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# 1 INTRODUCTION – READ ME!!

## *Unpacking*

If there are any signs of damage to the outside of the carton, please notify us or your supplier immediately, regardless of the unit's apparent physical condition. This is in case a claim has to be made at a later date because of previously undetected transit damage. The packaging material should not be discarded until the mixer has been acceptance tested and a suitable transit/storage case is available for secure, safe storage.

## *Visual Inspection*

Identification - please make a separate note of the serial number for your own capital equipment records. Ensure that it agrees with the number on the invoice/packing note. The serial number label is on the output panel.

Temperature - check the meter glasses for condensation. If the package has been in transit during cold weather, leave the mixer for at least 12 hours to allow it to return to normal room temperature. Any measurements or subjective tests then made, will be to a known temperature reference.

## *Specific Points – READ ME!*

- Battery compartment - the mixer has an integral battery compartment to accept 6 AA cells. – Do not allow batteries to run below 1.0V per cell as this will degrade the performance of the mixer.
- Access to internally assignable DIL switches requires the removal of the bottom panel and side covers.
- Testing and calibration should only be undertaken by suitably qualified engineers. **If in doubt contact the factory or your agent for advice.**
- To protect the mixer and internal power supply an automatic reset fuse is mounted on the main printed board (62-016-030). Should a fault condition arise the link will reset when the reason for the fault has been removed.
- Limiter threshold - is set at the factory at +8dBu, but an internal preset potentiometer allows adjustment to any other level above 0dBu.
- Microphone powering - the mixer will remain unconditionally stable if the powering on unterminated input channels is switched off - this also improves the noise performance and crosstalk. Powering - 48V phantom (PH) or 12V tonader (TA) - may be selected before or after the microphone is connected to the module.
- We wish you many trouble-free hours of use from your mixer. As a company, we are fully committed to BS EN ISO 9001. Should you have any problems or require any further information please do not hesitate to contact us.

# WARNING!

## 2 IMPORTANT SAFETY INSTRUCTIONS – READ ME!!

The user of electrical products must be familiar with their potential dangers, and fundamental precautions must always be taken. **Please read the following text carefully.**

Power supply units manufactured by Audio Developments Ltd are not user serviceable. There are no user-serviceable parts associated with any such power supply unit.

### **THE OUTER COVERS MUST NOT BE REMOVED!**

Such a power supply unit is solely for use with audio mixers and sound processors - hereafter called the equipment - manufactured by Audio Developments Ltd. Always use a cord set accepted by a National Approved Body.

**EARTHING/GROUNDING:** When using an external power supply unit that is connected to the mains supply to drive the mixer it must be **CONNECTED TO EARTH.**

In certain types of malfunction or breakdown, earthing provides a path of least resistance for electric current and considerably reduces the risk of electric shock.

**DANGER:** Incorrect connection of the equipment grounding/earthing conductor can result in the risk of electric shock. Where possible obtain a pre-wired mains lead from a reputable supplier with the correctly fitted mains connector for the type of mains outlet in use; otherwise, one correctly wired and checked by a qualified electrical engineer. If your mains lead is not suitable for the mains outlet, have the correct plug fitted by qualified personnel.

The **MAINS PLUG** of this equipment is the primary disconnect device. Therefore, in the final application, ensure it remains close to the equipment and easily accessible.

### 3 POWERING

The mixer may be powered from either internal cells or an external DC power source.

The integral battery compartment requires a total of 6 AA cells. Access is gained via a captive lid which is retained by a 90 degree turn fastener. The lid hinges outwards from the side panel. Either conventional dry, or rechargeable cells may be used. Ensure correct cell rotation when populating the battery compartment.

When using rechargeable cells in the internal battery compartment, they can be charged in situ using the constant current charge circuit, built within the mixer. To charge the cells a voltage in the range +12V to +20V needs to be applied to PIN 2 of the 4 PIN XLR. Ensure that only the rechargeable cells, such as N1 - CAD type, are fitted when powering PIN 2. Applying a voltage when dry-cell type batteries are fitted could cause them to leak resulting in damage to the battery housing and other areas of the mixer.

When driving the mixer from an external power source, PIN 1 is the 0V connection and a voltage in the range +9V to +15V DC should be supplied to PIN 4. The power source should be capable of delivering approximately 300mA - allowing some capacity for phantom powering.

If an external power supply unit (PSU) is to drive the mixer, a current capability of at least 300mA is required. It is poor practice to run a PSU at its limit, therefore we recommend a minimum of 500mA. Audio Developments AD100-09 PSU is a suitable unit.

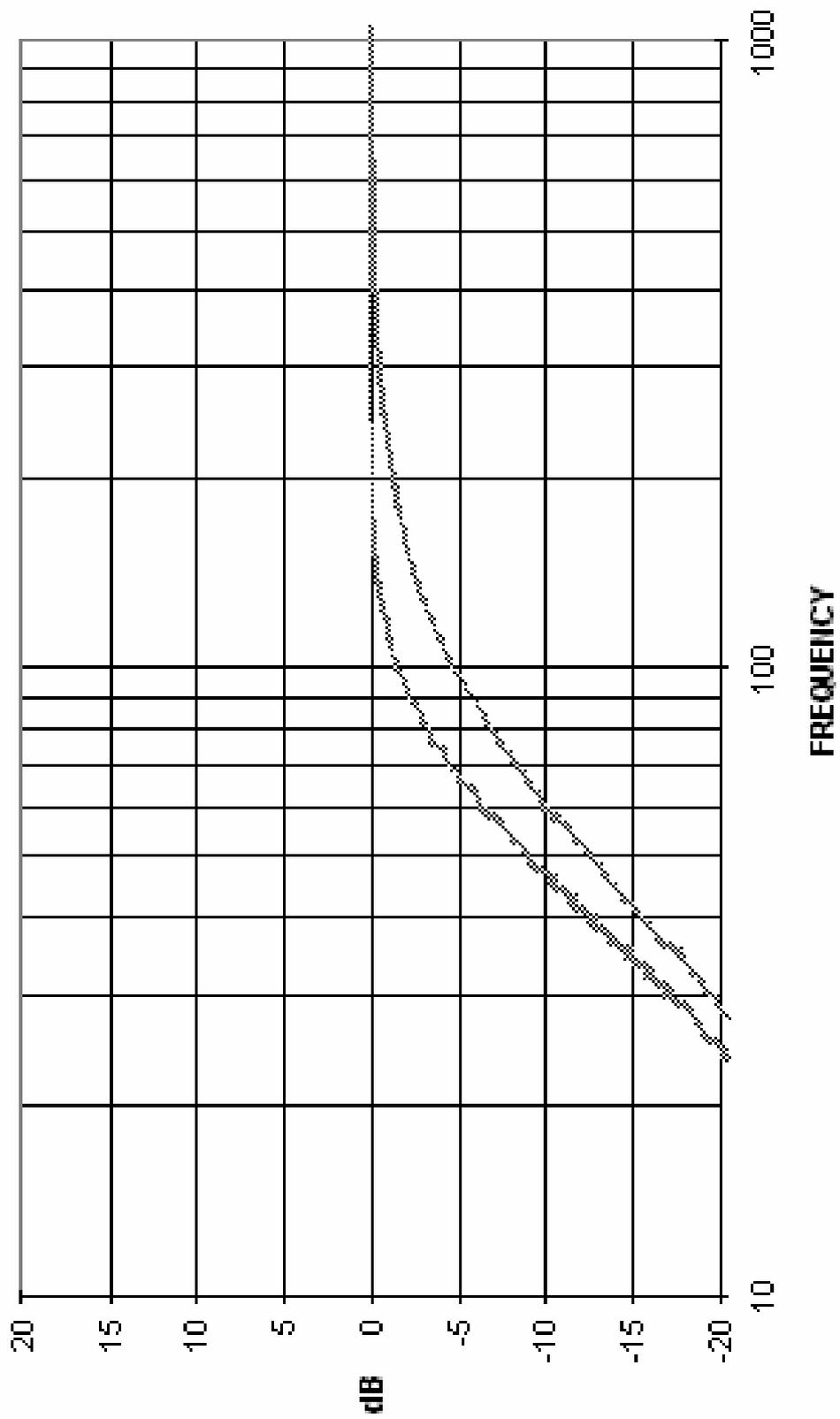
**WARNING:** When NOT using the PSU (AD100-09) supplied for the mixer, ensure your 4-pin XLR is correctly wired to match the POWER IN connector. Failure to do so may result in the breakdown of the internal DC-DC converter. Make this check even if using a PSU which may have been supplied to you in the past, eg AD100-06 or AD100-05.

## 4 TECHNICAL SPECIFICATION

MAX GAIN	MIC	76	68	60	52	44	36	dBu
	LINE	40	32	24	16	8	0	dBu
MAX INPUT	MIC	-40	-32	-24	-16	-8	0	dBu
	LINE	-10	-2	+6	+14	+22	+30	dBu
INPUT IMPEDANCE	MIC	> 2K $\Omega$						
	LINE	>10K $\Omega$						
MIC POWER		+48V PHANTOM. +12V TONADER						
FREQUENCY RESPONSE		+0; -1dB 20Hz to 20kHz						
HI PASS FILTER		-3dB @ 90Hz 12dB OCTAVE						
HARMONIC DISTORTION		<0.03% @ 1kHz 0dB						
		<0.15% @ 40-20kHz +15dBm						
CROSSTALK		<70dB 40Hz to 15kHz						
MAX OUTPUT LEVEL		+23dBm						
OUTPUT IMPENDANCE		<60R TRANSFORMER BALANCED						
		<20R MONITOR PATHS						
NOISE		<-125dB EIN; MIC 20Hz-20kHz; 200R SOURCE						
		< 75dB SNR; LINE 20Hz -20kHz						
LIMITER THRESHOLD		+8dB						
POWERING		INTERNAL 6 X AA CELLS						
		EXTERNAL 9V TO 15V DC						
CURRENT CONSUMPTION		130mA						
DIMENSIONS		230 X 145 X 58mm						
WEIGHT		1.8 KG						

## 5 HPF CURVES

### AD 161 HPF



## 6 CONNECTOR DETAILS

All input and output impedances and levels are to be found in the TECHNICAL SPECIFICATION.

All inputs to, and outputs from AD162 are to be found on the two connector panels.

The input connector accepts balanced microphones and balanced line-level inputs.

XLR (input & output)	Pin 1	Shield
	Pin 2	Signal +
	Pin 3	Signal -

In the case of unbalanced line-inputs and outputs, pins 1 & 3 should be connected. This will not lead to a loss of level.

Main stereo outputs are transformer balanced, and are at line-level.

The stereo tape-return enters the mixer on the 10 pin multiway connector. Each input is unbalanced.

Unbalanced headphone monitor outputs 1 and 2 appear on 'A' type stereo jacks. These outputs are capable of driving 25R at 0dBu.

### STEREO UNBALANCED JACK

Tip	Left signal
Ring	Right signal
Sleeve	Shield

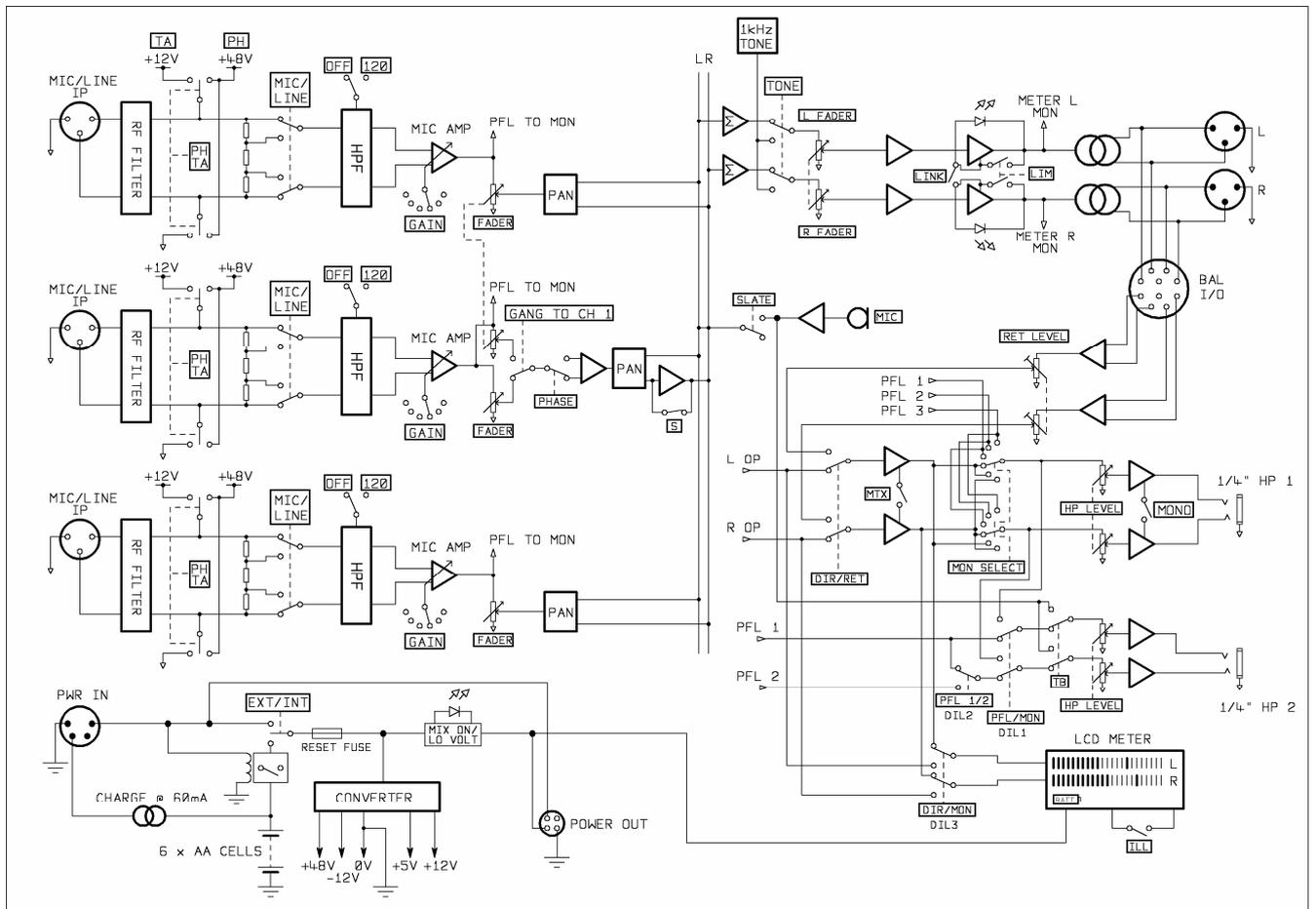
The 10-pin D connector, Multi-way, carries output and return signals to and from external device within one cable.

Pin.1	Left output +	Pin 6	Chassis/ground
Pin 2	Left output -	Pin 7	Left return
Pin 3	Right output +	Pin 8	Chassis/ground
Pin 4	Right output -	Pin 9	Chassis/ground
Pin 5	Return right	Pin 10	Chassis/ground

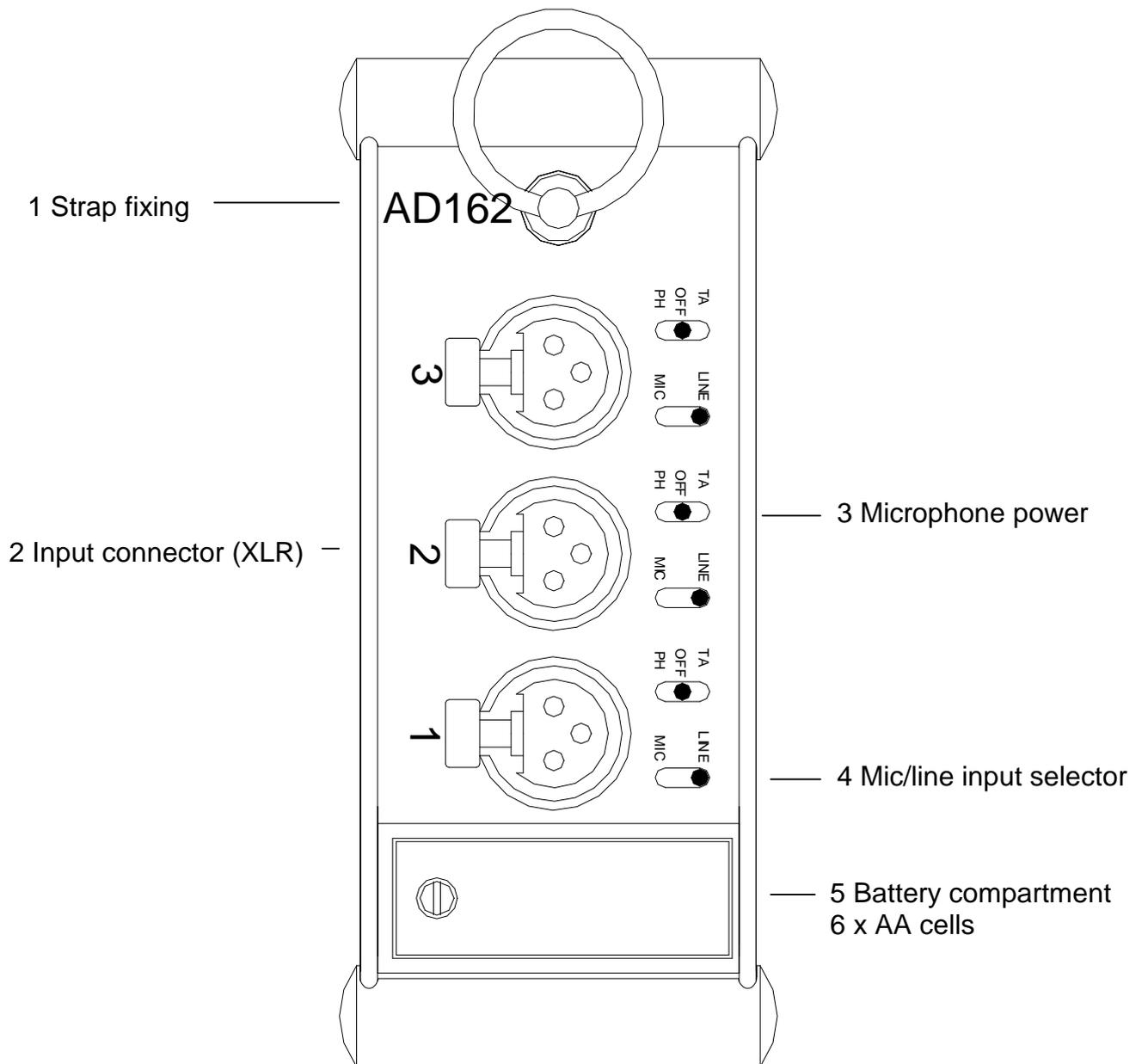
### POWERING

4 Pin XLR	Pin 1	0V		
	Pin 2	Charge volts (12V to 20V)		
	Pin 3	No connection		
	Pin 4	9V to 15V		
4 Pin Mini-connector	Pin 1	Chassis/ground	Pin 3	Output volts - Switched
	Pin 2	Chassis/ground	Pin 4	9v to 15V - Unswitched (In or Out)

# 7 BLOCK DIAGRAM



## 8 INPUT PANEL LAYOUT



## Input Panel Details

Input XLR connector (2) accepts balanced microphone level signals.

XLR (input & output)	Pin 1	Shield
	Pin 2	Signal +
	Pin 3	Signal -

In the case of unbalanced signals, pins 1 & 3 should be connected together. This will not lead to a loss of signal level.

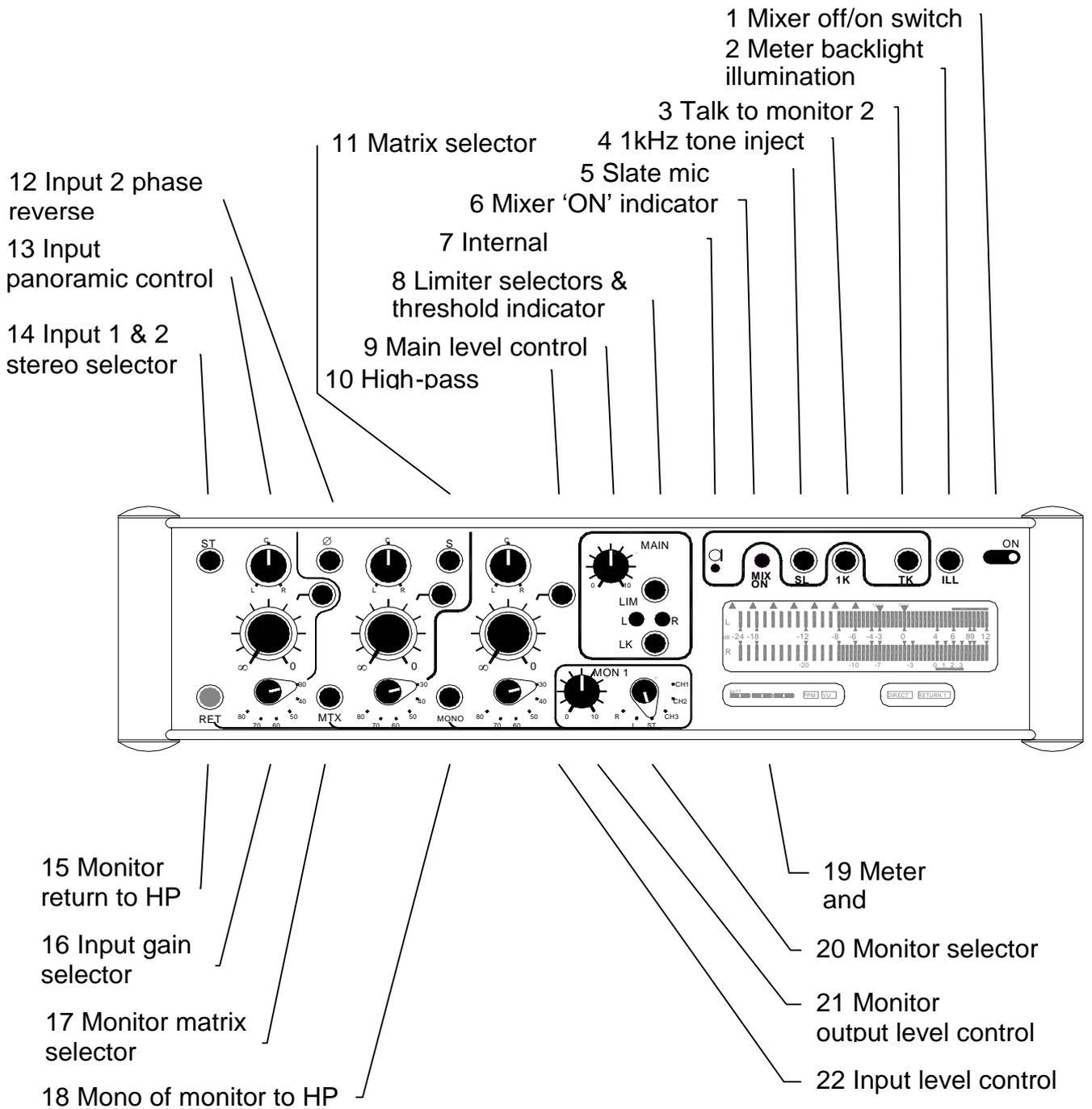
The microphone input functions are as follows: Switch (3) selects 48V phantom and 12V tonader power for use with condenser microphones. Powering may be selected before or after connecting the microphone, but switch off all powering on unterminated modules to ensure unconditional stability of the mixer.

The inputs can accept either LINE or MICROPHONE level signals. This is selected using switch (4). The signal attenuation in the LINE position is 36dB. Therefore the main signal path is calibrated for a 0dBu input and 0dBu output signal when the appropriate input gain selector switch (mounted on the top panel) is set to the position marked '36' and both input and output level controls fully open.

The internal battery compartment (5) requires a total of 6AA cells. Access is gained via a hinged lid which is retained by one 90 degree turn fastener. The lid hinges outward from the side panel.

To facilitate a carry strap a stud and ring (1) are fixed at the top of both side panels

## 9 TOP PANEL LAYOUT



## Top Panel Details

The input gain of the microphone amplifier is set by the 6-position rotary switch (16). The figures around the switch indicate the maximum gain available at a particular setting, with both input and master level controls fully open. Input level is controlled using the INPUT LEVEL control (22) and sets the amount of signal sent to the mixer.

Three push-button switches provide extra functions associated with the inputs.

Input level controls on inputs 1 & 2 can be grouped onto input 1 level control by selecting ST (14), stereo function.

Selecting (12) reverses the phase of the signal on input 2. Useful when using an M-S microphone system on a boom.

S (11) enables a signal in the M-S domain to be matrixed to the L-R domain. The S microphone needs to be operated in input 2.

The high-pass filter (10) operates on all input level settings. When selected the filter protects the input circuit from the effects caused by wind, traffic, air conditioning etc. (Operating frequency and filter curve can be found in the TECHNICAL SPECIFICATION).

The OUTPUT LEVEL control (9) is the master, controlling the level of any signal mixed onto the main busses and determines the signal level at the main output.

The limiter may be switched in to the main outputs - LIM (8). A red LED indicates when limiting is taking place. The threshold of the limiter (the signal level at which the limiter starts to operate) is factory set at an output signal level of +8dBu. Refer to the Adjustments and Calibrations section for the procedure on how to adjust the threshold level; if required.

The left and right limiters may be linked for stereo operation - LK (8)

The 1kHz line-up tone, when selected (4), replaces the normal signals on the main outputs. Line-up tone is calibrated on the PPM scale to 0, giving a line-output level of 0dBu with the output fader (9) set to maximum. The calibration when a VU meter is fitted is an output level of +4dBu (0VU). Note - other settings may apply which have been selected by the customer.

The signal from the internal microphone (7) allows the mixer operator to add a voice signal to the main output by operating the switch marked SL (5) - Slate.

TK (3) Talk enables the mixer operator to communicate with an outstation via Monitor 2. The signal replaces any other appearing at the outstation.

The meter (19) is factory set to read main outputs. Alternatively it may be set to follow MON 1 switch (20) to read what is selected to monitor 1 output. This is determined by a DIL switch mounted on printed circuit 62-016-030 (Refer to Adjustments and Calibrations).

The main output signal is metered and monitored after the output fader and limiter. The monitor signal is metered before its level control. Please refer to the Adjustments & Calibrations section for setting instructions.

Selecting ILL (2) illuminates a back light to improve the viewing of the meter in low ambient light levels.

Battery status is read on meter (19) using a 6 segment bar. Segments extinguish as battery voltage level falls. The first segment flashes when the internal voltage drops below a safe operating level. This function is duplicated by the mix ON indicator LED (6) also flashing.

Toggle switch (1) marked ON controls powering to the mixer whether operating using internal cells or an external power supply unit.

The remaining controls are associated with headphone monitoring. The signals appearing at monitor 1 output are selected using rotary switch (20) and push switches RET (15) return, MTX (17) matrix MS encode /decode and MONO (18) . The first three positions of switch (20) route the pre-fade (PFL) signal of the inputs 1 to 3 to left and right outputs. Position four (ST) selects outputs left and right as a stereo pair. Position five (L) selects left output to monitor 1 left and right outputs. Position six (R) selects right output to monitor 1 left and right outputs.

RET (15) routes the stereo return to monitor 1 via positions 4 to 6 of rotary switch (20). Thus enabling each return to be monitored on an individual basis or in stereo or two track mode.

An indicator on the meter shows the status of the monitor with regard to whether the mixer operator is listening to direct or return signals.

Should the monitor 1 signal be in the M-S domain it can be matrixed to the L-R domain by MTX (17). Any signal in the L-R domain may be matrixed (17) in order to reveal mono capability on monitor 1 left and out of phase components on monitor 1 right. These signals may be isolated by selective use of rotary switch (20)

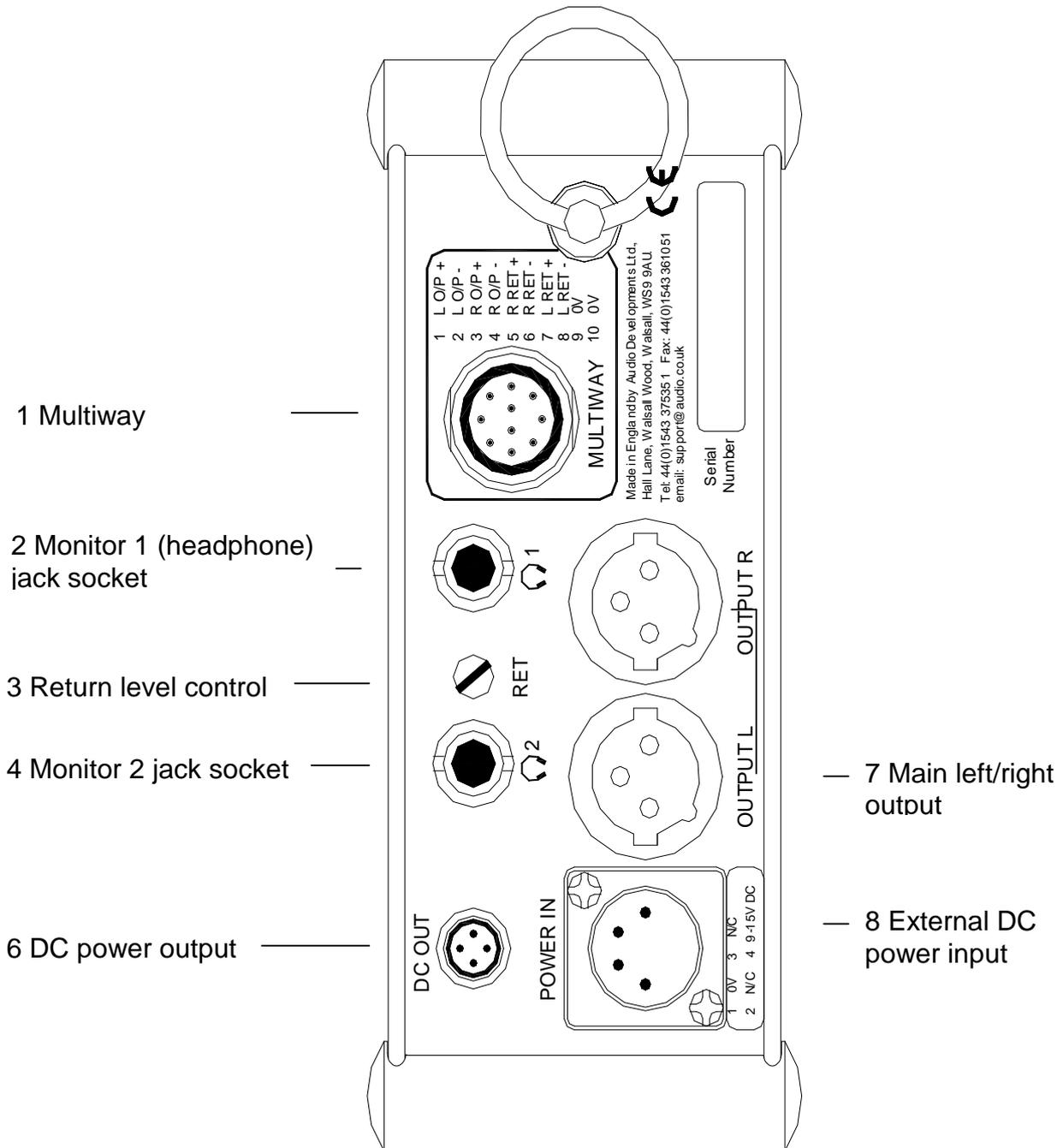
MONO (18) mixes any two-channel signal appearing on monitor 1 and presents it to both left and right outputs monitor 1.

The output level from the monitor 1 is controlled by rotary potentiometer (21).

Monitor 2 is an extra output enabling an outstation to receive a monitor signal (e.g. Boom operator). A series of internal DIL switches allow monitor 2 to function in various modes. The factory setting causes monitor 2 to follow and receive the same signal as monitor 1. Other possible settings route PFL of input 1 to monitor 2 left and right or an alternative is to route PFL of input 1 to monitor 2 left and PFL of input 2 to monitor 2 right.

**Caution** - Care should be taken when operating the PFL if a high signal level is being fed into an input. This is because, under these conditions, an high signal level could then be present at the pre-fade point and if routed to the headphones would create a high pressure level, causing pain to the ears.

# 10 OUTPUT PANEL LAYOUT



## Output Panel Details

Main output, XLR (7), is transformer balanced, with a low output impedance and calibrated for line-level operation. Main outputs are also available at the Multiway Connector (1).

### Output XLR

Pin 1	Shield
Pin 2	Signal +
Pin 3	Signal -

The return signals enter the mixer on the Multiway Connector (1) and are unbalanced. Therefore if a balanced return signal is in use the out-of-phase signal wire should be connected to pin 8 (left return) and pin 6 (right return). The return signal level to the monitor output is calibrated using the present control (3). It has a range of 25dB enabling a wide variety of return signal levels to be accommodated.

### MULTIWAY CONNECTOR

Pin 1	Left Output +	Pin 6	Shield/ground
Pin 2	Left Output -	Pin 7	Left Return
Pin 3	Right Output +	Pin 8	Shield/ground
Pin 4	Right Output -	Pin 9	Shield/Ground
Pin 5	Right Return +	Pin 10	Shield/ground

The headphone monitor 1 appears on an 'A' type stereo jack socket (2). The signals to monitor 1 are routed using the 6 way rotary switch mounted on the top panel, the output level controlled using the adjacent rotary potentiometer.

The headphone monitor 2 output appears on an 'A' type stereo jack (4). Signal level is set using the associated preset control (5). The monitor may be configured internally using a combination of 2 DIL switches. DIL1 selects either the PFL signal or monitor 1 signal. (the factory setting is monitor 1). DIL2 selects what configuration of PFL if the PFL position of DIL 1 is selected. The choice is to have the PFL of input 1 fed to monitor 1 left and right or PFL of input 1 fed to left and PFL of input 2 fed to right. This enables, for example, an outstation to receive only the signal from the boom microphone. Selecting talk (TK) on the top panel overrides the monitor signal allowing the mixer operator to communicate with the external station.

External power is supplied to the mixer via the 4 pin male XLR (8). Refer to powering section for details.

### Power XLR

Pin 1	0V
Pin 2	Charge Voltage +12V to +20V DC
Pin 3	N/C
Pin 4	9V to15V DC

An extra facility associated with the powering is the ability to drive other equipment, such as radio microphone receivers, from the same power source as that driving the mixer. This is achieved using the 4 way miniature connector (6).

- Pin 1 OV
- Pin 2 OV
- Pin 3 Output Volts - switched
- Pin 4 Output Volts - unswitched

Pin 4 is direct off the power source and pin 3 is switched off or on by the mixer main OFF/ON switch. It is highly recommended that no more than 150mA extra current is drawn from this connector.

If an external source is being used, such as a mains power supply unit, then it must be capable of supplying the extra current requirement.

When using a battery supply, either internal or external, then battery life could be greatly reduced.

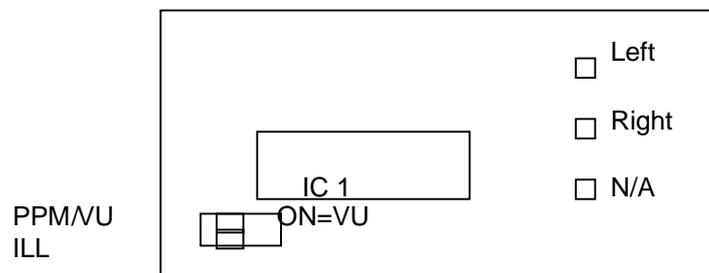
## 11 ADJUSTMENT AND CALIBRATION

### Meter Calibration

The meter has only one calibration preset potentiometer per indicator bar; which controls the adjustment of the level of the reading in relationship to the signal being measured. All other aspects of the meter specification are taken care of within the software and fixed values in the circuitry.

To gain access to the meter module the top panel holding the meter must be detached from the main chassis. (Refer to Disassemble and Assemble Instructions). When the top panel has been detached from the chassis access can be gained to the meter module by extending the ribbon cable connecting the meter module to the main circuit board.

To adjust the meter calibration level apply a signal to an input and obtain the desired calibration signal level from both outputs. Measurement can be made by applying a millivolt meter or similar measuring device across pins 2 & 3 of the XLR associated with the output under test. Adjust the associated preset potentiometer corresponding to the output being measured to obtain the desired meter reading. (See diagram below). Factory setting is a '0' reading on a PPM scale corresponds to 0dBu at the output and to +4dBu at the output on a VU scale unless prior instructions were received at the time of ordering.



### Line-up Tone

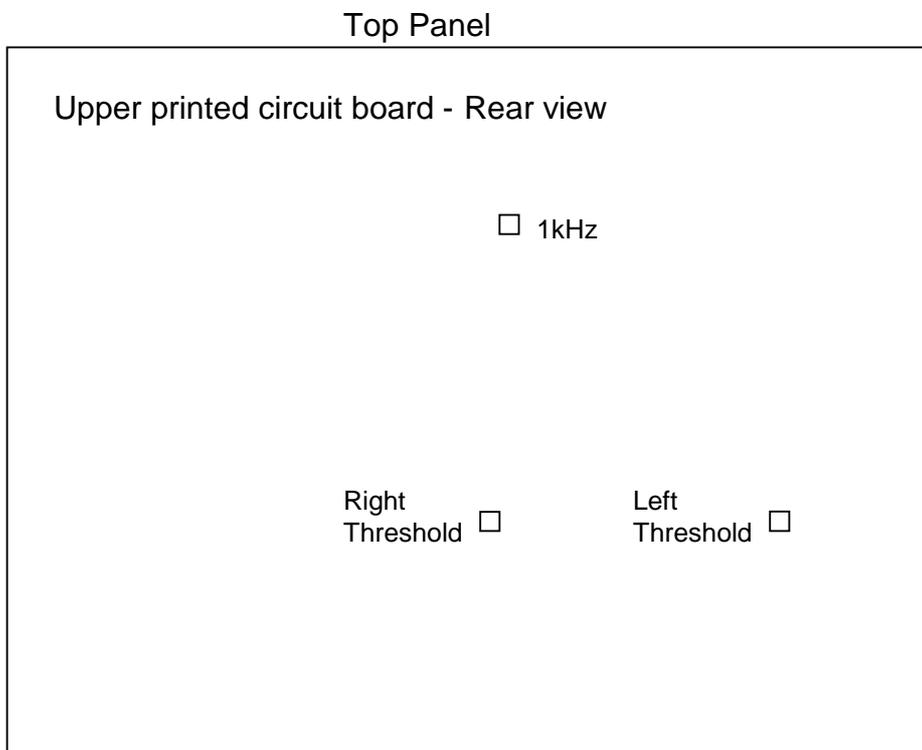
The preset potentiometer to enable adjustment of the tone level is located under the top cover. Access is gained by removing the four fix screws holding the cover.

To adjust the tone level at the output of the mixer apply an AC millivoltmeter or similar measuring device across pins 2 & 3 of one of the output XLRs. With the output master control turned fully open adjust VR1 (see diagram below) to give the desired signal level at the output. Factory setting - 0dBu for a PPM type meter and +4dBu for a VU type.

### Output Limiter

A preset potentiometer fitted in each of the output circuits enables adjustment of the limiter threshold point. These are located under the same top cover as the Line-up Tone adjustment.

To make an adjustment obtain a signal level of a magnitude 0.5dB above the desired threshold level, at the output being measured. Signal application and measurement is the same as that described for the Meter Calibration. Once the correct signal level has been obtained at the output introduce the Limiter function, but not the Link function and adjust the appropriate preset potentiometer to give the desired threshold level. VR3 adjusts the left output and VR5 the right output. (See diagram below). Factory setting is +8dBu at the output.



## 12 POWER SUPPLY UNIT

TYPE AD100-09

The AD100-09 mains POWER SUPPLY UNIT is suitable for driving most of AUDIO DEVELOPMENTS' range of portable audio mixers. This PSU is a single-rail device providing 500mA of current at +14V DC potential and is used as a substitute for battery power with mixers containing an internal DC-DC converter.

The AD100-09 may be powered from either a 110V/120V AC source or a 220V/240V AC source. Ensure that the AC Voltage Selector Switch on the front panel is in the correct position for the source in use. Operating the equipment at the wrong voltage could be hazardous. Care must be taken to connect the LIVE, NEUTRAL and EARTH pins of the PSU's IEC mains connector to the corresponding terminals associated with the AC source. The ON/OFF switch contains an indicator that illuminates when the PSU is operational.

FOR SAFETY REASONS, AD100-09 POWER SUPPLY UNIT MUST BE CONNECTED TO MAINS EARTH. Any maintenance to the PSU or its mains cable assembly should be performed by a qualified engineer.

CHARGING: If nickel-cadmium cells are fitted in an AD140 series mixer, they may be recharged in situ from AD100-09 power supply - whether the mixer is in use or not. (Maximum current is set at 250mA - in addition to the 500mA of current supplying the audio electronics.) The charging circuit has its own ON/OFF slide switch and LED indicator. DO NOT ACTIVATE THE CHARGE CIRCUIT UNLESS THE MIXER IS FITTED WITH NICKEL-CADMIUM CELLS.

FUSES: Two 20mm ANTI-SURGE fuses protect AD100-09 against fault conditions. Should either fail, it is strongly recommended that the cause be traced. Refer to the TECHNICAL LIBRARY. Only suitably qualified personnel should service the power supply unit. The fuse holder on the front panel contains the mains fuse.

250mA HRC TYPE T 240v AC
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For continued safety the specified fuse link must be fitted in the mains fuse holder when a replacement is required. Ensure it is of a type approved by a National Approved Body.

DC-OUTPUT XLR	PIN 1	OV	PIN 3	NOT CONNECTED
	PIN 2	CHARGE	PIN 4	+14V DC

### DO NOT REMOVE THE OUTER COVERS

NOTE: The power supply unit should be serviced by a suitably qualified engineer. Only genuine spare parts with identical specification must be used.

It is DANGEROUS to change the specification or modify the product in any way.

## **13 CUSTOMER NOTES AND FACTORY MODIFICATION**

## 14 TECHNICAL LIBRARY