

## PDA Range Selected Parts Listing

### PDA200E 200m<sup>2</sup> Hearing Loop Amplifier & Kits

PDA200E	200m <sup>2</sup> wall-mounted hearing loop amplifier
AKM1	PDA200E 200m <sup>2</sup> Meeting/seminar room hearing loop kit c/w PDA200E amplifier, APM omni-directional mic plate, 6m Belden cable
AKM3	PDA200E 200m <sup>2</sup> Professional meeting/seminar room hearing loop kit c/w PDA200E amplifier, PRO45 hanging ambient mic, APXM plate, 6m Belden cable
AKL1	PDA200E 200m <sup>2</sup> Lecture room hearing loop kit c/w PDA200E amplifier, AMT tie/desk mic, AML lectern mic, 2 x APJ plates, 2 x 6m Belden cable
AKT1	PDA200E 200m <sup>2</sup> TV/music lounge hearing loop kit c/w PDA200E amplifier, AMP handheld mic, APS SCART to double phono lead, APXM plate, APL plate, AL5 lead, 2 x 6m Belden cable
AKR1	PDA200E 200m <sup>2</sup> Waiting room hearing loop kit c/w PDA200E amplifier, APL plate, 6m Belden cable
AKW1	PDA200E 200m <sup>2</sup> Place of worship hearing loop kit (fixed lectern mic version) c/w PDA200E amplifier, AML lectern mic, APJ plate, APL plate, 2 x 6m Belden cable
AKW2/L	PDA200E 200m <sup>2</sup> Place of worship hearing loop kit (lavalier mic version) c/w PDA200E amplifier, AMR/LA lavalier radio mic, APXM plate, APJ plate, AL13 jack lead, AL6 convertor plug, 2 x 6m Belden cable
AKW2/H	PDA200E 200m <sup>2</sup> Place of worship hearing loop kit (handheld mic version) c/w PDA200E amplifier, AMR/HA handheld radio mic, APXM plate, APJ plate, AL13 jack lead, AL6 convertor plug, 2 x 6m Belden cable
AKH1/L	PDA200E 200m <sup>2</sup> Health and fitness club hearing loop kit (lavalier mic version) c/w PDA200E amplifier, AMR/LA lavalier radio mic, APQM plate, APL plate, AL13 jack lead, AL6 convertor plug, 2 x 6m Belden cable

### PDA/S Hearing Loop Amplifiers

PDA5/SD	200m <sup>2</sup> free-standing hearing loop amplifier
PDA7/SD	500m <sup>2</sup> free-standing hearing loop amplifier
PDA11/SD	1000m <sup>2</sup> free-standing hearing loop amplifier

### PDA/D Phase Shifting Dual Hearing Loop Amplifiers

PDA5/DD	200m <sup>2</sup> free-standing phased-shifting hearing loop amplifier
PDA7/DD	500m <sup>2</sup> free-standing phased-shifting hearing loop amplifier
PDA11/DD	1000m <sup>2</sup> free-standing phased-shifting hearing loop amplifier

### Outreach Plates

APM	Omni-directional plated microphone for wall/ceiling/desk mounted
APL	Dual phono line level outreach plate
APJ	3.5mm mic jack outreach plate
APQM	6.35mm (¼") mic jack outreach plate
APQL	6.35mm (¼") line level jack outreach plate
APXM	XLR 3 pin mic level outreach plate
APXL	XLR 3 pin line level outreach plate
APXO	XLR 3 pin balanced line output outreach plate

### Hearing Loop Testing Equipment and Connection Leads

FPROK1	FosMeter-Pro Hearing Loop Test Kit (includes FPRO Hearing Loop Tester, Audio Signal Generator & HEAD1 headphones)
FPROSG	Calibrated Audio Signal Generator c/w test tones ONLY (requires either AL3 lead for PDA102/MLK1K/PDA200E or AL14 lead for Pro-Range amplifiers).
AL1	3.5mm jack to 3.5mm jack lead
AL2	3.5mm jack to double phono lead
AL3	3.5mm jack to bare ended lead
AL4	6.35mm (¼") jack to XLRM lead

### Hearing Loop Ancillaries

APT	Loop connector plate (for the termination of the hearing loop cable)
LEST	100V line (i.e. PA system output) to 0db (775mV line level) convertor
APPS	Overspill reduction phase shifter

# PDA200E Hearing Loop Amplifier Installation Guide



**PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE INSTALLING OR MAINTAINING THIS EQUIPMENT.**

## Key Features

The PDA200E is a wall-mounted hearing loop amplifier that can drive a perimeter loop of up to 200m<sup>2</sup> (14m x 14m) in free spaces with low metal content. It provides the following key features:

- Fully compliant as a perimeter loop system as described in BS 7594, clause 10 A3 and BS EN 60118-4 when correctly installed.
- Internal manual controls for microphone, drive, 100V line, metal compensation, line 1 and 2 levels
- One microphone input with 12V phantom power for electret microphones.
- Two balanced/unbalanced line level inputs.
- Internal metal compensation control to improve intelligibility in rooms with high metal content.
- 100V line input from a PA/evacuation system.
- Full compatibility with the flexible outreach plate audio input extension system.
- Automatic compressor-limiter, which maintains the hearing loop signal for improved intelligibility.
- Front panel indicators for Limit, output current (High/Medium/Low), Loop Fault and Power.
- Short circuit protection.
- Internal temperature safety cut-out to stop overheating.
- Wall-mounted slimline metal enclosure for a permanent robust installation.
- Also available in a variety of 'AK' range kits for use in meeting rooms, TV lounges, places of worship, cinemas and more.

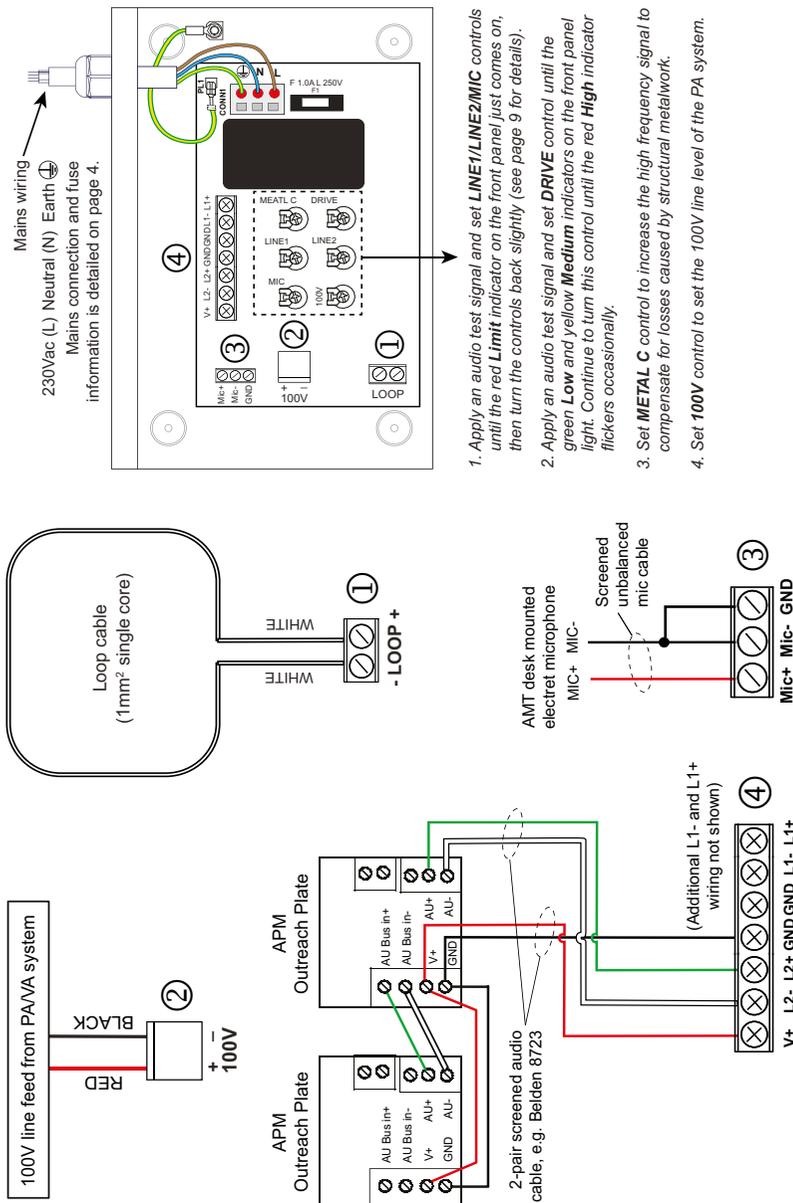


### Hint!

Additional information about hearing loops can be found in the Guide to Assistive Listening Systems, Document Number DLM055800. Available for download at [signet-ac.com](http://signet-ac.com).

## PDA200E Example Schematic

This schematic shows an example system that utilises a desk-mounted microphone (AMT) directly wired into the PDA200E, two outreach plate microphones (APM) and a 100V line fed from a PA system.



1. Apply an audio test signal and set **LINE1/LINE2/MIC** controls until the red **Limit** indicator on the front panel just comes on, then turn the controls back slightly (see page 9 for details).
2. Apply an audio test signal and set **DRIVE** control until the green **Low** and yellow **Medium** indicators on the front panel light. Continue to turn this control until the red **High** indicator flickers occasionally.
3. Set **METAL C** control to increase the high frequency signal to compensate for losses caused by structural metalwork.
4. Set **100V** control to set the 100V line level of the PA system.

## PDA200E Technical Specification

<b>Power</b>	
Mains Voltage:	230Vac, 50-60Hz
Power Consumption:	<80VA
Mains Fuse (F1):	F 1.0A L 250V, 20mm ceramic (L = Low Breaking Capacity)
<b>Audio Characteristics</b>	
Bandwidth:	100Hz-5kHz @ 0dB
Distortion:	<0.33% THD @ 1kHz 0dBu
<b>Line Level Input (x2)</b>	
Impedance:	1k + or - input to ground
Sensitivity:	200mV-2.5V RMS balanced or unbalanced
Input Voltage:	2.5V max. or outreach plates
<b>Microphone Input</b>	
Impedance:	1k + or - input to ground
Sensitivity:	1-8mV balanced
Phantom Voltage:	12Vdc
<b>100V Line Input</b>	
Impedance:	>20kΩ
Sensitivity:	+40dB
<b>Metal Compensation</b>	
Control:	3dB/octave band (boost)
<b>Output Drive Current</b>	
Maximum Peak:	>6.2A; continuous 4.2A
<b>Hearing Loop Cable</b>	
Max. Area of Coverage:	200m <sup>2</sup> (14m x 14m) using 1mm <sup>2</sup> cable - low metal content
Hearing Loop Impedance:	0.5 to 1Ω @ 1kHz
<b>Sensitivity Level Controls</b> (all rotary pot controls are screwdriver adjustable)	
LINE 1 & 2	Used to set the signal levels of the two line level inputs.
MIC	Used to set the signal level of the microphone input.
METAL C	Used to compensate for the loss of high frequencies that occur when significant amounts of metal are present. Turning this control clockwise boosts the range by +3dB per octave.
DRIVE	Used to adjust the strength of the magnetic field generated by the hearing loop by increasing/decreasing the electrical current driven into the loop.
100V	Used to set the 100V line level of the PA/evacuation system input.
<b>Front Panel Indicators</b>	
Limit:	Red LED - Indicates the signal level after adjustment. This indicator should not be permanently lit after set up.
High/Medium/Low:	Red/Yellow/Green LEDs - Provides a scale indicating the electrical current being driven into the loop. The Red High indicator should only light with peaks in the input signal.
Loop Fault	Yellow LED - Lights when the hearing loop is cut or the loop impedance is not within range. To rectify, turn off the AC mains and check for loop wiring faults before re-applying power.
Power:	Green LED - Lights when the amplifier is receiving power.
<b>Physical</b>	
Enclosure Material:	Galvanized steel 1mm thick, zinc coated
Weight:	1kg
Dimensions (W x H x D):	228mm x 155mm x 42mm
<b>Environmental</b>	
IP Rating (to EN 60529):	IP20 (indoor use only)
Operating Temperature:	0°C to +40°C
Storage Temperature:	-30°C to +60°C
Maximum Humidity:	95% non-condensing

## Outreach Plate Selected Variants

The outreach plate audio input extension system comprises of wall, ceiling and desk-mounted single gang plates designed to increase the audio input capability of a hearing loop system. They mix signals from various input sources into one balanced line level input, which can feed into the PDA200E's line input.

### Outreach Plate Input Variants

#### APM Omni-Directional Plated Microphone



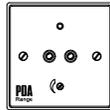
Self-contained omni-directional electret microphone complete with on-board mic to line level converter. Typical coverage up to 25m<sup>2</sup> (ambient) or 2.5m<sup>2</sup> (direct speech) when located at a ceiling height of 2.5 to 3m.

#### APXM XLR 3 Pin Microphone Plate



Accepts balanced or unbalanced microphones with standard 3 pin male XLR connectors. Includes an on-board mic to line level converter, high gain pre-amplifier and 12V phantom power.

#### APL Dual Phono Line Level Plate



Accepts stereo phono line level signals (typically from a stereo source, e.g. a TV, CD or DVD). Includes an on-board stereo line to mono converter.

#### APXL XLR 3 Pin Line Level Plate



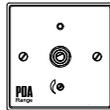
Accepts standard 3 pin male XLR feeds from audio equipment such as stage mixing desks, etc.

#### APJ 3.5mm Microphone Jack Plate



Accepts unbalanced electret microphones with 3.5mm mono jack plugs. Includes an onboard microphone to line level converter, high gain pre-amplifier and 12V phantom power.

#### APQM 6.35mm (1/4") Microphone Jack Plate



Accepts balanced or unbalanced electret microphones with 6.35mm (1/4") jack plugs. Includes an on-board microphone to line level converter, high gain pre-amplifier and 12V phantom power.

#### APQL 6.35mm (1/4") Line Level Jack Plate



Accepts 6.35mm (1/4") jack feeds from audio equipment such as stage, or church mixing desks, etc.

### Outreach Plate Output Variants

#### APXO XLR 3 Pin Balanced Line Output Plate



Provides an adjustable balanced line output (+12dB max.) on a standard 3 pin male XLR connector. Typically used to connect an outreach chain to third-party audio equipment such as conventional amplifiers.

#### API 'AFILS Active' Plate



Includes two ultra-bright LEDs in a translucent diffuser overprinted with the AFILS 'ear' symbol. The LEDs illuminate when the outreach network is powered to indicate that an AFILS system is installed.

### Selected Microphones

AMT - Tie Clip/Desk microphone	AMP - Phantom powered condenser microphone
AMC - Cardoid ambient microphone	AMR/LA - Lavalier radio microphone
AML - Lectern microphone	AMR/HA - Handheld radio microphone
AMD - Desktop microphone	PRO45 - Hanging ambient microphone



## Important Information

- This equipment is a piece of Class 1 equipment and **MUST BE EARTHED**.
- This installation guide **MUST NOT** be left accessible to the user.
- **ALWAYS** isolate the amplifier's mains supply before connecting to its PCB.

### Equipment Guarantee

This equipment is only guaranteed if the system is installed and commissioned in accordance with the relevant regional or national standards by an approved and competent person or organisation.

### General Precautions

DO NOT test wiring using an insulation tester (Megger) with any equipment connected, as the 500 volt test voltage will totally destroy these devices and invalidate the warranty.

These instructions are general and cannot be considered to cover every aspect of a hearing loop amplifier installation. E&OE. No responsibility can be accepted by the manufacturer or distributors of these units for any misinterpretation of this instruction or for the compliance of the system as a whole. The manufacturer's policy is one of continuous improvement and we reserve the right to make changes to product specifications at our discretion and without prior notice.

## What is a Hearing Loop System?



Hearing loop systems (also known as audio-frequency induction loop systems or AFILS) allow hearing impaired people, who are wearing a hearing aid fitted with a telecoil, to hear more clearly. Hearing loop systems also minimise distracting and annoying background noise.

Most hearing aids have a 'T' or 'MT' switch, allowing them to pick up the electromagnetic field generated by a hearing loop system. The hearing aid converts this signal into a sound suited to its user's specific hearing requirements.

Any hearing impaired person positioned within or near the hearing loop can hear the loop signal by switching their hearing aid to the correct position. This allows them to participate more effectively in general conversation, order goods or services, listen to public announcements, etc.

A hearing loop system therefore comprises four main elements:

**The audio source** – typically a microphone, television/radio, or other line level audio source.

**The hearing loop amplifier** – in this case the PDA200E.

**The hearing loop** – typically a single turn of wire usually run around the perimeter of the room.

**The receiver** – any hearing aid with a 'T' or 'MT' switch.

## PDA200E Kits

The PDA200E is supplied separately, or as part of an 'AK' range kit with outreach plates increasing the number of audio inputs to the PDA200E. All kits (listed on page 12) include a PDA200E amplifier and 6 metres of Belden 8723 cable per outreach plate. Contact your supplier for ordering kits.

## First Fix

**Note:** Before any of the following is carried out ensure that the mains supply is isolated.

### Equipment Location

All equipment must be sited indoors and MUST NOT be subjected to conditions likely to affect its performance, such as damp, salt air, water, extreme temperatures, physical abuse, etc.

The wall-mounted amplifier should be sited at an easily accessible height with indicators clearly visible.

### Remove Knockouts

Decide how the wiring will be brought into the amplifier and remove the required knockouts for cable entry. A basic PDA200E system would require four knockouts; one each for mains, hearing loop cable, 100V line and microphone/outreach plates.

If a knockout is removed, fill the hole with a good quality cable gland. Unused knockouts must be securely blanked off.

### Observe Proper Segregation of Wiring

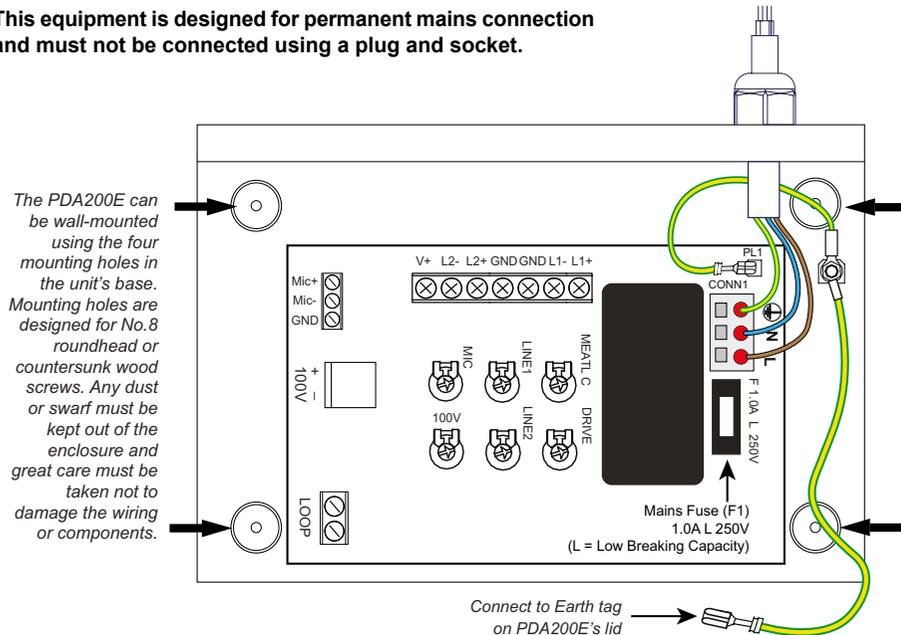
Mains, hearing loop and low power wiring must not come into contact, i.e. do not feed wiring through the same gland or allow wires of one type of connection to cross those of another. If the 100V input is used these wires must also be segregated from other inputs.

### Connect Mains to the PDA200E

The 230Vac cable MUST enter the enclosure via one of the knockouts at the top right-hand corner of the enclosure. This equipment requires fixed wiring, using three core cable (no less than 0.75mm<sup>2</sup> and no more than 2.5mm<sup>2</sup>) fed from a 3amp fuse spur fitted with an isolating switch, located no more than 3 metres from the amplifier.

Terminate the mains input lead using the fixed mains connector CONN1 on the unit's base (shown below).

**This equipment is designed for permanent mains connection and must not be connected using a plug and socket.**



## Second Fix

**Note:** It is recommended that you check the hearing loop system using a professional hearing loop test kit (see 'Testing the System' below). The amplifier's internal controls and front panel indicators may be used to set up the amplifier quickly.

### Internal Controls

Six internal pot controls (shown in the diagram below) are located on the PDA200E's PCB and can be adjusted using a flat-bladed screwdriver. Each control's minimum setting is the fully anti-clockwise position.

The **LINE 1** and **LINE 2** controls set the signal levels of the line level inputs into the amplifier. Power up the amplifier and apply an audio test signal, such as a CD player/test signal and turn this control clockwise until the red **Limit** indicator on the front panel comes on, then turn the control back slightly.

**CAUTION:** If the red **Limit** indicator is permanently lit, the amplifier's life span may be significantly shortened.

The **MIC** control sets the signal level of the microphone input. Adjust this control as per the **LINE 1** and **LINE 2** controls detailed above.

The **DRIVE** control is used to adjust the strength of the magnetic field generated by the hearing loop by increasing/decreasing the electrical current driven into the loop. This control should be set up after the 'Limit' has been set.

Apply an audio test signal and turn this control clockwise until the green **Low** and yellow **Medium** indicators light. Continue to turn this control until the red **High** indicator flickers occasionally.

**CAUTION:** If the red **High** indicator is permanently lit, the audio sound quality will be distorted and the amplifier may shut down to protect it from overheating.

The **METAL C** (metal compensation) control compensates for the loss of high frequencies that occur when significant amounts of metal are present. Turning this control clockwise boosts the range by +3dB per octave.

The **100V** control sets the 100V line level of the PA/evacuation system input.

### Testing the System

Apply an input test signal (microphone, line or outreach) to the amplifier and listen to the loop signal in all areas of coverage required. Ideally, a hearing loop listening device, or a national health hearing aid, should be used. If the signal level is not acceptable, adjust the **DRIVE** control in small increments until it is.

We recommend you check the hearing loop system using a Fosmeter-Pro Hearing Loop Test Kit (Order code: FPROK1), which includes a 400mA/m FosMeter-Pro hearing loop tester, audio signal generator and headphones. This kit assists with setting up, testing and calibrating an AFILS for compliance with BS EN 60118-4.



#### Hint!

Additional information about testing hearing loop systems can be found in the FosMeter-Pro (FPROK1) Instructions, Document Number DCM0004006. Available for download at [signet-ac.com](http://signet-ac.com).

## Overspill and More Complex Installations

A magnetic field is not confined to the area within the hearing loop and the signal may be heard in adjacent areas such as corridors up to three times the width of the hearing loop, away in all directions. If this is a problem, special designs of hearing loops can reduce the overspill field.

The AFILS British Standard (BS 7594) suggests several technically complex solutions that are reasonably effective but are not commonly employed due to high cost.

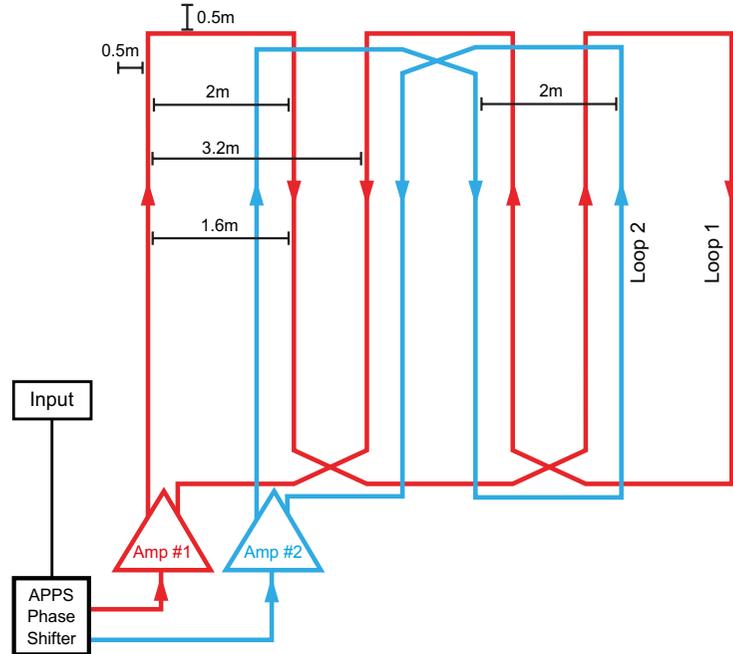
A low cost but effective design method to reduce overspill is to make a smaller hearing loop, typically in the centre of a room. The smallest practicable hearing loop for floor or ceiling mounting (up to 3 metres high) is 3 metres square. This design will provide a reasonable field at head height above the hearing loop and up to 4 metres away in all directions.

This hearing loop may be installed above a suspended ceiling or in a plastic conduit on the floor. Flat cable may be used under carpets.

In larger installations, where overspill or an abundance of steel is present, a phase shifted hearing loop array or 'super hearing loop' may be required. This is achieved using an APPS phase shifter unit and laying two identical but offset hearing loop patterns.

The APPS Overspill Reduction Phase Shifter is part of the outreach range of distributed mixer components. It is designed to take the signal from one or more outreach plates and produce two signals that are 90° out of phase with each other. These signals are then fed into two (identical) hearing loop amplifiers, which are, in turn, connected to two hearing loop patterns laid out in a special overlapping design. The resultant magnetic field is evenly spread within the hearing loop, but the strength falls off more quickly than outside a simple hearing loop.

Please see the diagram below (the sizes shown are examples only, as each system must be uniquely designed). Phase shifted hearing loop design is a free service available upon request.



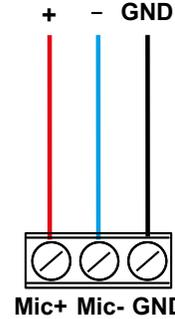
## Connecting Inputs

### Microphones (1 input available)

A mic level input can be directly wired to the PDA200E mic input as shown below.

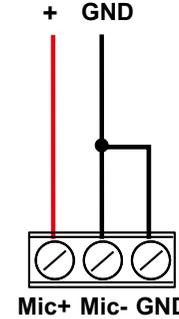
Balanced microphones should be wired to GND, Mic- and Mic+ (Mic+ carries the 12V phantom power). Unbalanced microphones (see Microphones, page 10), e.g., AMT, AML and AMD should be wired as signal+ to Mic+, Screen to GND and Mic- linked to GND.

Connect to electret mic



Balanced Mic

Connect to electret mic

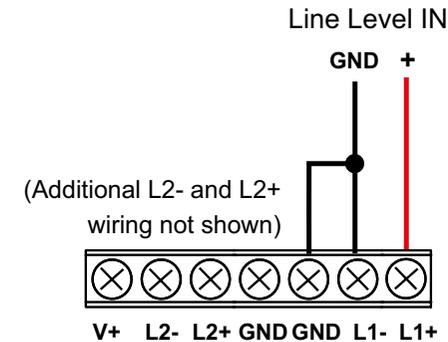


Unbalanced Mic

### Line Level (2 inputs available)

Unbalanced line level inputs should be wired as shown below with signal+ to L+, Screen to GND and L- linked to GND.

Balanced line level inputs should be wired using outreach plates (detailed in the next section).

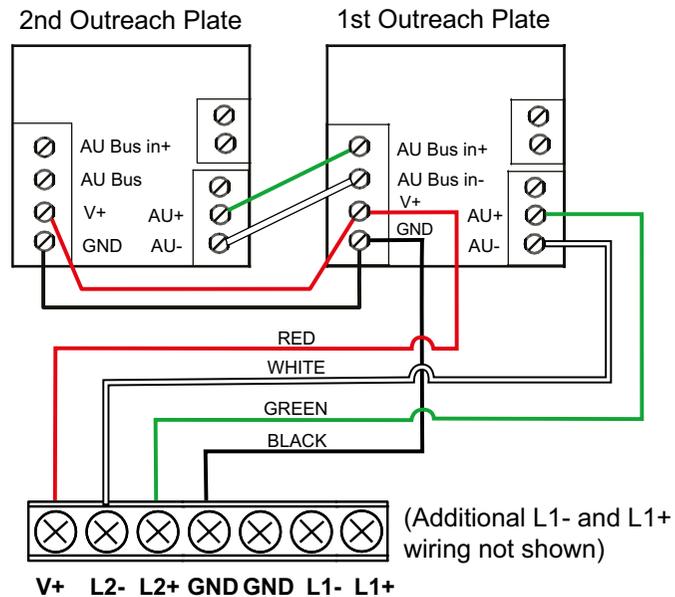


Unbalanced Line

## Outreach Plate Wiring

Outreach plates increase the number of audio inputs to the PDA200E. They can be daisy-chained together and then connected as a single line level input as shown below.

1. Run the 2-pair screened audio cable (supplied in the 'AK' range kits) from the PDA200E to the 1st outreach plate and secure with an appropriate gland.
2. Connect the PDA200E to the 1st outreach plate as follows:  
V+ on PDA200E to V+ on outreach plate.  
L- on PDA200E to AU- on outreach plate.  
L+ on PDA200E to AU+ on outreach plate.  
GND on PDA200E to GND on outreach plate.
3. Connect the 2nd outreach plate (if required) to the 1st outreach plate as shown below.
4. Fit the outreach plate to the outlet box using the screws provided.



### Hint!

Additional information about outreach plates can be found in the Outreach Plate Installation Guide, Document Number DCP0002212. Available for download at [signet-ac.com](http://signet-ac.com).

## Connecting the 100V Line

This should be wired into the 100V termination block, as shown in the diagram on page 2 of this guide. Ensure that the cables are connected in accordance with the colour coding shown.

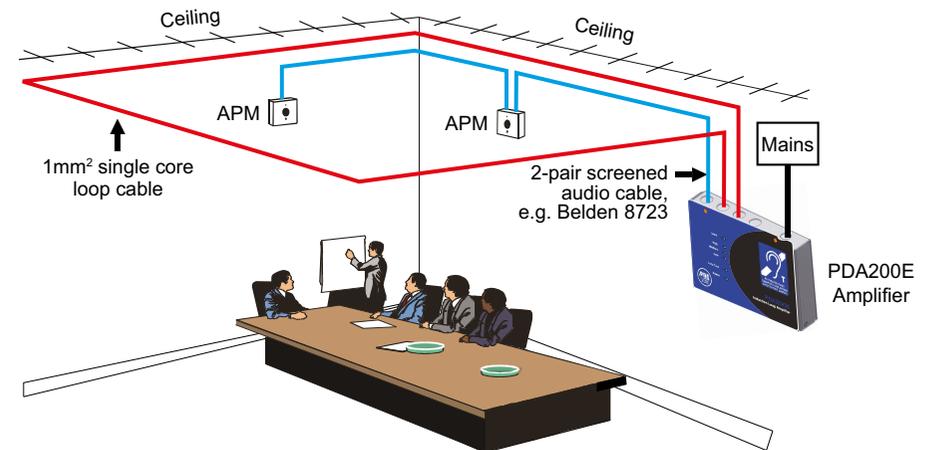
## Installing the Hearing Loop Cable

The hearing loop cable should be laid in a single turn and wired to the PDA200E's termination block labelled LOOP, as shown in the diagram on page 2 of this guide.

In most cases, hearing loop cables are typically mounted horizontally around the perimeter of the room to be covered, either at ceiling or floor height. They may also be installed under carpets by using a flat hearing loop cable.

**Note:** Do not install the hearing loop cable closer than 1.2 metres to a hearing aid position.

The typical PDA200E installation (shown below) mounts the hearing loop cable above the suspended ceiling and uses two wall-mounted microphones (APM).



### Hint!

Additional information about hearing loop designs can be found in the Guide to Assistive Listening Systems, Document Number DLM055800. Available for download at [signet-ac.com](http://signet-ac.com).