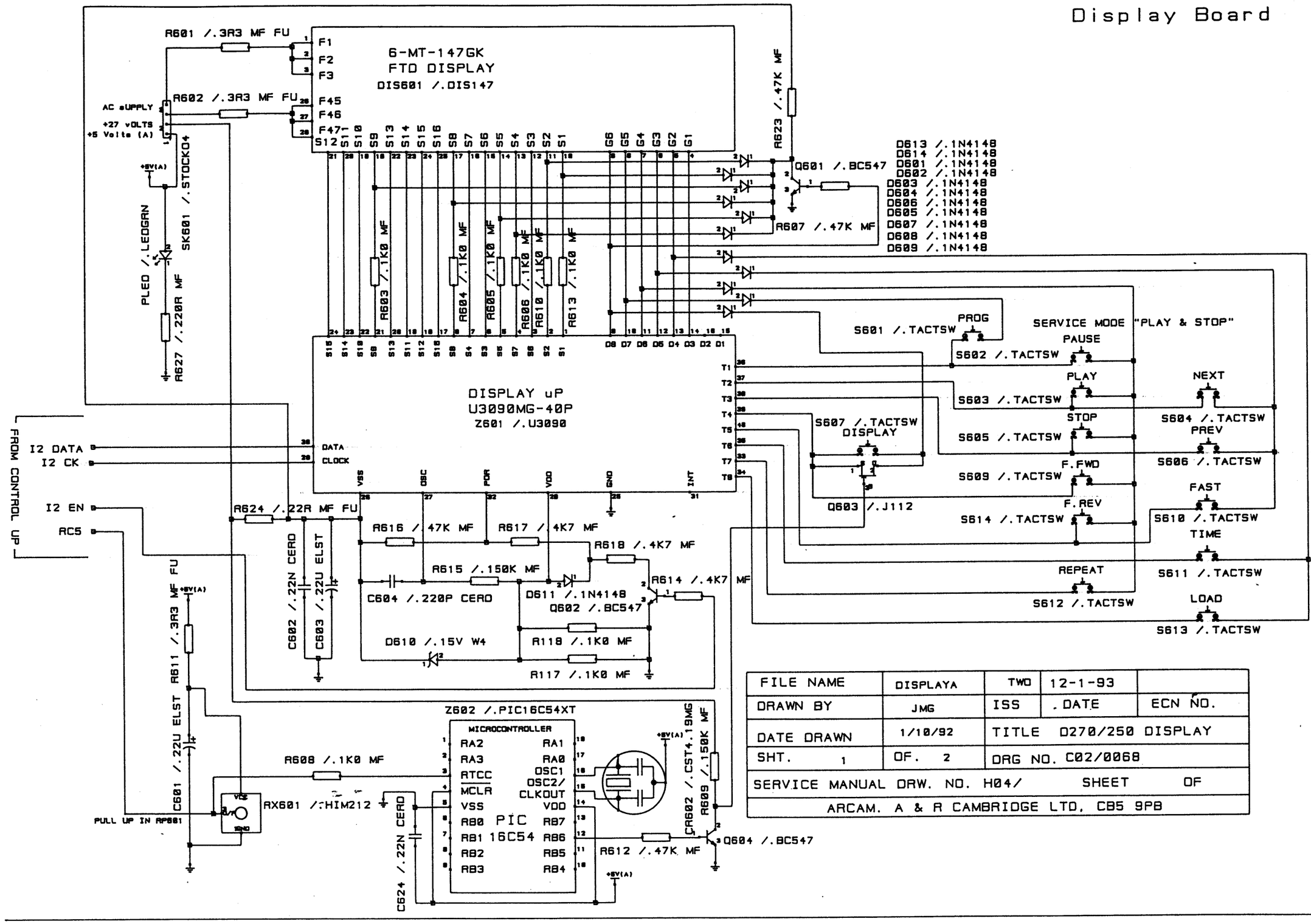
Transformer Board



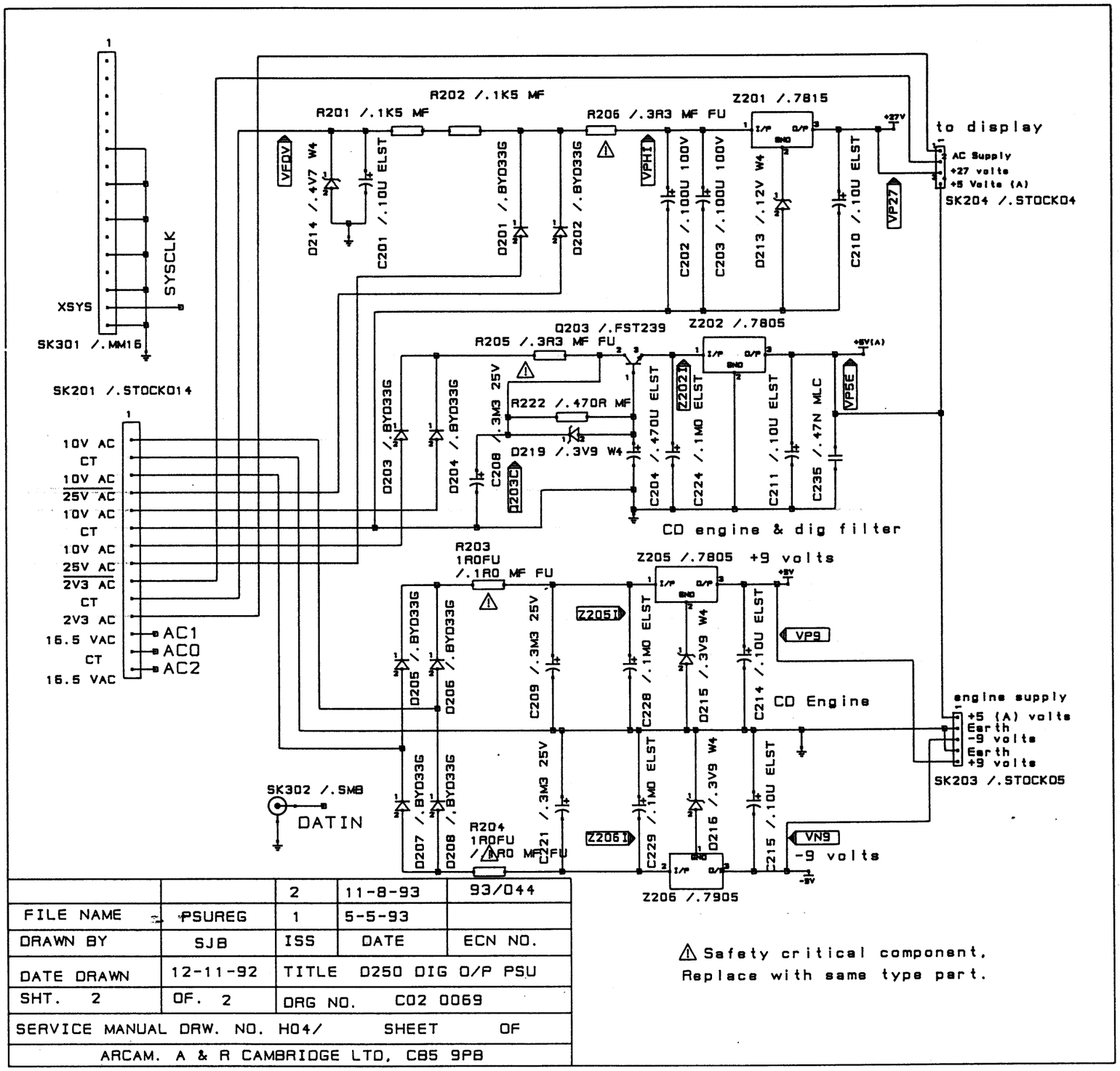
ALL VOLTAGES GIVEN @230 VAC & WITH LOAD SHOWN

FILE NAME	PSUTX	TWO	12-1-93	
DRAWN BY	JMG	ISS	DATE	ECN NO.
DATE DRAWN	24-7-92	TITLE Transformer Board		
SHT. 1	OF. 1	DRG NO. C02/0067		
SERVICE MANUAL DRW. NO. H04/ SHEET OF				
ARCAM. A & R CAMBRIDGE LTD, CB5 9PB				

Display Board



FILE NAME	DISPLAYA	TWO	12-1-93	
DRAWN BY	JMG	ISS	. DATE	ECN NO.
DATE DRAWN	1/10/92	TITLE D270/250 DISPLAY		
SHT. 1	OF. 2	ORG NO. C02/0068		
SERVICE MANUAL DRW. NO. H04/ SHEET OF				
ARCAM. A & R CAMBRIDGE LTD, CB5 9PB				



		2	11-8-93	93/044
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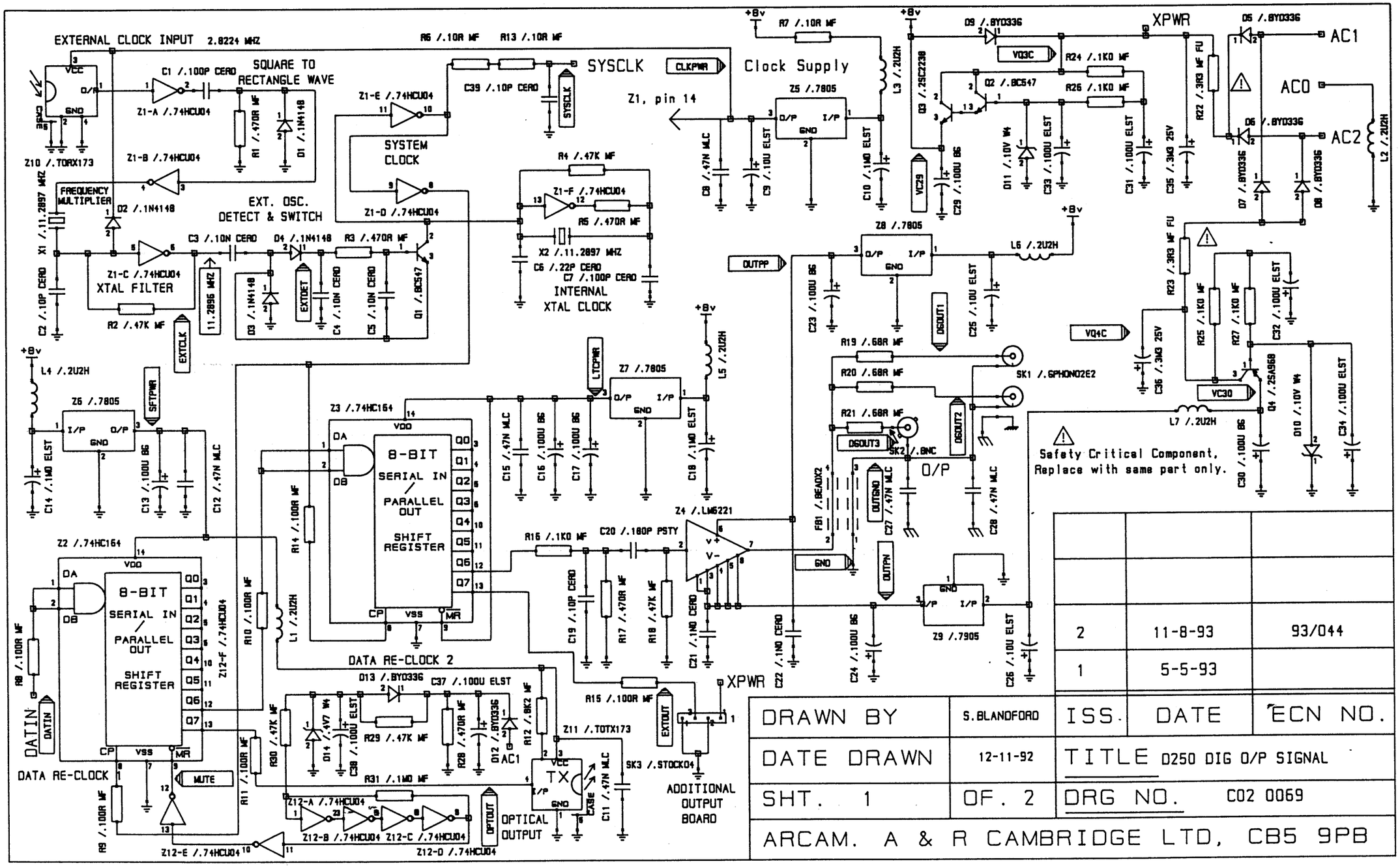
SHT. 2	OF. 2	ORG NO. C02 0069		
SERVICE MANUAL DRW. NO. H04/ SHEET OF				
ARCAM. A & R CAMBRIDGE LTD, CB5 9PB				

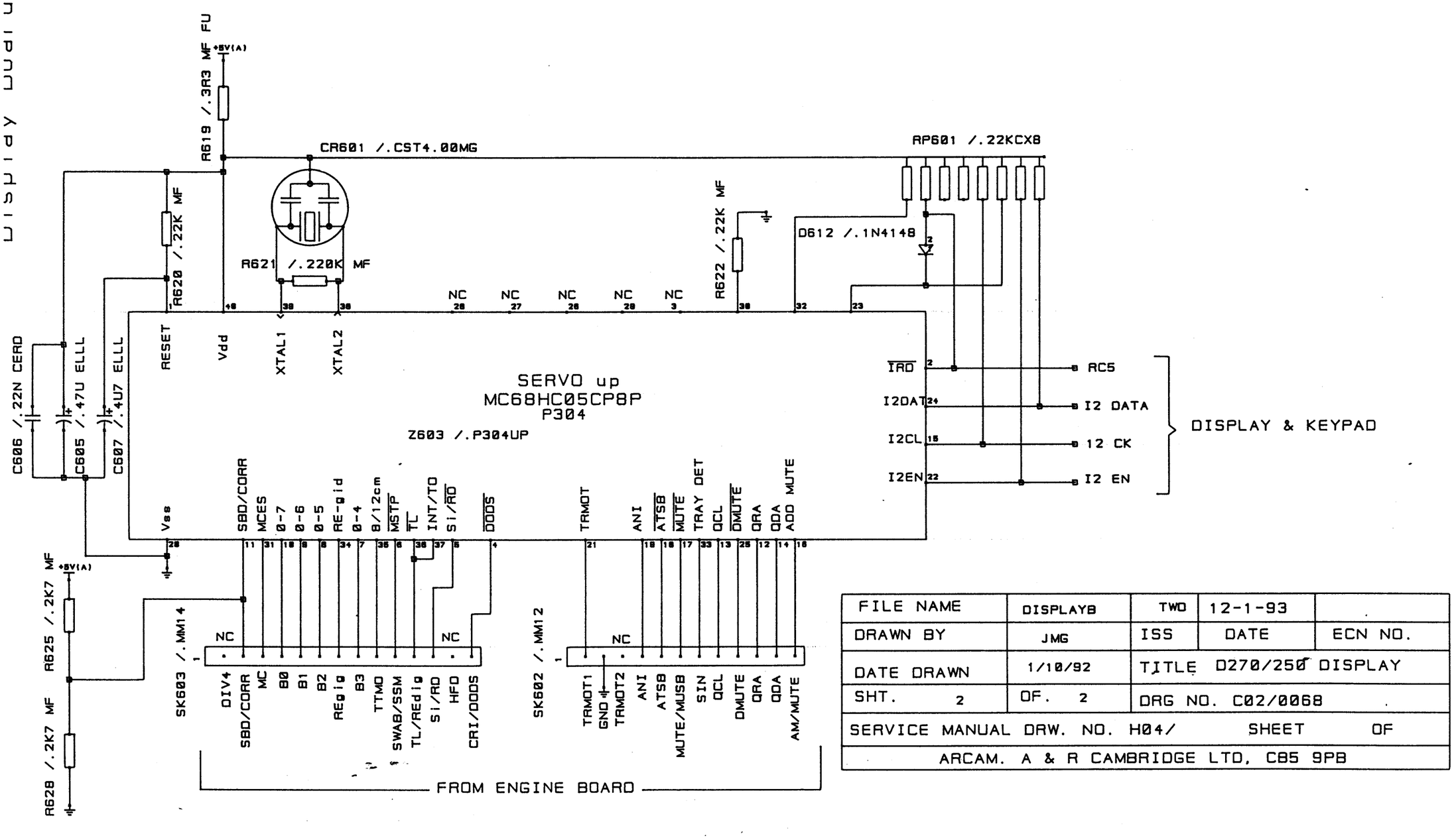
⚠ Safety critical component.
Replace with same type part.



2	11-8-93	93/044
1	5-5-93	

DRAWN BY	S.BLANDFORD	ISS.	DATE	ECN NO.
DATE DRAWN	12-11-92	TITLE D250 DIG O/P SIGNAL		
SHT. 1	OF. 2	DRG NO. C02 0069		
ARCAM. A & R CAMBRIDGE LTD, CB5 9PB				

Display Audio



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SHT. 2	OF. 2	DRG NO. C02/0068		
SERVICE MANUAL DRW. NO. H04/ SHEET OF				
ARCAM. A & R CAMBRIDGE LTD, CB5 9PB				

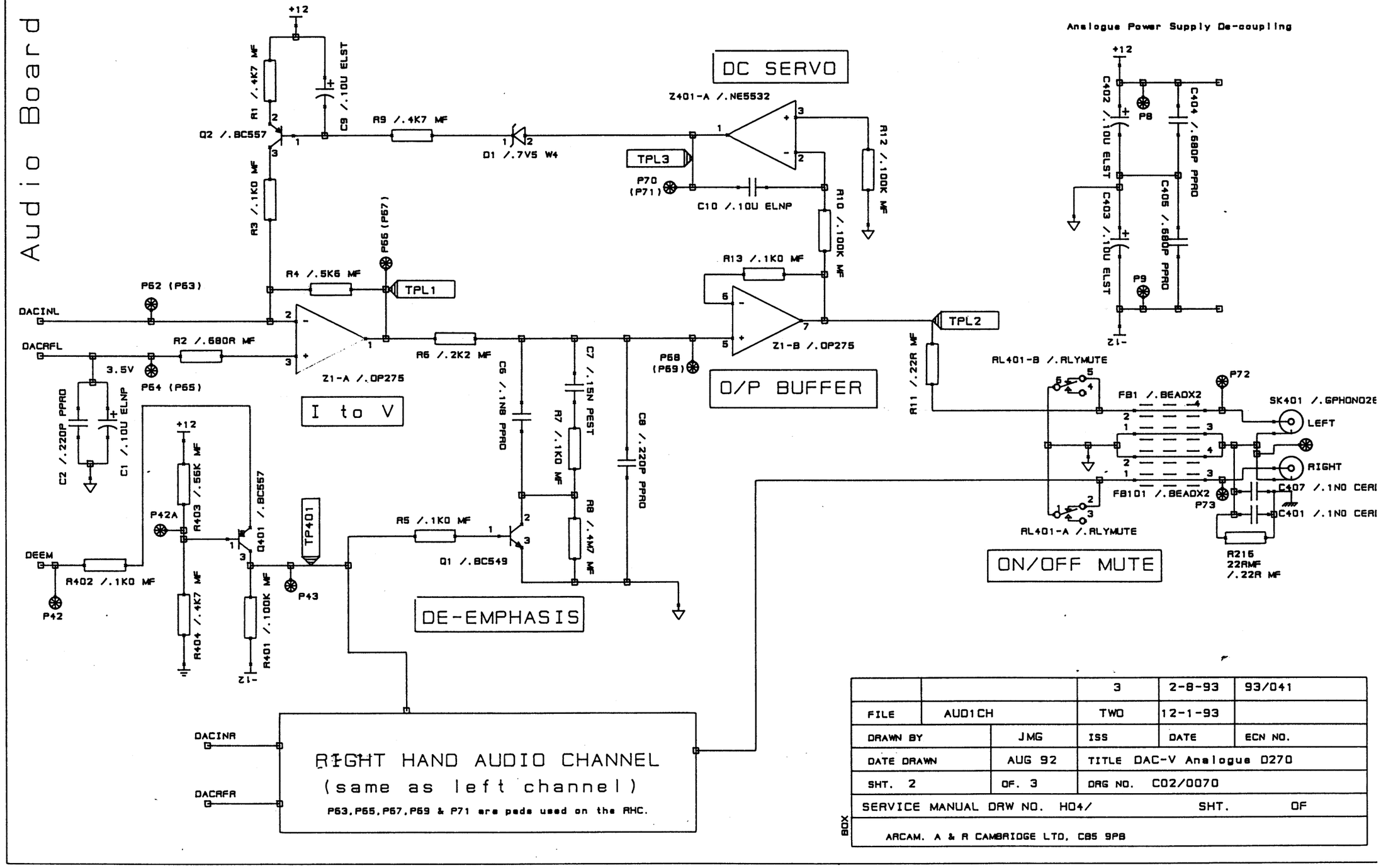
Audio Board

FROM ENGINE
SK301 /.MM15
MUTE
MUSB
ATSB
ANI
DEEM
GND
WSAB
GND
CLAB
GND
DAAB
GND
EFAB
GND
XSYS
GND
Q301 /.BC549
EDEEM
P42
P41
P40
11.28MHz
XSYS
P44
P44A
SK302 /.MOLEX2
DOBM FROM ENGINE
C320 /.10N CERO
P45
DOBM
+5V (C)
Z301-F /.74HCU04
Z301-D /.74HCU04
Z307-E /.74HCU04
Z307-F /.74HCU04
Z307-C /.74HCU04
Z307-D /.74HCU04
+5V(A)
Z306-A /.74HC74
Z306-B /.74HC74
SET
RESET
WS
CK
2.8 MHz
Z307-A /.74HCU04
MUTE
P38
Z307-B /.74HCU04
DATA
Z301-A /.74HCU04
DF CK
Z301-B /.74HCU04
P48
DAC CK
Z301-E /.74HCU04
P49
R302 /.100K MF
R301 /.470R MF
Z301-C /.74HCU04
Master Clock
X301 /.16.9344 MHZ
C301 /.4P7 CERO
C302 /.68P CERO
supply (C)
Divide by 2
Z302-B /.74HC74
Z302-A /.74HC74
Divide by 3
Z304-B /.74HC74
Z304-A /.74HC74
2.8MHz
Z303-B /.74HC86
+5V(A)
L301 /.33UH
P58A
C305 /.10U ELST
C306 /.47N MLC
C322 /.33U ELAL
Z309 /.YSF210
YSF210
XO
X1
VSS2
BCI
SDSY
IBIT1
IBIT2
IBIT3
MUTE
(NC)
SDI
VDO2
VDO1
DLO
(NC)
DRO
SHO
WCO
BCO
VSS1
ASY
(NC)
OBIT2
OBIT1
P46
P47
P39
P37
P50
P58
P59
P60
P61
+5V (D)
+5V (B)
L302 /.33UH
P72
P10
C307 /.U47 TANT
Z308 /.PCM67
PCM67P
+VA
LVCOM
LIOUT
SRVCAP
REFCAP
RIOUT
RVCOM
ACOM
+VD
NC
LDATA
WDCK
SYSCK
BTCK
RDATA
DCOM
DACRFL
DACINL
DACINR
DACRFR
C310 /.680P PPRO
C311 /.10U ELST
C312 /.100N PCRO
C309 /.10U ELST
C308 /.47N MLC
L312 / 6R8 MF
+5V(A)
Z305-A /.74HCU04
Z305-B /.74HCU04
D302 /.1N4148
R304 /.47K MF
Z305-D /.74HCU04
ENGINE CLOCK
11.28MHz
R311 /.47R MF
XSYS
SQUARE TO RECTANGLE
WAVE DISTORTION
C303 /.68P CERO
R303 /.680R MF
D301 /.1N4148
Z305-F /.74HCU04
FREQUENCY
MULTIPLIER
X302 /.11.2897 MHZ
Z305-E /.74HCU04
C304 /.22P CERO
C321 /.22P CERO
Z305-C /.74HCU04
+5V(A)
Z303-A /.74HC86
P51
supply (A)
L305 /.33UH
P21
SUPPLY FOR
Z302,303 & 304
C317 /.47N MLC
C316 /.10U ELST
Z303-D /.74HC86
Z303-C /.74HC86
P52
P53
R305 /.330R MF
R307 /.220R MF
R306 /.330R MF
R308 /.220R MF
C314 /.47P CERO
C315 /.47P CERO
L303 /.DOCOIL
L304 /.DOCOIL
P54
P55
P56
P57
DIG O/P (TWIN)
SK303 /.GPHONO2E2
R309 /.560R MF
R310 /.560R MF
C319 /.47N MLC
C318 /.47N MLC
C313
1NOC
/.1NO CERO

		3	3-8-93	93/041
FILE	AUDDIG	TWO	12-1-93	
DRAWN BY	JMG	ISS	DATE	ECN NO.
DATE DRAWN	4-8-92	TITLE	CLOCK, OF&DAC D270	
SHT. 1	OF. 3	DRG NO.	C02/0070	
SERVICE MANUAL DRW.NO. H04/			SHT.	OF
ARCAM. A & R CAMBRIDGE LTD, CB5 9PB				

BOX3

Audio Board



		3	2-8-93	93/041
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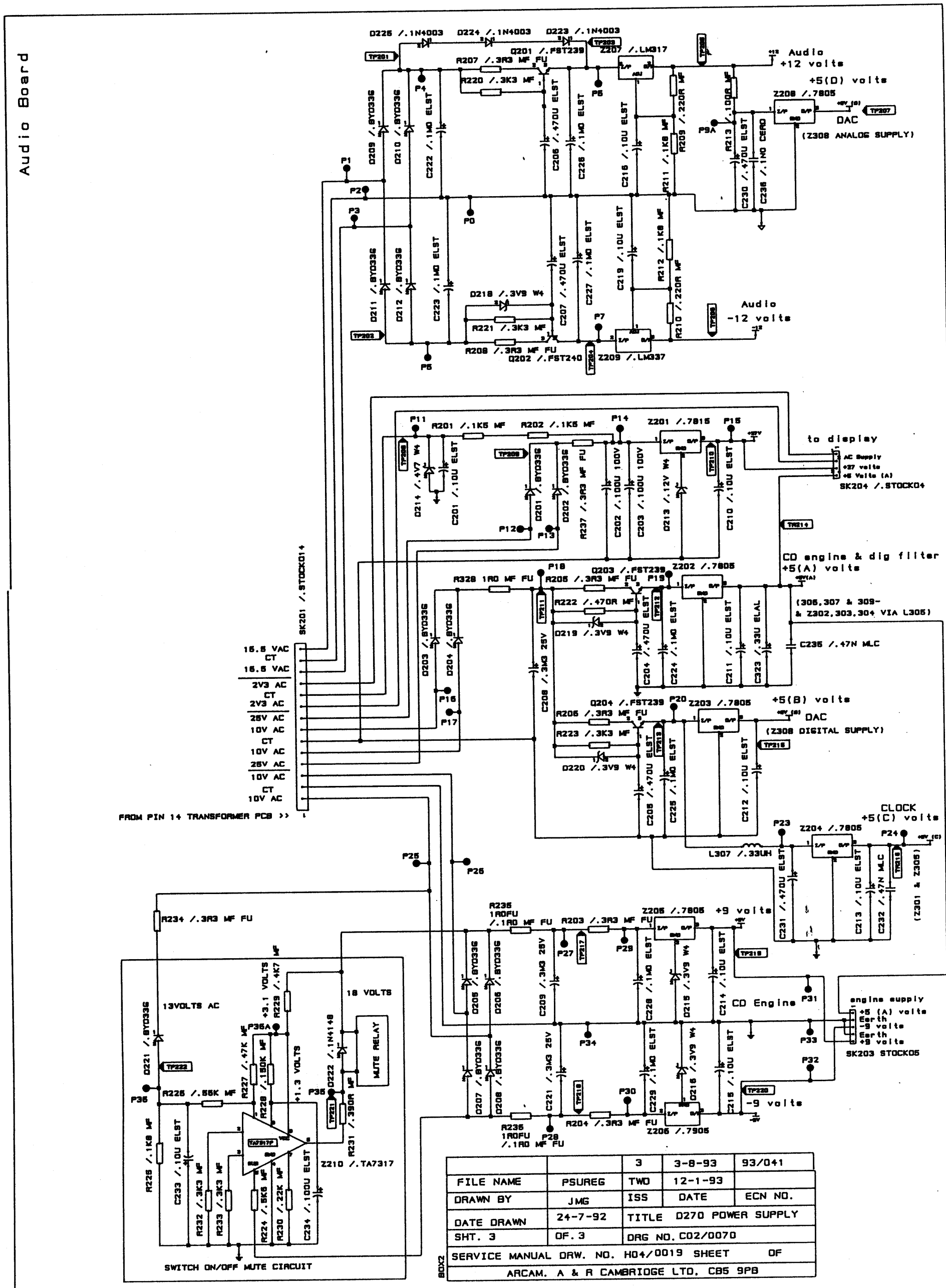
DATE DRAWN	AUG 92	TITLE DAC-V Analogue 0270		
SHT. 2	OF. 3	DRG NO. C02/0070		
SERVICE MANUAL DRW NO. H04/			SHT.	OF
BOX ARCAM. A & R CAMBRIDGE LTD, CB5 9PB				

Audio Board



		3	3-8-93	93/041
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DATE DRAWN	24-7-92	TITLE D270 POWER SUPPLY		
SHT. 3	OF. 3	DRG NO. C02/0070		
SERVICE MANUAL DRW. NO. H04/0019 SHEET OF				
ARCAM. A & R CAMBRIDGE LTD. CB5 9PB				

BOX2

To Display Board SK602

To Display Board SK603

1702-14 DIV4
1702-13 SBD/CORR
1702-12 MC
1702-11 B0
1702-10 B1
1702-9 B2
1702-8 REdig
1702-7 B3
1702-6 TTMO
1702-5 SWAB/SSM
1702-4 TL
1702-3 SI/RD
1702-2 HFD
1702-1 CRI/DODS

1703-1 AM(MUTE) ODA ORA DMUTE OCL SIn MUSB ATSB ANI TRMOT2 GND TRMOT1 1703-12

3715 10K

TO SERVO BOARD

1511-18 -VM
1511-17
1511-16 TTM
1511-15 RAD
1511-14 SIN
1511-13
1511-12 +VM
1511-11
1511-10 -5V
1511-9 3723 1k CRI/DODS
1511-8 +5V
1511-7
1511-6 HFI
1511-5
1511-4 3726 680R SI/RD
1511-3 HFG
1511-2 TRA-MOTOR
1511-1

1510-5 +VM
1510-4 -VM
1510-3
1510-2 +5V
1510-1

7501 79L05 ACP
3502 47u/16V 2502 100n 2503 100n -5V

7002 TDA8809
AGC REE DIV4 RE1 RE2 GND offset Out CLPF CHPF
Cosc1 Cosc2 Rosc Rwob
LM OSC 45° 90° 1-α/2 1+α/2 1/2x RAD MIRROR 10x 10x RAD
2029 220n 3071 22k 3033 22k 3039 0R 3041 0R 3072 33K
2028 220n ref 2027 33n +5A 2026 33n +5A
2021 8n2 2022 8n2 3025 47K 3026 22K
3077 0E TL

ANI ATSB 3715 4K7 1k 3719

1601-1 XSYS 1601-2 1601-3 EFAB 1601-4 1601-5 DAAB 1601-6 1601-7 CLAB 1601-8 1601-9 MSAB 1601-10 1601-11 DEEM 1601-12 1601-13 1601-14 MUSB 1601-15 MUTE 1601-16
1602-1 SWAB/SSM 1602-2 SDAB 1602-3 1602-4 SCAB 1602-5 1602-6

INTER IC SOUND SUBCODE

+5V 3702 4R7 +5uP 2705 47u/16V

TRMOT2 3601 4K7
TRMOT1 3600 4K7

+VM +5uP +5uP 3606 4R7 TRAYMOTOR
3602 12k 3603 12k
2601 47u/16V MOT 2602 100n MOT 2600 100n 3605 12k
3604 12k 3607 1R 2603 47u/16V MOT 2604 100n MOT 3608 22R
-VM MOT MOT MOT
2605 100n
2 7600 TCA0372 7 + 8 − 4

CRI/DODS SWAB/SSM AM(MUTE) ODA ORA OCL MUSB DEEM MC
3730 1K MUTE
3710 22k +5B 3739 0R 3733 0R

7100 SAA7310
HFG HFI 3100 2k2 2101 2n2 2100 47p 3101 22k 2105 470n
+5B 2102 100n 3106 3k3 1k6 3108 BF550 7101 3107 3k3
3102 4R7 +5B
HFI FB HFO CREF PD/OC TEST2 TEST1 TEST3 TEST4 VDD VSS
DATA SLICER DEMOD TIMING EFM DECODER SUBCODE PROCESSOR Q CHANNEL PROCESSOR
FIFO CONTROL & RAM INTERFACE X-TAL CLOCK
PHASE & FREQUENCY DETECTOR V.C.O.
3105 75R 2107 2u2/50V
CONTROL ADDRESS DATA & FLAG
C1 INTERLEAVER CORRECTOR C2 INTERLEAVER CORRECTOR DESCRAMBLER
ADAPTIVE FLAG PROCESSOR
I SAMPLE INTER-POLATOR & SAMPLE /HOLD & MUTE CIRCUIT
X-TAL OSCILLATOR
RAM INTERFACE
DEEM SDAB MC SCAB AM MUTE MSAB CLAB DAAB EFAB XOUT XIN DIN12
RAS CAS R/W A0 A1 A2 A3 A4 A5 A6 A7 D1 D2 D3 D4
2104 100n 2103 47u/16V +5V 3109 4R7 2108 47u/16V 2109 100n
7102 DRAM MN4264-15

3144 680k
3147 4k7 -5V 3148 4k7 7135 BC858A 3149 1k2
7134 BC858A
3146 33k 3145 5K6 3133 100k 3134 91k +5B 7131 NJN4560
3150 200k 3135 5k3 3136 5k6 2132 330n 2133 2n2 3137 150k 7131 NJN4560 3139 100R
3132 47k 2131 18n 3142 4R7 +VM 2134 100n 2135 47u/16V
3131 4k7 +5B
3138 82k 3143 4R7 2136 100n 2137 47u/16V
+VM MOT 3140 4R7 2138 100u/16V 7132 BC538 TTM
3141 4R7 2139 100u/16V 7133 BC328 -VM MOT
-VM

DMUTE ATSB
3211 4R7 +5V 3225 0E 3224 0E 3214 22k 2211 47u/16V 2212 100n
3160 47R 2160 47p 3161 47R
3162 47R 2161 47p 3163 47R
3164 47R 2162 47p 3165 47R
3166 47R 2163 47p 3167 47R
EFAB DAAB CLAB MSAB SDAB SCAB
7211 PCF2705 PCF3523
MSAB CLAB DAAB EFAB FS32 SCAB SDAB VSS VDD ATSB DOEN DOBM TEST XSYS XOUT XIN
3219 47R 3220 47R 2215 47p 3221 47R 3222 47R 2216 15p
3217 680k 1211 11.2896MHz 2213 47p 2214 47p
3223 0R XSYS
1201-1 1201-2 DIGITAL AUDIO OUTPUT

identification resistor 3999 1k

ENGINE BOARD 3104 118 0202

HF1 HF GND IFD DODS SI/RD FOC+ FOC- TTM-DC TTM TTM+ TTM-

1002-13 1002-16 1002-14 1002-10 1002-15 1001-1 1001-4 1002-3 1004-1 1004-2

Mot

3005 100E

3006 1K

2009 100p

2010 10n

2007 2n2

3004 15k

2008 47n

2006 100n

2003 100n

3000 4K7

3001 100k

2000 100n

2001 470p

7001 TDA8808

VDD VBB CLPF BEQ HFout GCHf DEC BGC HFin

HF AMPLIFIER

EQUALIZER

3007 24k

SHIELD 1001-8
GUARD 1001-14
KATHODE 1001-13

D1 1001-10
D2 1001-9
D3 1001-11
D4 1001-12

RE1 1002-6
RE2 1002-8

2015 1n

GAIN CONTROL

HF DETECTOR

DET PLLH DODS

2011 1n

FOCUS NORMALIZING CIRCUIT

FE FElog FS

5k6 3008

LASER SUPPLY

STARTING CIRCUIT

SI/RD

3009 10K +5A

2014 220p

GND TL GCIf LM LO Sc

2013 470n

2012 220n

TL 1002-12

LM 1001-7

LG 1001-5

LO 1001-6

+VL 2083 220n

7004 BC635

3083 100E

2082 47u/16V

2081 220p

3082 12E

+5 1002-11

GND 1002-2

3503 1E

2503 100u 16V

3504 0E

-5A 3049 3M3 2043 220n 3046 56k

2042 4n7 3045 390k

3041 11k

3042 150k 7003 TCA0372(B) 3047 27E

3043 120k 3044 100k 3048 22E

2041 470n 2044

1011-2 TRAY OUT (Back)
1011-1
1009-2 TRAY OUT (Back)
1009-1

TRAY

+5A 3087 10K

SIN 1002-5 3081 0E

3086 0E

TRAY SWITCH
DOOR SWITCH

1005-1

3500 1E 2500 100u 16V

3501 1E 2501 2u2 50V

3502 1E 2502 100u 16V

+VM -5A -VM

1002-7 1002-9 1002-1 1002-4

+VM -5 -VM RAD

3k 3064 33E 2062 100n 3063 3E3

2064 100n

7003 2 TCA0372(A)

6062 7V5 6061 7V5 2061 470n

3061 3K3 2063 100n

TRAY

1002-18 1002-17

TRAY IN

1001-2 1001-3

RAD+ RAD-

PHILIPS

L3 A