

240
TWIN CHANNEL
PROFESSIONAL
POWER AMPLIFIER

USER MANUAL

Q U A D

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1.0 DESCRIPTION

Introduction The Quad 240 is a two channel power amplifier designed for professional users including broadcast, recording and public address. The power output of either channel exceeds 80W into a 4Ω load and 50W into an 8Ω load. The Quad 240 uses an implementation of the current dumping circuit technique. This circuit topology was first used on the renowned Quad 405 amplifier and resulted in the award of a Queen's Award for Technological Innovation. The Quad 240 series is constructed in a rugged case which is designed to withstand reasonable treatment by professional users.

Current Dumping Current dumping involves a feed forward error correction technique and it eliminates many of the problems associated with transistor amplifiers. It is covered by patents in several countries. In a current dumping amplifier there is in effect both a low power very high quality amplifier and a high power heavy duty amplifier. The low power amplifier controls the loudspeakers at all times and it calls upon the high power amplifier to provide most of the muscle. The small amplifier is arranged so that provided the large power transistors can deliver almost the full amount of required output current the small low power amplifier will provide the remainder accurately and completely. Therefore the output signal quality is solely dependent on the performance of the small signal amplifier and since this amplifier is only required to deliver low powers it can be made very accurate indeed. The problems of crossover distortion, quiescent current adjustment, thermal tracking and transistor matching disappear. Current dumping amplifiers require no internal adjustments or alignment and the choice of output power transistor types is less restrictive.

Options The Quad 240 amplifier is available with one major option, the fitting of an active remote level control. This is intended for use where the control of the maximum output level is required from a location remote from the amplifier. The amplifier can be supplied with the option factory fitted but fitting at a later stage is a simple operation and the only tool required is a screwdriver.

Variants The major variants of the Quad 240 is the slave model which has no provision for altering the level from the front panel. The option to set the amplifier sensitivity internally is still provided. This model is intended for use in applications where casual adjustment of the amplifiers gain is to be avoided. Note that the standard amplifier has anti-tamper locking screws for the front panel level controls.

In addition slightly different versions are produced for particular countries and applications. Quad will be pleased to consider the adaptation of any of its products to suit particular applications.

2.0 INSTALLATION

Unpacking The Quad 240 amplifier is shipped in protective chip foam protective packing and packed in a heavy duty cardboard carton. The packing materials should be retained for use in the unlikely event of a return for servicing being necessary.

Contents The packing contains the following:

Main Unit: One Quad 240 version amplifier.

Accessories: One 2m length of IEC socket terminated mains lead.
Part No. QESOE2A.

One manual. Part No. OI240EC.

One M3 Allen key (1.5 mm). For the level control anti-tamper grub screws.

Two NL4FC cable mounting connectors to match those mounted on the chassis where fitted. Part No. PPNL4FC. (adhesive labels which indicate the wiring convention are supplied).

Shortages should be notified to the Distributor or the Factory as appropriate. Further supplies of accessories can be purchased as required.

Mains Voltage Selection

The Quad 240 can be set internally for either 240/220V or 120/110V ac working. The change involves replacing links on the mains power supply printed circuit board. Note that the voltage of the unit as shipped from the factory is clearly marked on the rear panel and a similar clear marking should be made if the setting is changed. Note also that the fuse rating should also be altered to suit:

T2A for 240V ac mains. T4A for 120V ac mains.

The Quad 240 will function safely for mains voltages up to 10% of the nominal 240V ac for which performance has been characterised.

Disconnect the mains power supply before making any changes.

To change the mains voltage setting the protective mains cover must be removed from the power supply PCB by prising out the two small plastic retaining rivets. The links on the PCB (which are clearly marked) should be resoldered, as indicated, for the required voltage range. Refit protective cover. The linking arrangement is also shown in the circuit diagram on page 13.

Mains Input Connection

The mains input connection is via a standard CEE22 plug and socket. The amplifier chassis must be connected to ground via the mains supply lead. A simple retaining clip ensures that the mains connector cannot be removed accidentally.

The mains lead supplied should be wired to the mains power supply plug with due regard to the following colour convention:

Brown wire	Live connection
Blue wire	Neutral connection
Green/Yellow wire	Safety earth

The Brown wire must be connected to the plug terminal marked L or coloured Red. The Blue wire must be connected to the terminal marked N or coloured Black. The Green/Yellow wire must be connected to the terminal marked E or coloured Green or Green/Yellow.

Note: The amplifier must be protected by a 10A fuse when a 13A plug is used, or if another type of plug is used, by a 10A fuse either in the plug or adaptor, or at the distribution board. If in doubt consult a qualified electrician.

Earthing Requirements

Quad advises that proper safety procedures are followed as they cannot accept liability for improper installation or operation. It is usually a safety requirement that the mains power lead earth connection is properly connected to the amplifier chassis.

Mounting/Thermal Considerations

The Quad 240 amplifier is intended for mounting in a standard 483 mm (19 inch) rack. It occupies 1U (45 mm) of space. In this environment the amplifier will be able to dissipate most of its waste heat from the side fins provided that a free air flow is available. Additionally the amplifier can be restrained from moving at the rear by using the M6 tapped holes in the rear of the heatsink extrusion. A suitable bracket fixed to the rear of the rack frame can be attached to the rear of the amplifier.

The amplifier may also be operated free standing. In this case it is necessary to ensure that there is an ample supply of free flowing air to the heatsink fins especially if the amplifier is to be driven hard for long periods. There are significant benefits in raising the amplifier on short feet (for example self adhesive type) as this will allow air to flow beneath the amplifier case.

In enclosed spaces, for example when placed in a rack with other equipment which also dissipates significant waste heat, consideration should be given to the provision of forced ventilation for all the equipment in the rack cabinet.

Connectors

There exists a variety of input and output connector conventions. The wiring of the rear panel of the Quad 240 follows the IEC268 wiring convention for the input XLR style 3-pole female connector and this is marked on the rear panel. It should be noted that some manufacturers have used the alternative combinations of the gender of chassis connector and of the NAB convention.

IEC Input Convention Chassis mounted socket. Standard convention adopted by Quad.

Chassis Mounted Socket or Plug

Pin 1: Chassis.

Pin 2: Hot or phase.

Pin 3: Cold or signal return.

Note: On XLR connectors pin 1 mates before the other two pins and thus makes the safety earth first.

NAB Input Convention To special order.

Chassis Mounted Socket

Pin 1: Cold or signal return.

Pin 2: Connected to pin 1.

Pin 3: Hot or phase.

Neutrik Speakon Connectors Neutrik Speakon output convention for single output standard voltage systems. Standard convention adopted by Quad.

Chassis Mounted Socket

Pin 1+: Amplifier output.

Pin 1-: Amplifier output return or 0V.

Pin 2+: Not used.

Pin 2- : Not used.

Note: A different convention is used in 100V line systems to avoid the risk of incorrect loads being connected.

IEC Output Convention To special order. May be either a chassis mounted plug or socket.

Chassis Mounted Plug or Socket

Pin 1: Not used.

Pin 2: Amplifier output.

Pin 3: Amplifier return or 0V.

NAB Output Convention To special order.

Chassis mounted plug

Pin 1: Amplifier return or 0V.

Pin 2: Connected to pin 1.

Pin 3: Amplifier output.

Output Connection Requirements

The NAB convention loses the advantage of an independent safety earth connection to the input sockets. Also the sense of the output connections are reversed which could cause an amplifier output to be shorted in some systems. The use of the Neutrik Speakon connector provides power amplifiers with a dedicated output connector which has been designed for high current loads and also satisfies the EEC low voltage safety requirements.

It obviates the problems often associated with binding posts and provides a sensible way out of the quandary of XLR genders and wiring conventions. It additionally provides a higher current rating than the XLR styles, a better cable grip and the option of solderless installation. It is currently being proposed as a standard connector through the relevant IEC bodies.

Optimum performance will only be achieved if the amplifier is correctly grounded. Since each channel of the amplifier is provided with a transformer isolated input circuit there is a reduced risk of the return output currents appearing as input voltages in series with the earth side of the input circuits. Good system practise suggests that each channel be treated as a four terminal device and that there is no connection between the cold sides of either output or the cold sides of an input and related output. Correct use of cables, connectors and system installation is essential in order for the amplifier to meet its full EMC performance. However the use of unbalanced circuits in installations may bring about EMC risks generic to unbalanced and single ended systems.

3.0 OPERATION

The amplifier is switched on by the power switch on the front panel. Two red LED's will illuminate the circular bezel which surrounds the switch button and indicate that power is available to each amplifier module. The level of each channel can be adjusted by the two level controls each of which is fitted with a simple tamper resistant device. Gain is at maximum when the controls are rotated fully clockwise. To lock a level control, remove the green plastic pip from the control knob and tighten the M3 grub screw, with the 1.5 mm Allen key provided. Do not forget to refit the pip and to keep the Allen key in a safe place for future use.

The overall gain of each channel can be set internally by moving a link plug on each amplifier board, to provide full output with nominal input levels of -4 dBu and +8 dBu, as shown in the circuit diagram on page 13.

Protection

The Quad 240 series includes full protection against short circuits, input overload and inadequate ventilation. Each channel is fitted with a thermal sensor which, when a channel experiences excessive temperature for any reason, switches off that channel until the amplifier has cooled sufficiently. When the thermal trip point has been reached the appropriate front panel power LED will go out. The amplifier channel will cycle through this process until the cause of overheating is corrected or the input signal is reduced.

The load is protected from damage due to component failure in the amplifier by a fuse in the power supply circuit and by the electronic centring system. This fuse is located on the power supply pcb.

The Quad 240 has been designed and manufactured to conform to the relevant EEC electrical safety and electromagnetic isolation and immunity requirements.

Fuses

The replacement fuse values are:

FS1: Mains fuse 240V ac supply	20x5 mm T2A
FS1: Mains fuse 120V ac supply	20x5 mm T4A
FS2: Internal protection fuse (per channel)	20x5 mm T3.15A

The replacement of FS2 requires the removal of the top cover.

4.0 SERVICE AND MAINTENANCE

The Quad 240 amplifier series is carefully tested and inspected at all stages of manufacture and before packing and delivery to ensure that it will provide many years of reliable service. All amplifiers are soak tested for at least 24 hours before being subjected to a second visit to the final test area.

In the rare event of failure the Quad 240 series can usually be serviced in the field by replacing a complete amplifier board assembly. This requires only simple handtools and no setting up or electronic alignment is required.

The cover can be removed by undoing the two rear retaining screws and sliding it gently backwards. Each amplifier module is retained by three M4 bolts and it is important that the spacing washers and tensioning washers are retained for reassembly. The bolts must be tightened to a torque of 13.85 kg/cm.

Note that the gain of the replacement module may have to be reset to match the removed module and any link option PCB fitted will have to be transferred to the new module.

Replacement modules and individual components (which can be identified from the related parts list and circuit diagram) should be obtained through the vendor from whom the amplifier was purchased. It will be necessary to quote the amplifier serial number.

If the amplifier has to be returned to the vendor or directly to Quad then it should be sent in its original packing.

Warranty

The Quad 240 series is guaranteed against defects in material or workmanship for a period of twelve months from the date of purchase. Within this period the supply of replacement parts will be free of charge provided that the failure was not due to misuse, accident or negligence. Freight costs are not covered unless this has been locally agreed.

Within the UK the guarantee offered with this equipment does not limit the customer's statutory rights. A guarantee card is not supplied and the guarantee period commences on the day on which the unit is delivered.

Preventative Maintenance

There are no user adjustable controls within the Quad 240 series. Like any equipment of its class it will not benefit from immersion in liquids nor if it is resident in a damp environment for any appreciable time. Both operating and storage temperatures should be maintained within the range of -5° to +45°C. The panel work may be cleaned using a moist cloth. Strong organic solvents should be avoided as they are likely to have a deleterious effect on the paint finish.

Repair

Where repair is not, for a variety of reasons, a matter of simply replacing a module, reference should be made to the circuit diagram and the related parts list in order to ascertain the appropriate replacement part number. These parts will be held by and are available from Quad and its Distributors.

Packing

If the amplifier is returned to Quad it is desirable that the original packing is used. The equipment will be returned in this packing where possible. Quad will charge for the use of fresh packing materials where used.

Spares

Spare parts are not normally supplied as part of each amplifier. However in any particular application Quad will be pleased to consider any request to provide, for a given shipment or installation, a spares provision.

The contents of this would be negotiated as required. A spares parts list is available for isolated spares requirements and parts can be requested through Quad's distributors or through Quad directly.

Circuit Description

The circuit diagram should be referred to. The detailed function of the parts of the circuit should be apparent to those aware of discrete analogue design techniques. A few guiding notes may help.

The main circuit diagram shows the relationship between the major elements of the Quad 240 amplifier.

The balanced input circuit is based around IC1. L1 is the input transformer which operates at the input to the virtual earth input of IC1. The input resistance is defined by R2 and R3 whilst C1 performs the function of blocking zf (zero frequency) voltages from saturating the transformer core. Compensation for the winding resistance is provided by R5, C3 and R6.

The output signal is fed to the link option PCB via the front panel gain control. This approach permits the common mode rejection ratio (CMRR) of the input to be retained at >60 dB (typically >80 dB) at any gain control setting whilst permitting peak levels of >20 dBu to be handled without clipping.

The link PCB usually provides a straight link for the audio signal into the main power amplifier circuit. Optional link PCB's can be supplied to perform a limited range of signal processing prior to the power amplifier. The main option is the provision of a remotely controllable level which uses a VCA based circuit.

The input signal to the main amplifier is fed to the input buffer T1 which then drives the main gain stage T3. The amplifier gain is set by a link plug which connects the gain setting resistor R18 in parallel with R19 in order to set high gain (32 dB), to select low gain (20 dB) the link plug is parked on adjacent inactive pins.

The class A amplifier stage comprises the driver transistors T5, T6, T7 and their loads of R25 and R26. The current dumping bridge comprises C11, R32, R33 and L3, the main output current being provided by T9 and T10. Excess current requirement is controlled by T4 sensing the voltage across R27 for the positive cycle and by R29/D9 starving the drive current in the negative cycle. C13 and R37 provides Zobel equalisation.

The DC power supply is derived from rectification of the secondary of the mains transformer L2 via D12, capacitors C14 to C17 and T11/T12 providing an active ground centre rail which allows the supply protection to be provided by the single fuse FS2. TH1 is a self-resetting thermal cutout switch which becomes an open circuit at 85° C and thus protects the amplifier from overheating. The mains transformer primary tapplings are selected on the mains power supply board, by appropriate links, for 110/125V or 220/250. Note that the fuse rating must also be changed.

Specification

The nominal specification of the 240 series is given below, certain parameters may be affected by changes in the mains input voltage. The following performance figures are for a typical amplifier powered from a UK mains supply of 240V \pm 5%.

Power output 4 Ω : 80W per channel <0.1% THD+N at 240V, 20°C amb.

Power output 8 Ω : 50W per channel <0.1% THD+N at 240V, 20°C amb.

Power response: 10 Hz-30 kHz -3 dB ref 1kHz at 50W/8 Ω .

Frequency response: 40 Hz-20 kHz -1 dB ref 1 kHz.

Group delay*: <6 μ s at 1kHz.

Group delay error* <1.5 μ s up to 20 kHz ref 1 kHz.

Distortion:	<0.03% THD+N, 40 Hz any level up to 40W/8Ω. <0.01% THD+N, 1 kHz any level up to 40W/8Ω. <0.1% THD+N, 20 kHz any level up to 40W/8Ω.
Dynamic range: (hum+noise)	-105 dB 'A' wtd ref full output (15.7 kHz bandwidth), at low gain setting.
Input sensitivity: (set internally)	1) 500 mV (-4 dBu) 32 dB gain. 2) 2V (+8 dBu) 22 dB gain. Equal to ppm 6.
Input impedance:	10 kΩ balanced, resistive.
Balanced input:	10 kΩ resistive 10 Hz - 20 kHz, nominal ±1%. Common mode rejection typically <80 dB at 1 kHz. Common mode range 250V 50 Hz.
Output impedance:	0.03Ω in series with 1.5 μH.
Output voltage offset:	7 mV typical.
Channel separation:	>80 dB at 1 kHz inputs terminated.
Load stability:	Unconditional any load.
Power requirements:	250 VA with both channels delivering 50W/8Ω.
Mains voltage:	250V-220V or 125V-110V ac, set internally (note lower supplies will reduce output power).
Indicators:	LED (red) DC supply indication for each channel.
Protection:	Thermal; 85°C internal heatsink temperature. Peak current; 7.5A peak output current limit. DC offset; 0V power supply centring circuit. DC supply fuse; T3.15A internal (per channel). Mains fuse; T2A 220/240V, T4A 110/120V.
Temperature range:	0°C to 45°C. High ambient temperatures require forced ventilation for full output to be maintained for long periods.
Input connector:	XLR-3 chassis socket normally wired to IEC convention. Pin 1=chassis, pin 2=hot, pin 3=cold.
Output connector:	Neutrik NL4 wired to low output impedance convention. 1+ = signal, 1- = return, (2+ and 2- n/c).
Weight:	7 kg less packing.
dimensions overall:	W483 (19" rack) x H45 (1U) x D350 mm.

*Group delay is a measure of the transit delay of signals passing through the amplifier. Group delay error is a measure of the delay experienced by the frequency components of a complex signal passing through the amplifier.

The Quad 240 has been designed and manufactured to conform to the relevant EEC electrical safety and electromagnetic isolation and immunity requirements.

The right is reserved to alter performance and specifications as required.

Parts List

The parts list below lists the items most likely to be required in normal servicing. For the most part the variants employ readily available components. Quad distributors hold a comprehensive parts list of all Quad products and should be able to give any necessary assistance.

Resistors

Ref	Description	Part No.
R2	4k99Ω 1% 0.25W metal film	R4K99F4
R3	4k99Ω 1% 0.25W metal film	R4K99FA
R4	10 kΩ 5% 0.25W carbon film	R10K0J4
R5	270Ω 5% 0.25W carbon film	R270RJ4
R6	10 kΩ 5% 0.25W carbon film	R10K0J4
R7	1k2Ω 5% wire wound 290-1	R1K20JO
R8	1k2Ω 5% wire wound 290-1	R1K20JO
R9	4k7Ω 5% 0.25W carbon film	R4K70J4
R10	4k7Ω 5% 0.25W carbon film	R4K70J4
R11	120 kΩ 5% 0.25W carbon film	R120KJ4
R13	33Ω 5% 0.25W carbon film	R33R0J4
R14	47Ω 5% 0.25W carbon film	R47R0J4
R15	330Ω 5% 0.25W carbon film	R330RJ4
R16	2k2Ω 5% 0.25W carbon film	R2K20J4
R17	330Ω 5% 0.25W carbon film	R330RJ4
R18	18Ω 1% 0.25W metal film	R18R0F4
R19	43Ω 1% 0.25W metal film	R43R0F4
R21	10 kΩ 5% 0.25W carbon film	R10K0J4
R22	4k7Ω 5% 0.25W carbon film	R4K70J4
R23	10 kΩ 5% 0.25W carbon film	R10K0J4
R24	330Ω 5% 0.25W carbon film	R330RJ4
R25	560Ω 5% wire wound X2B	R560RJO
R26	560Ω 5% wire wound X2B	R560RJO
R27	0R1Ω 5% CB3	R0R10JC
R28	10Ω 5% 0.25W carbon film	R10R0J4
R29	0R1Ω 5% CB3	R0R10JC
R31	22Ω 5% 0.25W carbon film	R22R0J4
R32	560Ω 5% PR52	R560RJS
R33	56Ω 1% 0.25W metal film	R56R0F4
R35	2M2Ω 5% 0.25W carbon film	R2M20J4
R36	22Ω 5% 0.25W carbon film	R22R0J4
R37	10Ω 5% 0.5W carbon film	R10R0J2
R38	10 kΩ 1% 0.25W metal film	R10K0F4
R39	9k1Ω 1% 0.25W metal film	R9K10F4
R41	1k2Ω 5% wire wound 290-1	R1K20JO
R42	1k2Ω 5% wire wound 290-1	R1K20JO

Capacitors

Ref	Description	Part No.
C1	22 μF 20% 10V bipolar	C22U0MJ
C3	22 μF 20% 10V bipolar	C22U0MJ
C4	47 pF 10% UP125	C47P0KJ
C5	330 pF 2% 100V	C330PHP
C6	680 nF 5% 63V	C680NJA
C7	330 pF 10% UP125	C330PKJ
C8	100 nF 5% 100V	C100NJA
C9	330 pF 10% UP125	C330PKJ
C10	47 nF 63V	C47N0ZM
C11	47 pF 1% 350V silver mica	C47P0FS
C12	47 μF 20% 63V	C47U0MM
C13	47 nF 5% 250V	C47N0JS

Ref	Description	Part No.
C14	4700 μ F 20% 63V	C4K7UMC
C15	4700 μ F 20% 63V	C4K7UMC
C16	4700 μ F 20% 63V	C4K7UMC
C17	4700 μ F 20% 63V	C4K7UMC
C19	100 nF 5% 250V	C100NJS

Semiconductors

Ref	Description	Part No.
T1	Transistor BC214C	DBC214C
T2	Transistor MPSA43-K	DMPSA43
T3	Transistor BC413C	DBC413X
T4	Transistor MPSA93-K	DMPSA93
T6	Transistor MPSA93-K	DMPSA93
T7	Transistor 40872-99	D40872X
T8	Transistor 40872-99	D40872X
T9	Output device 17556	D17556X
T10	Output device 17556	D17556X
T11	Transistor ZTX650-K	DZTX650
T12	Transistor ZTX750-K	DZTX750
D1	Diode Zener 15V 400 mW axial	D8815VA
D2	Diode Zener 15V 400 mW axial	D8815VA
D3	Diode Zener 6.8V 500 mW axial	D886V8A
D4	Diode Zener 6.8V 500 mW axial	D886V8A
D5	Diode 1N4148	D1N4148
D6	Diode 1N4003 1A 200V	D1N4003
D7	Diode 1N4003 1A 200V	D1N4003
D8	Diode 1N4003 1A 200V	D1N4003
D9	Diode 1N4003 1A 200V	D1N4003
D11	Diode 1N4003 1A 200V	D1N4003
D12	Bridge rectifier KBU8D	DKBU8DX
D13	Diode 1N4003 1A 200V	D1N4003
CR1	Current source LM334Z	DLM334Z
CR2	Diode current regulator J503	DJ503XX
IC1	Integrated circuit TL071CP	D071CPX
IC2	Intrgrated circuit TLC271P	DTLC271

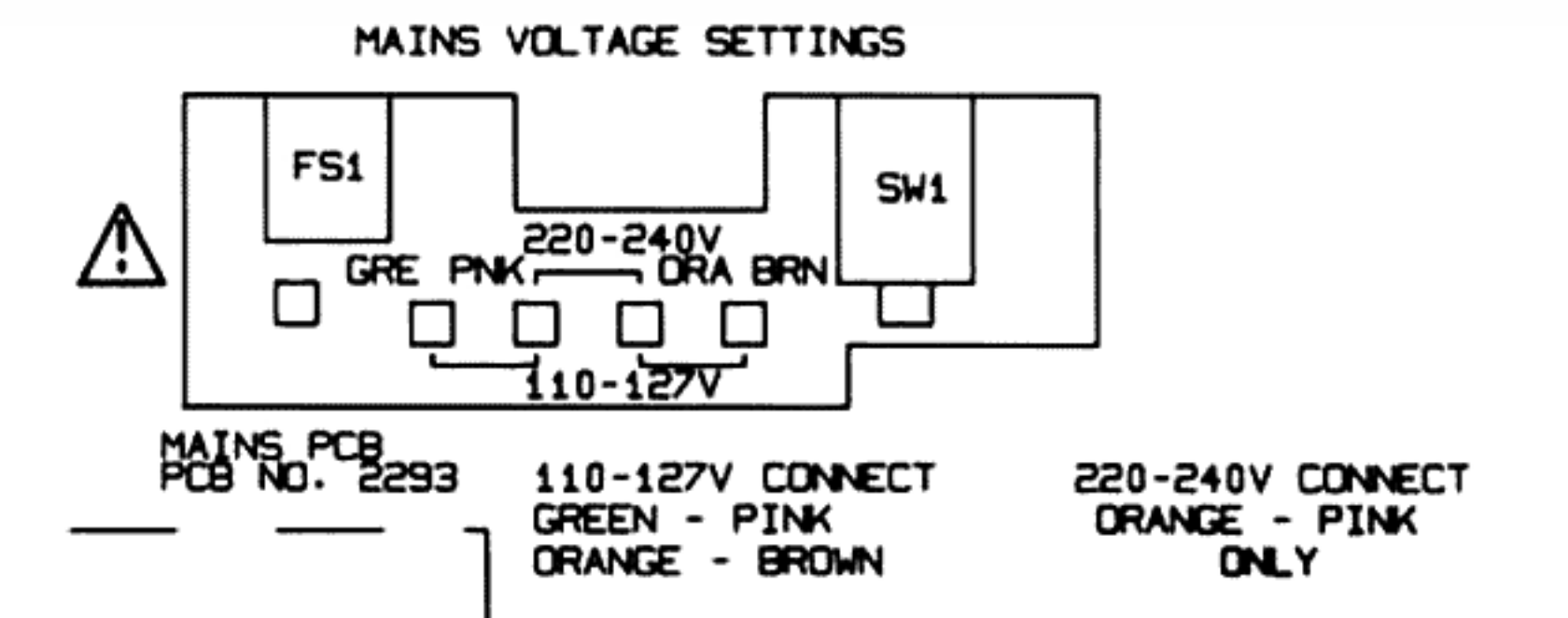
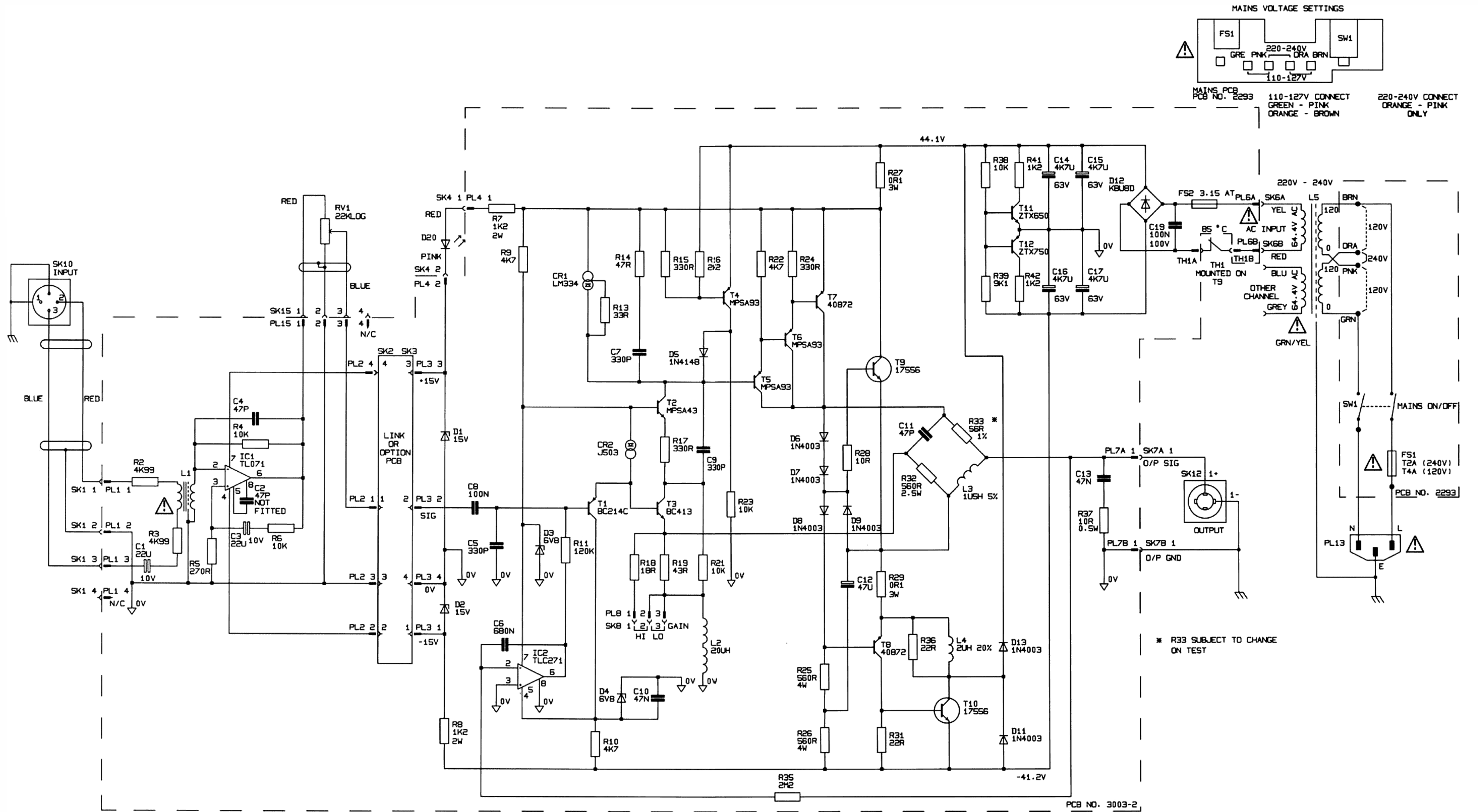
Miscellaneous

Ref	Description	Part No.
L1	Floating line i/p transformer	L52FINP
L2	Choke 20 μ H 00711	L12861A
L3	Choke 1.5 μ H 5%	L00528A
L4	Choke 2 μ H 20% 00868	L12914A
L5	Mains transformer assy c/w connectors SK6A/B	Q24VARU
-	Heatsink anodised black	M22782A
-	PCB heatsink	M22951A
-	Level control knob grey	M22871G
-	Allen key 1.5 mm - knob locking	YKA1M5A
-	Knob indicator pip	M23012A
-	Mains ON/OFF button	M22911A
-	Chassis	M22941A
-	Mains button spring	M23071A
-	Mains switch coupling	N39159A
-	Mains switch link	M23001A
-	Chassis support	M23051A
-	Front panel	M24FP1S
-	Front panel - slave version	M24FP2S
-	Mains voltage safety cover	M30001A

Ref	Description	Part No.
-	W button 70320-01 - retains mains safety cover	FP70320
-	Control socket cover	M23211A
-	W button.70271-01 black - retains control socket cover	FP27101
-	Cover assembly grey - c/w permanite damping	Q24COVG
-	Permanite damping - for cover & under modules	IPEDAMA
-	Amplifier module c/w floating i/p assy	Q24PCBA
SK10	Cable i/p assembly c/w SK1 - CH1	Q24INP1
SK10	Cable i/p assembly c/w SK1 - CH2	Q24INP2
SK2	Socket 4 way square PCB mount	PS10201
SK3	Socket 4 way square PCB mount	PS10201
PL1	Post header 4 way	PAM3712
PL4	Post header AMP 2 position straight	PAM3702
PL6A	Faston PCB mount 0.25"	PP025RS
PL6B	Faston PCB mount 0.25"	PP025RS
PL7A	Faston PCB mount 0.25"	PP025RS
PL7B	Faston PCB mount 0.25"	PP025RS
PL8	PCB header 3 way straight	PP03SRB
PL13	Plug 3 pin AC panel snap in	PPR0331
-	AC connector retaining kit 9299	N9299AA
PL15	Post header 4 way	PAM3712
SK12	Output socket assy c/w SK7A/B	Q24OUTP
-	PCB link floating i/p to amp	Q24LCBA
-	LED cable assembly - CH1	Q24LED1
-	LED cable assembly - CH2	Q24LED2
-	LED bezel assembly c/w LED button & cable	Q24LEDB
RV1	Level control c/w SK15 - CH1	Q24LEV1
RV2	Level control c/w SK15 - CH2	Q24LEV2
SW1	Mains PCB assy 2293 c/w ON/OFF switch fholder etc	Q24MCBA
-	Magnetic shield assembly	Q24MCS1
-	Threaded standoff - supports magnetic shield	M23102A
-	Screw kit - for main assy	Q24SCR1
-	Screw kit - for cover to chassis	Q24SCRC
-	Nut washer kit - for amplifier module	Q24SCRB
SK8	Jumper - gain setting	PS7105A
FS1	Fuse 2A delay (2AT) 20 mm 220/240V	UM02ADA
FS1	Fuse 4A delay (4AT) 20 mm 110/120V	UM04ADA
FS2	Fuse 3.15A delay (3.15AT) 20 mm	UM3A15D
TH1	Thermal switch 85° - 70° C	ST8570A
TH1	Thermal switch 85° - 70° C c/w cables	Q24CABT
-	Thermal switch retaining clamp	M20031A
-	Mica washer TO3 size - for T9 T10	DMICALA
-	Mica washer TO229 size - for.T7 T8	DMICASA
-	Nylon bush 3.5 mm - insulators for T7 T8 T9 T10	M12577D
-	Ceramic bead No1 - standoffs for R7 R8 R41 R4I	M1CYLA
-	Ceramic bead 6 mm - standoffs for R32	IM2CYLA
-	Carton c/w end caps	ZC2401A

Accessories

Ref	Description	Part No.
-	Mains input cable 2M	QESOE2A
-	User manual - English	OI240EC
-	Neutrik speaker connector NL4FC	PPNL4FC



* R33 SUBJECT TO CHANGE ON TEST

240 series
Circuit diagram 3002-1
(pcb issue 3003-2)



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