

## CONTENTS

|  |    |
|--|----|
| SCENARIO                                 | 1  |
| INTRODUCTION                             | 3  |
| UNPACKING                                | 3  |
| VISUAL INSPECTION                        | 3  |
| SPECIFIC POINTS                          | 3  |
| IMPORTANT SAFETY INSTRUCTIONS            | 5  |
| POWERING                                 | 6  |
| TECHNICAL SPECIFICATION                  | 8  |
| EQUALISATION CURVES                      | 11 |
| BLOCK DIAGRAM                            | 12 |
| CONNECTOR PANEL                          | 13 |
| CONNECTIONS                              | 14 |
| INPUT MODULE                             | 16 |
| OUTPUT MODULE                            | 18 |
| ADJUSTMENTS AND CALIBRATIONS             | 21 |
| AD100-09 POWER SUPPLY UNIT               | 24 |
| CUSTOMER NOTES AND FACTORY MODIFICATIONS | 25 |
| TECHNICAL LIBRARY                        | 26 |

SCENARIO

Time was when it became necessary to update the ubiquitous AD145 PICO mixer. Our survey showed two main requirements: as well as Audio Developments' build and audio qualities, narrower and shorter modules were required, and the simple but effective equaliser from PICO had to be retained. By this time, 4-track recording equipment had begun to trickle into the marketplace (Nagra D etc), so we decided to give the new mixer four outputs. Because of the lower noise-floor of modern digital recorders, the level of input signals may be reduced. We have taken advantage of this fact and lowered the slope ratio of the limiters to 7:1. By so doing, not only is signal distortion greatly reduced, but also the artefacts associated with limiters become much less noticeable or objectionable. Also, sixty years after the event, sound engineers have come to realise the potential of Blumlein's M-S techniques; to this end, facilities have been incorporated to take advantage of these techniques. The result is AD146 - a four-output mixer.

This was followed by AD148 - edit mixer. Based on AD146, two comprehensive left and right monitor modules have been added for editing purposes. If a mic/line module is included for commentary or voice-over purposes, its input-gain switch can be changed to a potentiometer, and its gain structure changed to ensure consistent level matching with a fixed, mechanical point of reference. Unfortunately, this way of working does reduce headroom and also compromises a mixer's noise performance.

After AD146/AD148 it was back to the drawing board. Our customers were still demanding a two-output mixer - as a true replacement for the PICO, and with the PICO's simplicity. Despite past assurances to the contrary, T powering is still required. And could we incorporate auxiliaries? And could we possibly bring it to market at 'entry level'? We have, and we have and that's MERCURY (AD147).

AD149 completes the 140 series of mixers, and has a repertoire of party tricks not to be found in any other mixer - not even for 'ready money'. The design team took, as its starting point, our list of all the ideas and suggestions presented to us over the past few years. Many of these requests came from film-sound recordists - a sub-set of recordists we have unintentionally neglected in the past.

Since the days of R & D for AD146, channel insert points suddenly became de rigueur. It transpires that many sound engineers have experienced the power of FLEX-EQ, our industrial-strength equaliser, and wish to be able to use it when making original recordings.

Being latter-day converts, we have included circuitry to take full advantage of all M-S techniques - even shuffling - in both production and post-production.

AD149 is Audio Developments' tribute to, and celebration of the genius of Alan Blumlein.

We appeal to all AD149 users to break with tradition and, just on this occasion, study the manual to reveal all the mixer's secrets.

THIS IS ESSENTIAL.

Well - we HAD every intention that AD149 would complete the 140 series.

We'd reckoned, however, without the persistence - nay, insistence - of our customers for a mains-operated version of the AD146 with four auxiliaries ...

we've called it AD144.



Radical change and PICO have proved to be uneasy bedfellows: never a matinée idol and denied its *dulce et decorum* death, AD145 has now been repackaged in the 140 series metalwork - thereby reducing its size and weight. Facilities remain largely unchanged: internally, the microphone amplifier has been replaced with the one designed for AD146 and externally, the mono return is now in stereo form. Now designated AD245, shall we have PICO - like the poor - always with us?

## INTRODUCTION

### 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 back cover, adjacent to the battery compartment.

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

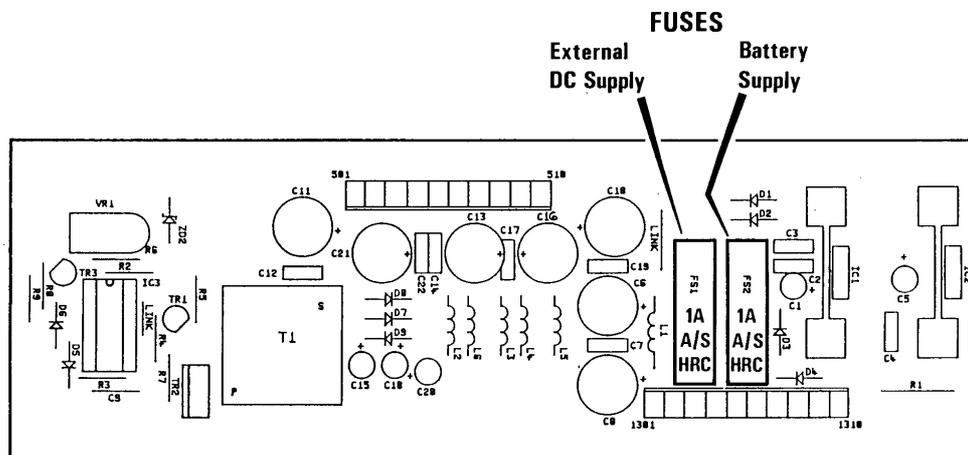
Battery compartment - the mixer has an integral battery compartment to accept 8 size-C cells, and is formed as part of the bottom transversal extrusion. This helps to lower the centre of gravity, as well as adding to the rigidity of the frame.

DC-DC converter - is mounted on the top side of the battery housing and is underneath the fader section of the modules.

In order to facilitate the testing and calibration of all modules, a set of two extender modules is available from the factory.

Connectors - for convenience, the connector panel is labelled for reading from above. All connectors are in line with their corresponding module.

Fuses - to protect the mixer and internal power supply are mounted on the power supply/converter board. Access is gained by removing the output module. 20mm, 1A ANTI-SURGE HRC fuses are used - one for the internal battery power supply and one for the external DC supply.



Limiter threshold - is set at the factory at +8dBu (PPM 6), but an internal preset potentiometer allows adjustment to any other level above 0dBu. The limiters are to be found on the output module printed circuit board.

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 or 12v tonader - may be selected before or after the microphone is connected to the module.

Module fix screws - Hexagon head screws are used to fix the modules and back cover. The size being 1.5mm HEX A/F with a 2.5M thread.

If it becomes necessary to remove modules or back cover it is strongly advised using a good quality hexagonal head driver.

Use of a screwdriver, however desperate, is not recommended.

Finally, may we draw your attention to our range of portable, battery-operated audio-toys called PORT-A-FLEX (AD066) which will complement your new mixer. No 1 - broadcast quality compressor/limiter. Nos 3,7,8,10 - distribution amplifiers for microphone and line-level signals. No 13 - the aforementioned FLEX-EQ in its portable guise.

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 on FLEX-EQ or the M-S microphone technique, please do not hesitate to contact us on 01543 375351 or by fax on 01543 361051.

# **WARNING**

## **IMPORTANT SAFETY INSTRUCTIONS**

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.

## POWERING

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

The integral battery compartment requires a total of 8 size-C cells. Access is gained via a captive lid which is retained by two, 90-degree-turn buckles. The lid hinges outwards 45 degrees from the back panel. When installing new cells, the row nearest the hinge should be fitted first.

Either conventional dry, or rechargeable nickel-cadmium cells may be used. NICADs may be recharged in situ through the 4-pin POWER IN connector. (The circuit for recharging is already incorporated within the mixer.) A voltage in the range +15v to +24v DC @ 250mA is required on PIN 2 of the POWER IN XLR.

When driving the mixer from an external power source, PIN 1 is the 0v connection and a voltage in the range +12v to +15v DC should be supplied to PIN 4. The power source should be capable of delivering approximately 400mA - allowing some capacity for phantom powering.

If an external power supply unit (PSU) is to drive the mixer and simultaneously charge a set of NICADs, a current capability of at least 650mA is required. It is poor practice to run a PSU at its limit, therefore we recommend a minimum of 750mA.

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.

AD100-05 PSU is NOT suitable for use with an AD245 mixer and must not be used.

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LF:  $\pm 10\text{dB}$  @ 100Hz

MF:  $\pm 15\text{dB}$

CENTRE FREQUENCY 2k5Hz Q=1.2

HPF: PRE-TRANSFORMER 12dB/OCTAVE

-3dB @ 150Hz

-3dB @ 90Hz

OUTPUT LIMITER

THRESHOLD +8dB

RATIO 7:1

ATTACK 2 SETTINGS INTERNALLY SWITCHABLE

1: 4mS 2: 0.8mS

RELEASE 2 SETTINGS INTERNALLY SWITCHABLE

1: 250mS 2: 80mS

FACTORY SETTING: SLOW

CURRENT CONSUMPTION 180mA (6 INPUT)

12v DC SUPPLY

TECHNICAL SPECIFICATION - MECHANICAL  
SIZE

|   | 6 I/P | 8 I/P | 10 I/P | 12 I/P |
|---|-------|-------|--------|--------|
| A | 320   | 381   | 442    | 503    |
| B | 295   | 356   | 417    | 478    |

ALL DIMENSIONS IN MILLIMETRES

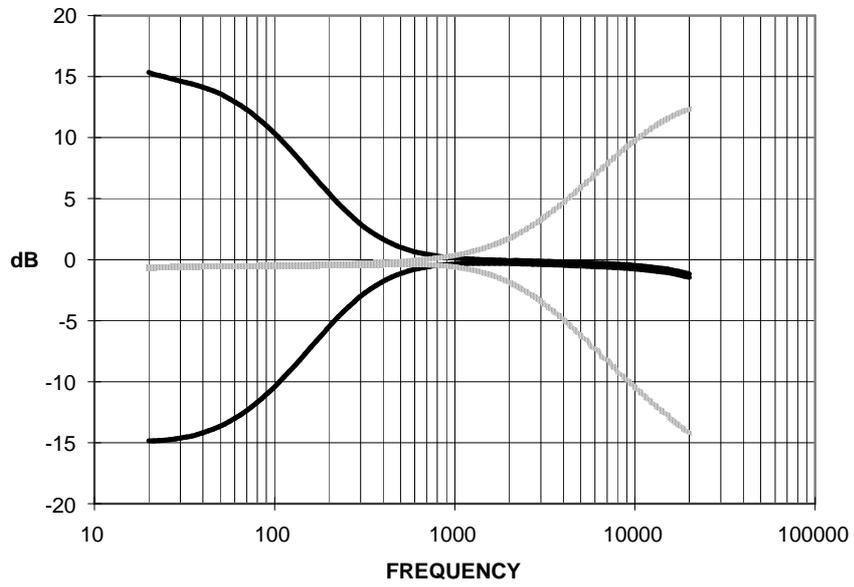
WEIGHT

| 6 I/P | 8 I/P | 10 I/P | 12 I/P |
|-------|-------|--------|--------|
| 6     | 7     | 8      | 9      |

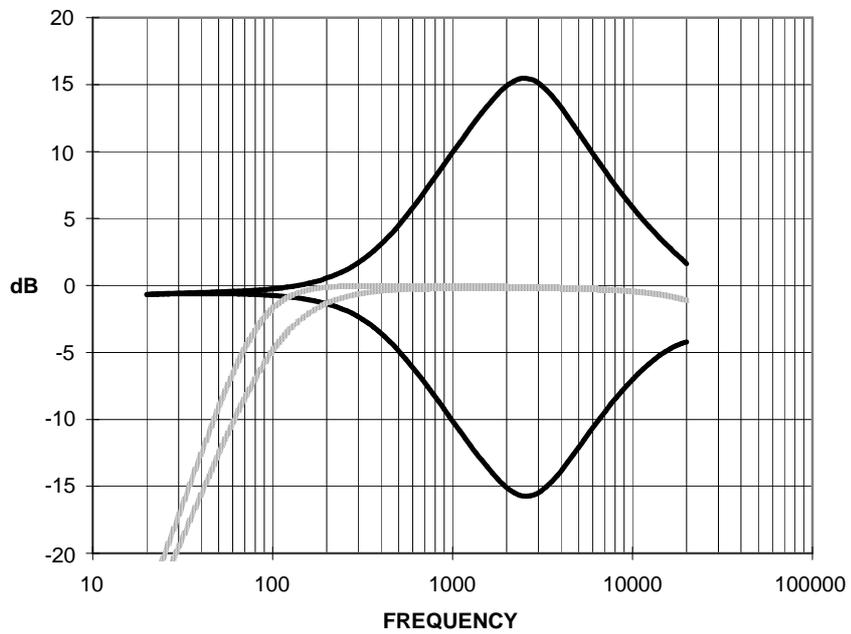
ALL WEIGHTS IN KILOGRAMS

EQUALISATION CURVES

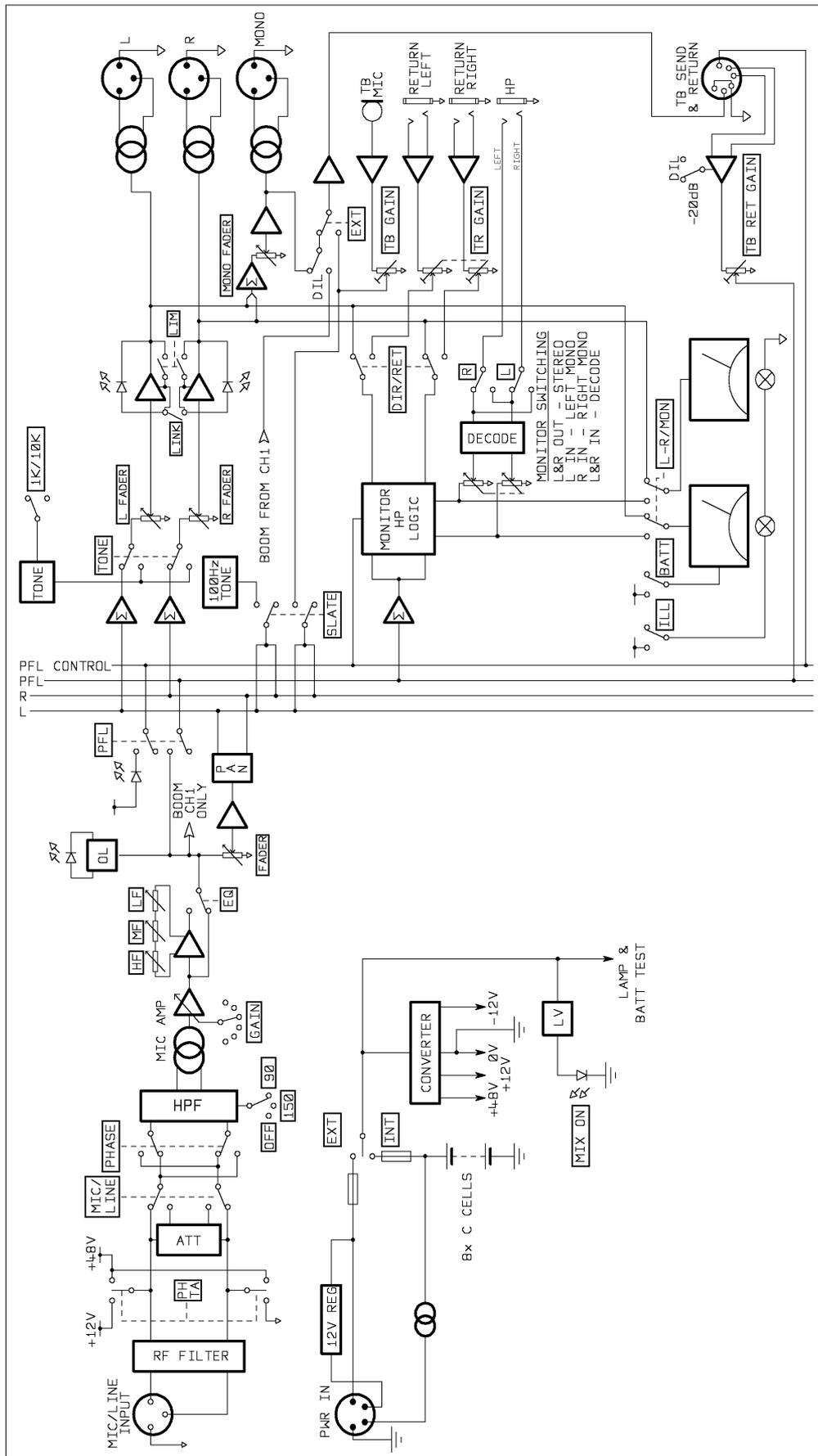
### AD 245 HIGH AND LOW EQ



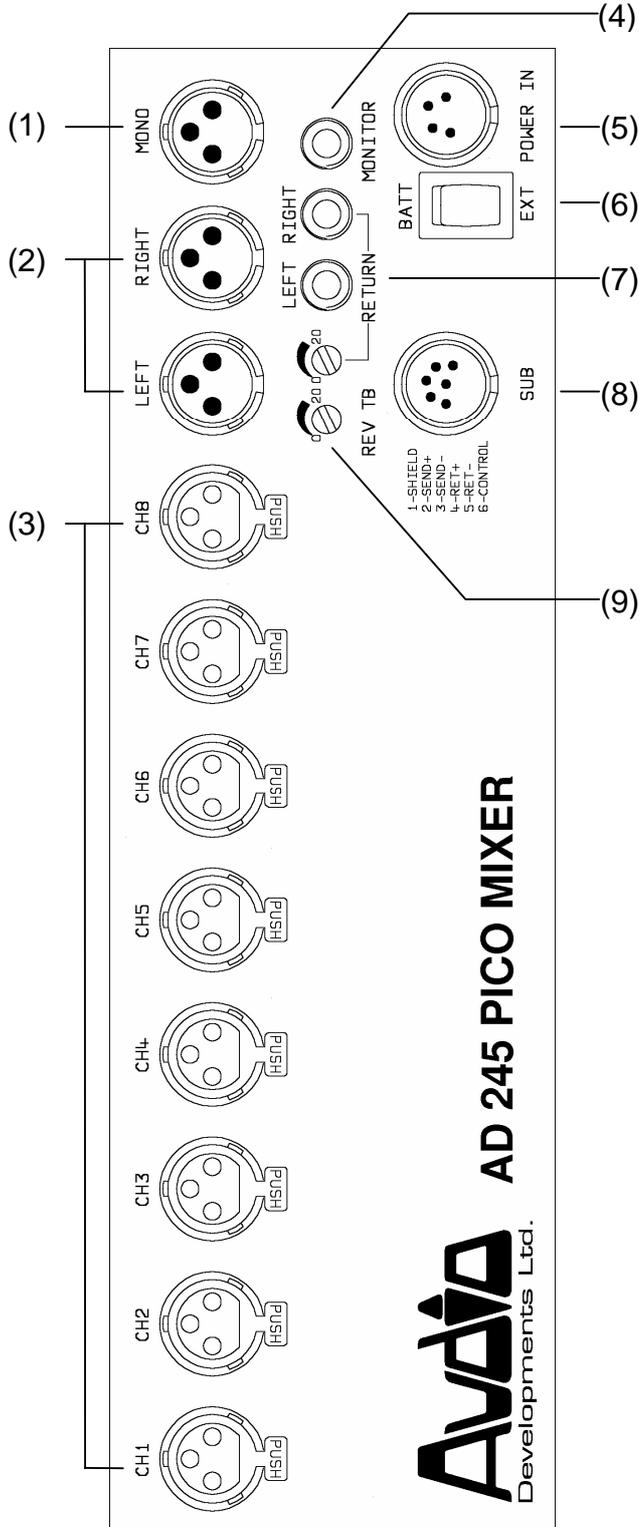
### AD 245 MID EQ AND HPF



# BLOCK DIAGRAM



# CONNECTOR PANEL



- (1) Mono output XLR
- (2) Stereo output XLRs (L & R)
- (3) Mic/Line input XLRs
- (4) Headphone monitor jack
- (5) External DC power input
- (6) Off/On switch (internal and external)
- (7) Stereo-return jacks (L & R) and calibration preset
- (8) Subsidiary connector
- (9) Reverse talkback preset

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

All inputs to, and outputs from AD245 are to be found on the connector panel.

Module connector (3) 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 (2) and mono (1) outputs are transformer balanced, and are at line-level.

The electronically-balanced stereo tape-return enters the mixer on two standard, 'A' type stereo jacks (7); left and right. Adjacent is the input calibration preset. For a 0dBu return signal, the system is calibrated when the preset is fully counter-clockwise. From that point 20dB gain is available for lower level signals.

Unbalanced headphone monitor output appears on an 'A' type stereo jack (4). This output is capable of driving 25R at 0dBu.

#### STEREO BALANCED JACK

|        |          |
|--------|----------|
| Tip    | Signal + |
| Ring   | Signal - |
| Sleeve | Shield   |

#### STEREO UNBALANCED JACK

|        |              |
|--------|--------------|
| Tip    | Left signal  |
| Ring   | Right signal |
| Sleeve | Shield       |

The 6-pin XLR connector, SUB (8), carries all signals to and from an outstation. Reverse-talkback level may be set by REV TB preset (9).

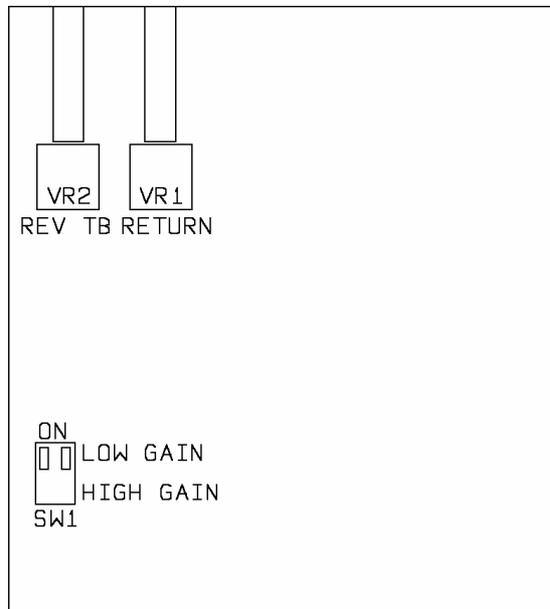
|     |       |        |       |         |
|-----|-------|--------|-------|---------|
| XLR | Pin 1 | Shield | Pin 4 | Ret +   |
|     | Pin 2 | Send + | Pin 5 | Ret -   |
|     | Pin 3 | Shield | Pin 6 | Control |

The unbalanced send is low impedance with a capability of driving headphones of 25 ohms impedance or greater.

The balanced (or unbalanced) signal from the outstation may be at mic level or line level. The mixer leaves the factory set for a line-level return, but the gain of the return amplifier may be increased by 20dB via the DIL switch on the sub board attached to the connector panel. Preset (9) controls the level of the return - which feeds on to the PFL mixing buss and is routed by grounding the control line (Pin 6) at the external source.

Thus, a two-way conversation can take place between mixer and boom operator with the boom operator being able to listen to programme when no communication is taking place. The programme may be selected, via a DIL switch, between the mono output from the mixer or the signal from input channel 1 (when being used for the

boom microphone). The DIL switch appears on the output module PCB. (Refer to block diagram and line drawing in output section.) The mixer leaves the factory with the DIL switch set in the MONO position.



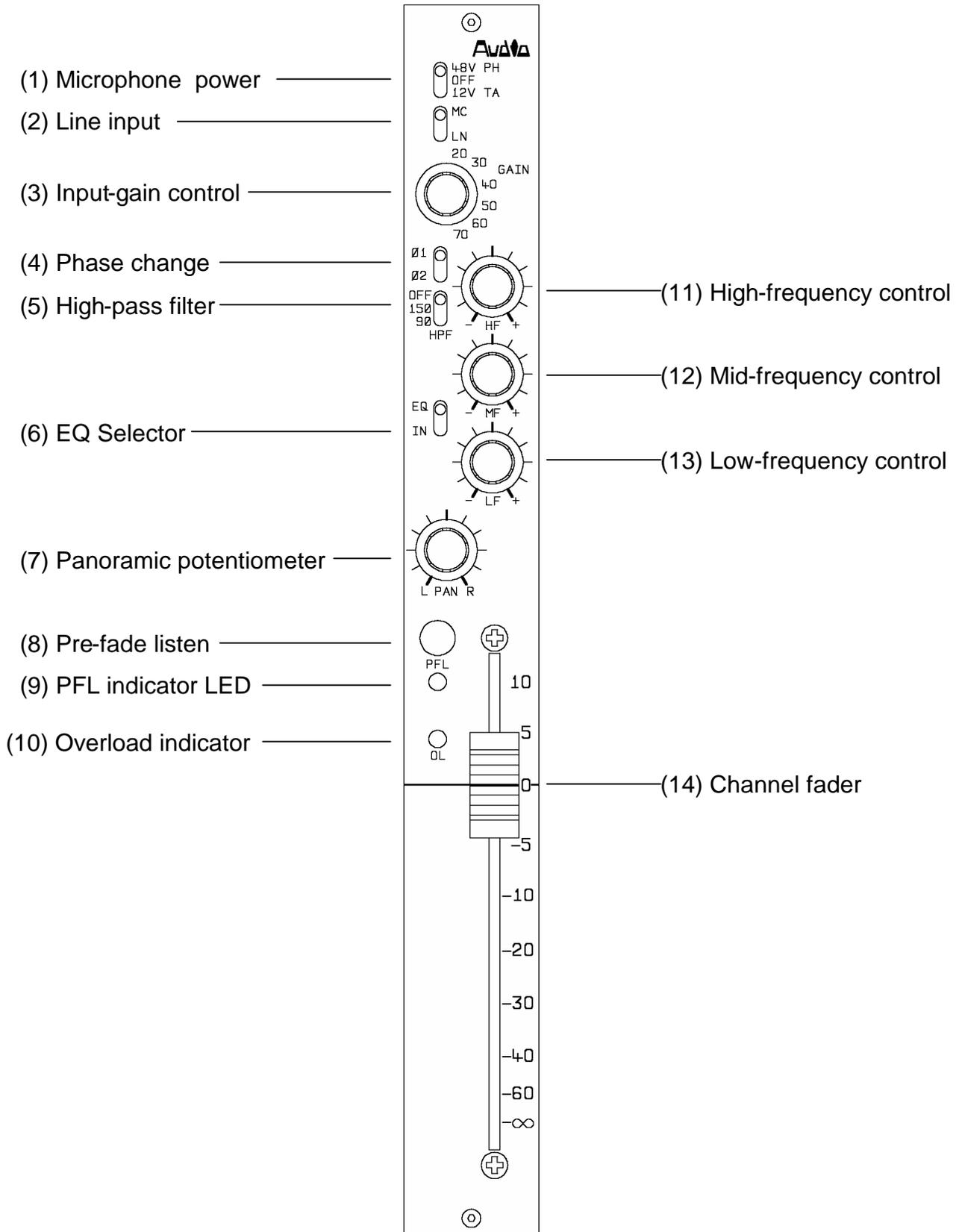
A three-position rocker switch BATT/EXT (6) selects either internal batteries or an external DC source. Power to the mixer is confirmed by the MIX ON LED on the output module. The LED flashes when the internal voltage falls below the safe operating level of 9v.

External powering of the mixer is via a 4-pin XLR (5).

|     |       |        |       |           |
|-----|-------|--------|-------|-----------|
| XLR | Pin 1 | 0v     | Pin 3 | NC        |
|     | Pin 2 | Charge | Pin 4 | 12-15v DC |

A suitable external power supply is Audio Developments' AD100-09 but any external DC source must be capable of delivering 750mA at 12v.

# MICROPHONE/LINE INPUT MODULE



The Microphone/Line input module functions are as follows: Switch (1) selects 48v phantom and 12v tonader power for 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. For complete safety of external equipment, switch off microphone power before connecting a line-level signal.

Phase change (4) is pre transformer and operates on microphone and line inputs.  $\emptyset_1$  is the normal position.

The high-pass filter is pre transformer and, similarly, operates on microphone and line inputs. In this position the filter protects the transformer from low-frequency saturation caused by wind, traffic, air conditioning etc. Operating frequencies are to be found in the TECHNICAL SPECIFICATION. The high-pass filter operates independently of the equaliser.

The input gain of the microphone amplifier is set by the 6-position switch (3). The range of this control is 50dB in 10dB steps. For line-level signals, an input attenuator is inserted via switch (2).

Following the microphone amplifier is the simple, but effective, equaliser which has been retained from the original PICO - selector switch (6). Because of the inherent inaccuracy of the centre-detent mechanism, it is not Audio Developments' practice to fit such devices to equaliser amplitude controls - HF (11), MF (12), LF (13).

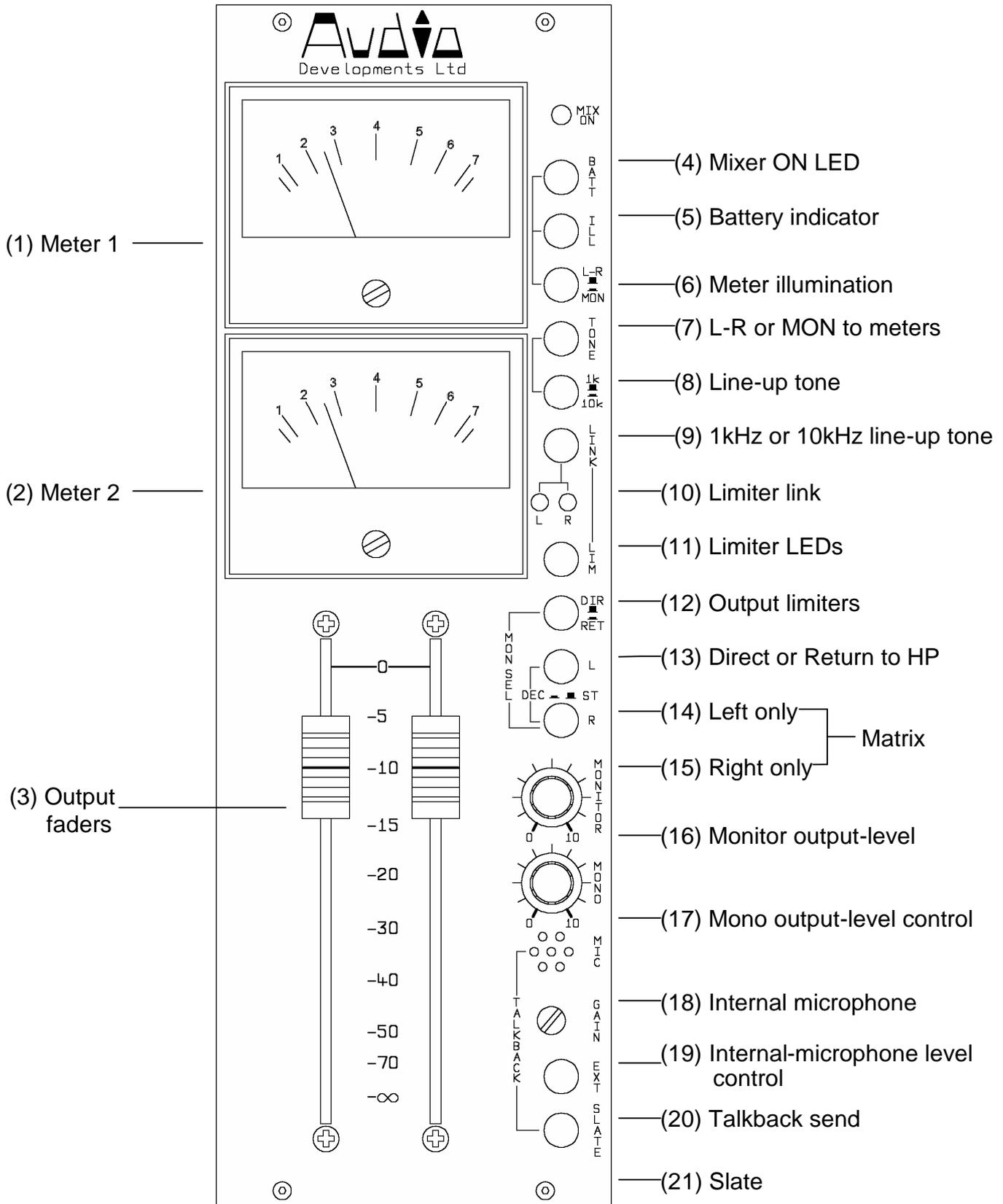
A panoramic potentiometer - panpot - (7) routes the module's signal proportionately between the left and right mix busses.

Pre-fader listen (8) with its LED indicator (9) routes the module's signal to the monitor/PFL mix buss for auditioning on headphones.

An overload LED (10) illuminates 3dB before clipping at the input to the fader.

The Penny & Giles fader (14) is calibrated 10dB from its fully open position, allowing the operator to work with 10dB of gain in reserve. Faders on adjacent modules can be coupled for stereo operation by the use of standard ganging clips.

# OUTPUT MODULE



This module controls the level of main and monitor output signals and metering of the output and monitor signals (including PFL). Calibration is achieved when the output faders (3) are at maximum.

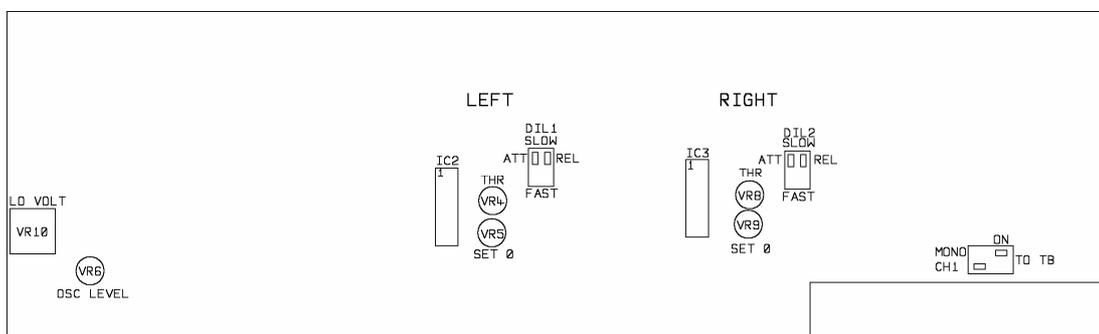
The upper meter (1) reads left output, the lower meter (2) right output when switch (7) is in its L-R position. In MON position the meters read either mono output or monitor output. This is determined by a set of links on the main printed circuit card of the output module. The factory setting, with switch (7), set to MON is both meters read mono output. Refer ADJUSTMENTS & CALIBRATION section for instructions on how to convert the MON position of switch (7) to enable the meters to read monitor output.

Battery status is read on the upper meter by BATT (5) and the meters may be illuminated by ILL (6) - overuse of this function will rapidly drain the batteries. When the internal voltage drops below a safe operating level, the MIX ON indicator LED (4) will flash.

The main output signal is metered and monitored after the output faders and limiters. The monitor signal is metered before its level control.

A pair of limiters may be switched in to the main output - LIM (12) - and linked for stereo operation - LINK (10). LEDs (11) indicate when limiting is taking place. A choice of fast or slow attack and release times may be made via the two DIL switches on the output printed circuit board. When the limiters are being used as a stereo pair, they should have their attack times and release times set identically. The factory setting for the DIL switches is SLOW.

## OUTPUT MODULE PRINTED CIRCUIT BOARD



Line-up tone, when selected (8), replaces the normal signals on the main output. The frequency of the line-up tone may be selected between 1kHz and 10kHz (9). Line-up tone is calibrated on the (BBC-scaled) meters to PPM4, giving a line-output level of 0dBu with the output faders set to maximum.

The remaining controls are associated with headphone-monitoring of signals from the mixer - internal signals (DIR) or tape-return (RET) may be selected (13): these signals may be either in the L-R domain or the M-S domain. When switches (13), (14) and (15) remain unselected the main-output signal from the mixer appears on the headphones. If SW (14) is selected, the left-output signal appears on both earpieces; if SW (15) is selected, the right-output signal appears on both earpieces. If switches (14) + (15) are selected, a matrix amplifier is inserted across the monitor output: when the main output is in the L-R domain, the matrix will enable mono compatibility to be assessed on the left earpiece and out-of-phase components to be checked on the right earpiece. When working entirely in the M-S domain, the matrix will transform the mixer output into the L-R domain for monitoring purposes. Selection of RET (13) will allow these functions to be performed on a tape-return signal. The level of the monitor signal is controlled by potentiometer (16).

A mono mixdown of the main, stereo output from the mixer is available and its level is adjusted by MONO (17).

The signal from the internal microphone (18) replaces any other signal appearing at the outstation when routed via EXT (20) - the level being set by preset GAIN (19).

SLATE (21) allows the mixer operator to ADD a voice signal to the main stereo output together with a low-frequency identification tone (100Hz).

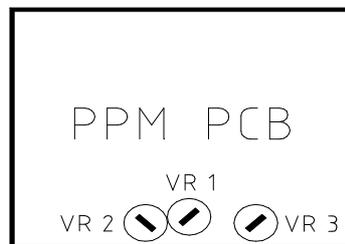
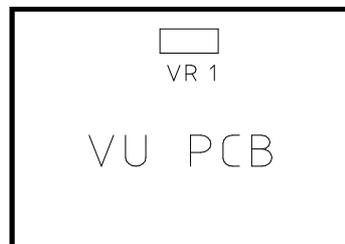
When PFL is selected on an input channel or when the outstation wishes to communicate with the mixer operator (by grounding pin 6 on the multiway), logic changes the signal on monitor output accordingly.

## ADJUSTMENTS AND CALIBRATIONS

Meters - are to broadcast specification and either a VU or a PPM may be selected. A choice of 3 scales is available for the PPM: BBC, N10, SDR.

Line-up-tone oscillator - the preset (VR6) that adjusts its level at the output of the mixer is mounted on the output module printed circuit board.

Low-battery indicator - the preset (VR10) associated with this facility is also mounted on the output module printed circuit board. The low reading is set at the factory and corresponds to a set of batteries having discharged to 9v. On a VU meter, low volts is at 0VU. On a PPM meter it is indicated by a separate marking: yellow on a BBC scale and red on an N10 and SDR scale.



14991201

VU meter - there is one preset, on the VU meter PCB, for meter adjustment. Set an input module for a line input and introduce a 1kHz tone from an audio signal generator. Adjust levels to achieve a reading of +4dBu, at a main output, on an AC millivoltmeter - measured across pins 2 & 3 on the output XLR. Select the meters to L-R and adjust the preset to give a reading of 0VU.

PPM meter - the driver PCB has three calibration controls (presets). VR1 adjusts the reference level, VR2 and VR3 adjust the 'law' of the meter. VR2 adjusts the upper sector of the scale and VR3 adjusts the lower sector. To initiate calibration, set each preset to its mid position.

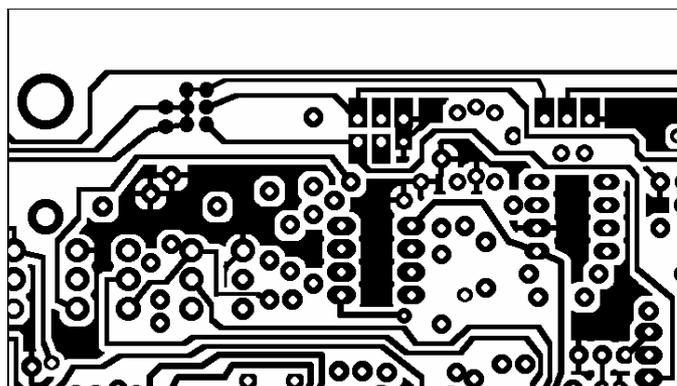
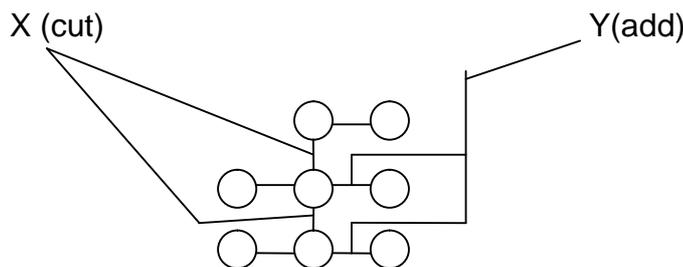
BBC scale - using the tone generator and millivoltmeter as described above, adjust mixer levels for a reading of 0dBu, on the millivoltmeter, from a main output. Select the meters to L-R and adjust VR1 for a reading of 4. Increase the output signal to +8dBu and adjust VR2 for a reading of 6. Decrease the output signal to -8dBu and adjust VR3 for a reading of 2. Repeat this procedure until an accurate set of readings is obtained without further adjustment to any of the presets being required. Now check all points 1 to 7 on the scale to determine whether they are within specification.

N10 scale - for a meter calibration of TEST = 0dBu. With a main-output signal of -6dBu, adjust VR1 to give a meter reading at -6. Increase the signal to +6dBu and adjust VR2 to obtain a meter reading at +6. Lower the output signal to -18dBu and adjust VR3 to obtain a meter reading at -18. Repeat this procedure to obtain an accurate reading at each of these three points. Now check the calibration of all meter points.

SDR scale - with a main-output signal level of -6dBu, adjust VR1 to obtain a reading of -12. Increase the output signal to +6dBu and use VR2 to obtain a reading of 0 on the meter. Lower the output signal to -18dBu and adjust VR3 to give a reading of -24. Repeat the procedure to obtain an accurate reading at each of these three points. Now check the calibration of all meter points.

L-R/MON switch - To enable the meters to read monitor output rather than mono output when in the MON position a set of links on the main printed circuit card of the output module have to be broken and another set of links made.

Referring to the diagrams below. Shown is the section of the printed circuit card containing the link mechanism. Cut links marked 'X' and add links in the places marked 'Y'. It may be necessary to clear the solder mask from the printed circuit pads before new links (Y) can be soldered into place.



Main-output limiters - calibration involves two presets per output.  
Using the 'L' output as the example ...

Biasing and threshold are adjusted as follows: VR5 biases the limiter circuit to the point of correct operation and VR4 sets the threshold. (Labelled SET 0 and THR respectively.)

With no signal present, VR5 should be adjusted to give a reading in the range -1.5v to -2.5v at PIN 8 of IC 2. VR4 should be adjusted to give a reading in the range -2.5v to -3.5v at PIN 12 of IC2.

Apply a signal at 1kHz to the mixer to give a level of 0dBu at 'L' output. Then select the limiter function and adjust VR5 until the output signal starts to fall (typically 0.2dB). The DC voltage at PIN 8 of IC 2 should be approximately -2.0v.

After setting VR5, adjust the output signal to just greater than +8dBu with the limiter deselected. Introduce the limiter and adjust VR4 until the output signal falls to +8dBu. This is the THRESHOLD setting. (If a different threshold setting is required, alter the signal levels accordingly.) The DC voltage at PIN 12 of IC 2 should be approximately 0.6v different from that at PIN 8.

The right output can be set using the above procedure, but the preset and IC numbers change to correspond with the output being calibrated.

The link function has no individual setting of its own. To ensure this works within specification it is important that L and R outputs are set up as a pair. After following the above procedure, the DC voltages at PINS 8 and PINS 12 of the ICs should be identical. (Tolerance  $\pm 0.05\text{v}$  with typical figures at PIN 12 of -2.6v and PIN 8 of -2.0v)

There are two DIL switches associated with the attack and release times: one for the left output, the other for the right output.

**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 110/120v 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 |
|--------------------------|

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 | 0v     | PIN 3 | NOT CONNECTED |
|               | PIN 2 | CHARGE | PIN 4 | +14vDC        |

**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.  
**CUSTOMER NOTES AND FACTORY MODIFICATION**

TECHNICAL LIBRARY