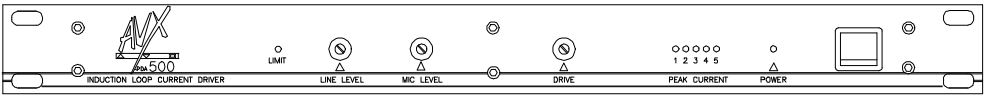
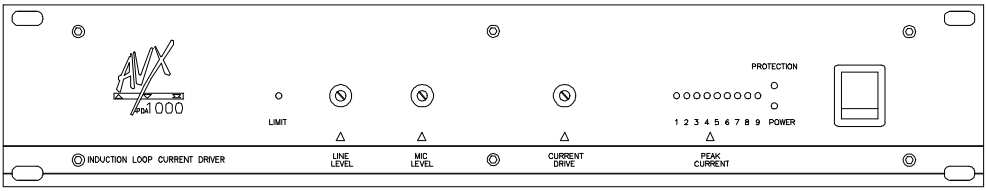
PDA500 & PDA1000

Operation Instruction Manual

Audio frequency induction loop ampilifiers





Features

- PDA500 provides up to 250m^2 coverage
- PDA1000 provides up to 550m^2 coverage
- Automatic tracking compressor
- Line input
- Mic input
- Hidden controls
- Popular 3pin XLR connectors
- Input peak LED
- Output current meter
- 19” rack mounting case

Technical Description

The PDA series are constant current audio frequency induction loop amplifiers. They use an advanced and unique floating sense system to achieve greater efficiency and to correct the phase problems created by driving an inductor, whilst also providing exceptional sound quality

The pre amplification stage in the PDA series incorporates an advanced signal processing system which allows tight control to be maintained over the signal. This is achieved with only minimal degradation of the signal and is unnoticeable in normal operation. This is far more advanced and sophisticated system than that found in many dedicated signal processing units.

The processor can be switched between compression and compansion (compression and expansion). Expansion is limited to 28 dB to prevent background noise and hiss being amplified. Compression up to 90dB is available. The compression ratio is dynamically variable. For most applications the processor should be set for compression, however compansion should be used in installations where there are a large number of microphones and little or no external signal processing.

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Doc No. DCP0000518 JH 12/7/99 rev2

AC power operation

For normal AC operation, plug the AC power supply cord in a wall outlet of 230 V specified voltage. The unit complies with BS415.

AC power cord
The wires in the mains lead supplied with the unit are coloured in accordance with the following code.

Green and Yellow	Earth
Blue	Neutral
Brown	Live

As the colours of the wires in the mains lead of this unit may not correspond with the coloured markings identifying the terminals in your plug, please connect as follows.

Wire	**Plug terminal**
Green & Yellow	'E' mark 'EARTH' symbol mark 'GREEN' mark 'GREEN AND YELLOW' mark
Blue	'N' mark 'BLACK' mark 'BLUE' mark
Brown	'L' mark 'RED' mark 'BROWN' mark

Caution
To prevent electric shock do not remove the cover

Unpacking

Upon receipt of the amplifier shipment, please inspect for any damage incurred in transit. If damage is found, please notify your local representative and the transport company immediately. State date, nature of damage and whether any damage was noticed on the shipping container prior to unpacking. Please give the waybill number of the shipping order.

The unit should not be placed in areas;
1. with poor ventilation
2. exposed to direct sunlight
3. with high ambient temperature or adjacent to heat generating equipment
4. with high humidity or dust levels
5. susceptible to vibration

Doc No. DCP0000518 JH 12/7/99 rev2

Installation

Read this manual throughally before starting installation, the following procedure should be used.

1. Install the loop (see page 6)
2. Before connecting a loop to the amplifier use a multimeter to check the loop is not shorted to ground at any point, (it will almost certainly damage the amplifier if it is).
3. Connect music or speech input signal to the amplifier. The peak line level of this signal should be approximately 1V.
4. Ensure input levels controls and drive control are fully anti-clockwise. .
5. Increase the input level controls until the 'limit' LED is just flashing. This indicates that the dynamic range processor is receiving a signal of the correct level. If you are using both inputs the level controls act as a simple mixer.
6. Adjust the drive control until the required current peak is produced. (see page 5). **Care should be taken when doing this to ensure the current is within the recommended rating of the cable. The average current output should be approximately one quarter of the maximum peak.**
7. Using an induction loop receiver (eg SigNET Rxti2), listen to the signal inside the loop. It is also advisable to check the system with a field strength meter. Please note that the orientation of the field strength meter may influence the reading.

Mains Hum

Background hum can sometimes be heard when testing an installation especailly when testing with a induction loop reciever. This is not caused by the loop system and will NOT normally be heard by hearing aid users, due to built in filtering in most hearing aids.

The source of the hum is most likely to be mains wiring, particularly in old buildings where Live and Neutral cables may take different routes, thus creating an induction loop radiating at 50Hz.

If the client complains of mains hum simply disconnect the loop to prove that the source is unrelated.

Input connections

Two input connectors are standard 3pin XLR. One input is for line level the other for mic. level signals. For pin connections use the following chart or see the back of the unit which has the pin outs marked next to the relavent connector.

LIne Input

Unbalanced		**Balanced**	
pin1	ground	pin1	ground
pin2	signal	pin2	Hot
pin3	link to pin1	pin3	Cold

Microphone input

Unbalanced		**Balanced**	
pin1	ground	pin1	ground
pin2	signal	pin2	Hot
pin3	link to pin1	pin3	Cold

Phantom is supplied on pins 2 and 3, 44V, 5mA maximum per pin.

Doc No. DCP0000518 JH 12/7/99 rev2

Output connections

Loop output

The output is via two 30A 4mm terminal posts. Connection can be made by way of tails or 4mm plugs. Tails are recommended as they are very unlikely to be pulled out.

WARNING: The PDA amplifiers are capable of producing short term peaks of twice their rated current.

Internal adjustments

These adjustments should only be carried out by qualified personnel. The power lead must be disconnected before the top cover is removed.

Compand/ compress

Compress (Default) pins 1&2	At a factory set level the compression ratio will be automatically changed to keep prevent clipping. This option gives the best sound quality and should be selected if the input is from a mixing desk or theatre stage for example.
Compand pins 2&3	This option can be used set for a system which has a large number of microphones or is likely to suffer from poor mic use. The tracking compressor will give ±15dB gain to the signal to try to keep the level as level as possible.

Duck

Off (Default)	No attenuation
On	For every 1 dB increase above threshold, the microphone input is attenuated by 10 dB, to a maximum of 60dB.

The duck feature when selected, attenuates the microphone input signal when the line input signal passes a pre-set threshold level. The duck is used to eliminate any echo that may be occur due to the signal from the stage/line input being heard, then after a short delay, heard again from the audience response microphone which picks up the signal amplified by the main PA system. This will only occur when a loop system incorporating an audience response microphone is used in conjunction with a stage/ front of house signal feed to the line input.

Peak current calculation

To calculate the required current it is first necessary to calculate the aspect ratio of the loop. This is the width of the loop divided by the length of the loop, assuming the loop approximates to a rectangle. Circular loops should be approximated to a square. If the room is L - shaped, assume it is a square or rectangle and use the longest side and the longest width. (For this case, the calculated peak current required will be too large, so reduce the drive level slightly) It is also necessary to know the total length of the loop cable. If the connecting cable from the amplifier to the loop is the same cable as used for the loop, then this should also be included.

The calculations below assume that the loop will be approximately the same level as the receiver. (Vertical displacement) If the loop is significantly higher or lower (more than one to two metres) than the receiver, then the peak current required will be slightly higher.

Peak current calculation

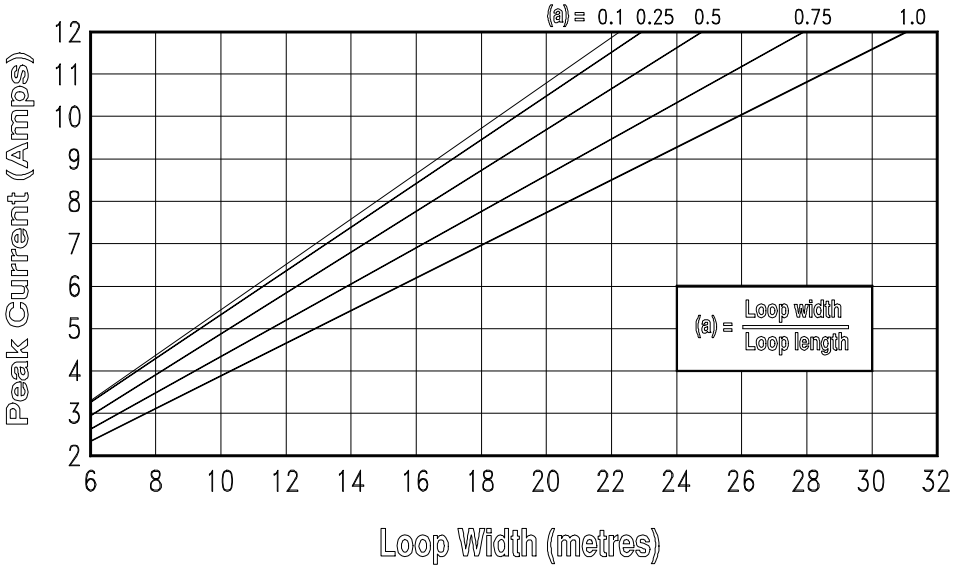
Refer to the current width- graph to establish the required peak current. The width of the loop is shown on the x-axis. The peak current is shown vertically on the y-axis.

This is the peak current. **The average current output should be approximately one quarter of the maximum peak.**

Move along the x-axis until you come to the width of your loop, then move up until you come to one of the aspect ratio lines. From this point, read the peak current required.

The D.C resistance of the loop should be between 0.2 Ohms and 2 Ohms. It is very unlikely that any loop will be less than 0.2 Ohms as this is virtually a short. It is quite acceptable to have a D.C resistance greater than two Ohms, but full current drive may not be possible.

Peak current against loop width for differing aspect ratios. (a)



Doc No. DCP0000518 JH 12/7/99 rev2

Loop cables

Cable selection

Almost any single core cable (multi-strand or solid core) can be used for the loop provided it is of the appropriate impedance. Ideally the DC impedance of the loop should be 1 Ohm (<0.2 Ohm or >2 Ohm will result in a degradation in signal). The following table gives some useful approximations.

Recommended cable gauge

PDA500	1.0 -2.5mm^2
PDA1000	2.5 - 5mm^2

Use of cables outside the recommended gauges may may result in damage to the unit, or risk of fire.

Optimum cable lengths:

Cable diameter	Optimum lengths
1.0mm^2	30 - 70 metres
1.5mm^2	70 - 100 metres
2.5mm^2	100 - 165 metres
4.0mm^2	165+ metres

Only use cable diameters recommened for each unit

Use of a tri-rated cable is recommended. This is cable with a tougher than usual jacket, the reason being; damage will occur to the amplifier if at any point the loop is grounded.

Loop cable should ideally be laid at floor level but in certain circumstances this may not be possible. Any large amounts of metal (eg steel meshed reinforced concrete floors) will absorb some of the signal strength, in this case the cable may have to be mounted in the walls.

Aluminium (suspended ceilings) being para-magnetic should also be avoided, mounting a loop above a aluminium suspended ceiling will probably result in almost no coverage, turning up the output of an amplifier would just make matters worse as it will just stress the output stage (and minutely warm the aluminium) resulting in a definite shortening of the life-span of the amplifier.

Loop cables

Speaker positioning

If a speaker is placed near or beside a loop cable the cross-over in the speaker may pick up the loop signal, so try to keep speakers and loop cables as far apart as possible. Normally this does not show up in use because loop and speaker have the same programme material, only where the loop has a different signal to the speakers (e.g. stage talk back systems)will this become an issue.

Feeder Cables

When connecting an amplifier to a loop some distance away use a heavy gauge twisted pair (4-6mm^2). This will have a negligible impedance, as such the amplifier will not drive against it and the power will be fed into the loop where it can do useful work. For the cable size of the actual loop, follow guidelines opposite.

Test loops

We always recommend the laying of a test loop, there is no such thing as a standard installation and sometimes only a test loop will uncover problematic areas.

Feedback

Long lengths of unbalanced signal cable may cause feedback when placed inside the loop. This problem can be virtually eliminated by using balanced signals.

Problems may occur when using standard dynamic microphones. The coil inside may act as a receiver and cause feedback. It is advisable to use condenser microphones. These may require phantom powering, available on both microphone inputs.

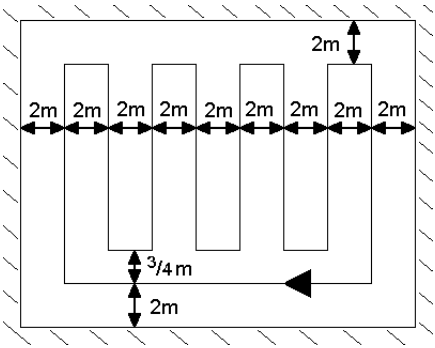
Other sources of feedback are coils in other equipment that is linked to the induction loop system, for example guitar pickups.

Loop cable class

A loop cable is classed as a 2A cable under IEEE 16th Edition wiring regulations. As such it must be sited a minimum of 600mm away from telephone, mains and control cables.

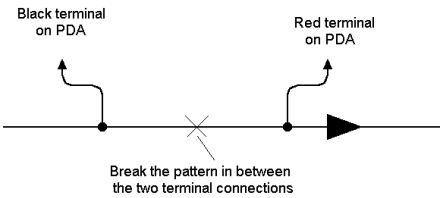
Loop patterns

A loop pattern laid on the floor is a low cost method to reduce over-spill by providing more even field strength compared to the usual single turn of cable laid around the room's perimeter. The basic pattern looks like the diagram below:



Each pattern should be considered as a many pronged fork. The pattern should be spaced approx. 2m from nearest wall / next pattern, prongs of the fork should be spaced approx. 2m apart and should be approx. 2m wide, prongs should extend to approx. 3/4m of base of fork.

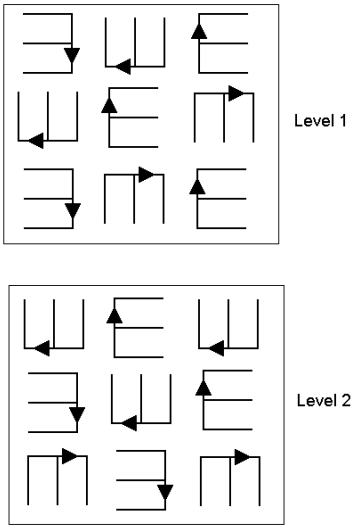
Assume the cable is being run around the edge of a room for cable diameter calculations, as the pattern restricts the amount of power which can be fed into the loop. The large black arrow shows clockwise direction of loop. Break into pattern at any point to connect PDA unit.



Loop patterns

Large areas and multiple rooms

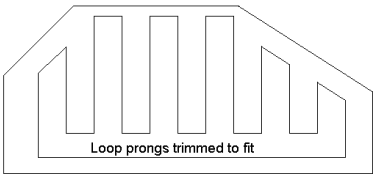
Use several loop patterns, each pattern must be connected to a separate loop amplifier. When laying out patterns, ensure each is 90 degrees out of phase with its neighbours as per the following diagrams which show a two story building:



Note. For a two storey building the *same* loop position on different floors is also 90 degrees out of phase.

Non-rectangular rooms

Layout as per a basic pattern and step back the prongs to the shape of the room.



Doc No. DCP0000518 JH 12/7/99 rev2

Specification

Inputs	Two - XLR. Balanced - electronically
Microphone	200 Ohms - balanced 47 K Unbalanced Sensitivity -66 dBm to -2dBm
Line	Impedance10 K balanced; 20 K unbalanced Sensitivity -20 dBm to + 22 dBm
Performance	Bandwidth At any output level - 20 Hz to 16 KHz - 3 dB Distortion < 0.05% THD @ 1 KHz Dynamic range >90 dB Noise <-86 dB CMRR >84 dB
Input level control	Line: - ì to +6 dB Mic: - ì to + 66 dB
Mains voltage	230 V AC ± 20%
Power Consumption	PDA500 < 100 VA PDA1000 < 225 VA
Dimensions	Width 482 mm Height 44 mm PDA500 88 mm PDA1000 Length 243 mm.

Specification

PDA 500 Output Drive current

Max peak	> 10 A
EBU PPM	> 8 A
Sine - 1KHz	> 2.6 A RMS
Loop coverage	> 220m²
Loop impedance	0.2 to 2 ohms

PDA 1000 Output Drive current

Max peak	> 16 A
EBU PPM	> 12 A
Sine - 1KHz	> 5 A RMS
Loop coverage	> 540m²
Loop impedance	0.2 to 2 ohms