Cloud

MULTI-ZONE MIXER AMPLIFIERS

46-120
46-120MEDIA
46-120T
46-120TMEDIA

Installation and User Guide

IMPORTANT SAFETY INSTRUCTIONS

1. Read these Instructions.

2. Keep these Instructions.

3. Heed all Warnings.

4. Follow all Instructions.

5. Do not use this apparatus near water.

6. Clean only with a dry cloth.

7. Do not block any ventilation openings. Install in accordance with the manufacturers' instructions.

8. Do not install near any heat sources such as radiators, heat registers, stoves or other apparatus (including amplifiers) that produce heat.

9. Do not defeat the safety purpose of the polarized or grounding - type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. When the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

11. Only use attachments/accessories specified by the manufacturer.

12. Use only with the cart, stand, tripod, bracket or table specified by the manufacturer or sold with the apparatus, when a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

13. Unplug this apparatus during lightning storms or when unused for long periods of time.

14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Do not expose the apparatus to dripping or splashing, and ensure that no objects filled with water, such as vases, are placed on the apparatus.

L'appareil ne doit être exposé aux écoulements ou aux éclaboussures et aucun objet ne contenant de liquide, tel qu'un vase, ne doit être placé sur l'appareil.

The mains plug is used as the disconnect device and it should remain readily accessible during intended use. In order to isolate the apparatus from the mains, the mains plug should be completely removed from the mains outlet socket.

Le prise du secteur ne doit pas être obstruée ou doit être facilement accessible pendant son utilisation. Pour être complètement déconnnecté de l'alimentation d'entrée, la prise doit être débranchée du secteur.

This apparatus is of Class 1 construction and must only be connected to a mains outlet socket with a protective earthing connection.

Terminals marked with the ⚡ symbol may use Class 2 Wiring, but voltages at these terminals may be of sufficient magnitude to constitute a risk of electric shock. The external wiring connected to these terminals requires installation by an instructed person or the use of pre-made leads or cords.

Contents

SAFETY INFORMATION

Safety Notes regarding Installation

- Do not expose the unit to water or moisture.

- Do not expose the unit to naked flames.

- Do not block or restrict any air vent.

- Do not operate the unit in ambient temperatures above 35°C.

- Do not touch any part or terminal carrying the hazardous live symbol ⚡ while power is supplied to the unit.

- Do not perform any internal adjustments unless you are qualified to do so and fully understand the hazards associated with mains-operated equipment.

- The unit has no user-serviceable parts. Refer servicing to qualified service personnel.

- If the moulded plug is cut off the AC power lead for any reason, the discarded plug is a potential hazard and should be disposed of in a responsible manner.

Conformities

This product conforms to the following European EMC Standards:

BS EN 55103-1:2009

BS EN 55103-2:2009

CE

This product has been tested for use in commercial and light industrial environments. If the unit is used in controlled EMC environments, the urban outdoors, heavy industrial environments or close to railways, transmitters, overhead power lines, etc., the performance of the unit may be degraded.

The product conforms to the following European electrical safety standard:

BS EN 60065:2012

Safety Considerations and Information

All versions of the Cloud 46-120 must be earthed. Ensure that the mains power supply provides an effective earth connection using a three-wire termination.

Caution – High Voltage

Do not touch any part or terminal carrying the hazardous live symbol ⚡ while power is applied to the unit. Terminals to which the hazardous live symbol refers require installation by a qualified person.

Caution – Mains Fuse

The 46-120 contains no user-replaceable fuses. Mains over-current protection is provided by the fuse in the IEC receptacle; only replace this fuse with one of an identical type and rating.

Caution – Servicing

The unit contains no user-serviceable parts. Refer servicing to qualified personnel. Do not perform servicing unless you are qualified to do so. Disconnect the power cable from the unit before removing the top panel and do not make any internal adjustments with the unit switched on. Only reassemble the unit using bolts/screws identical to the original parts.

OVERVIEW

Introduction

Thank you for purchasing this Cloud Multi-Zone Mixer Amplifier. We are confident that you will be pleased with its performance, features, flexibility and reliability.

The Cloud 46-120 is an integrated, analogue audio mixer amplifier. It combines simple control of background music for four independent zones with versatile microphone paging and power amplification in a single unit. It is suitable for use in many types of premises, including pubs, bars, clubs, shops, offices, hotels, etc. It is compatible with Cloud PM Series paging microphones and is also designed to interface with most third-party paging microphones conforming to industry standards.

Scope of this manual

This manual provides a comprehensive guide to the features and functionality of all models of the Cloud 46-120 Integrated Mixer Amplifier. The 46-120 is available in four versions, with or without an integral digital music player and/or with pre-installed transformers for 100 V-line operation (70 V-line operation for the US market), as follows:

*   46-120 four-zone Mixer Amplifier

*   46-120T four-zone Mixer Amplifier with 100 V-line outputs (70 V configurable)

*   46-120MEDIA four zone Mixer Amplifier with integral digital music player

*   46-120TMEDIA four-zone Mixer Amplifier with integral digital music payer and 100 V-line outputs (70 V configurable)

Apart from the additional functionality provided by the music player in the MEDIA versions, all 46-120 models are identical in facilities and features. Unless specifically stated otherwise, the reference "46-120" can be taken to apply to all four models throughout this User Guide, and all instructions and guidance in the Guide can be assumed to be relevant to all models.

Please read through the manual to become fully acquainted with the various configuration and control functions the 46-120 offers.

The manual is arranged as follows:

*   **Overview** – introduction to the 46-120 and its options.

*   **Installation** – wiring the 46-120 in a practical situation.

*   **Setting Up & Operation** – setting the system up and user instructions.

*   **Options and Additional Information** – additional information about system options.

*   **Appendix** – additional technical information (includes technical specifications).

The 46-120 manual includes basic information on interfacing Cloud PM Series paging microphones and connecting Cloud LM-2 remote active modules and RL-1/RSL-6 Series remote

control plates. An overview of the additional facilities provided by the optional CDI-46 digital interface card is also included. Full installation information for each of these options is supplied with the items themselves.

Thank you again for placing your confidence in Cloud products.

What's in the box

Unpack the 46-120 and its accessories with care. It is always a good idea to store all packaging (if practical), in case you ever need to return the unit to your Cloud dealer for any reason.

As well as this manual, the shipping carton should contain the items listed below. Please contact your Cloud dealer immediately if any of them are missing or damaged.

*   Cloud 46-120 Multi-Zone Mixing Amplifier

*   IEC mains lead (AC cord) with moulded plug appropriate to the territory

*   Set of mating connectors for all rear panel multi-pin screw-terminal connectors

*   Set of four plastic feet, with fixings

*   Front panel security cover (prevents access to Zone EQ controls)

*   4qty M3 x 6 hex-head screws for security cover

*   2 mm hex key (for security cover screws)

Key features

- Mixer amplifier for four zones

- Built-in digital music player supports MP3 and WMA files from USB memory sticks or SD cards at all standard data rates/sample frequencies (MEDIA versions only)

- Six (unbalanced) stereo line inputs with individual gain trim controls

- Front panel user controls for music source, music level and level of each microphone, for each zone, plus preset controls for HF/LF EQ

- Two balanced mic inputs; 15 V phantom power selectable on either or both

- MIC 1 input can be configured as telephone system interface

- Contact closure access port for paging zone selection – most OEM paging systems supported

- Sensitivity and HF/LF EQ adjustment for mic inputs (rear panel)

- Selectable VOX-triggered mic-over-music priority

- Selectable LINE 6 priority in Zone 1, with choice of release times

- 4 x 120 W power output (4 ohms)

- Transformer-isolated auxiliary output with independent mic and music level control - for use with telephone MOH systems

- Aux output source selection (internal jumper) – fixed source or mix of Mic 1 and Zone 1 music source

- Zones 1 & 2 auxiliary line level outputs (pre-power amplifier), for connection of additional external amplifiers

- Optional CXL-46T 70/100 V transformer can be fitted internally to any or all zone outputs (pre-fitted to all channels in T versions)

- Selectable 65 Hz high-pass filter per-output (for use with 70/100 V-line systems)

- Music Mute control input (N/O or N/C) for interface to emergency system

- Zone 1 Facility Port (RJ45) for connection of optional LM-2 mic/line remote input/control modules via Cat 5

- Compatible with standard Cloud remote control plates: RL Series (music level) and RSL Series (music level and source selection), per-zone

- Optional EQ cards available to suit various popular installation loudspeakers may be fitted in any or all outputs

- Optional CDI-46 digital interface card with Cloud Digital Paging System port for direct interface to PM Series paging microphones, RS-232 serial port and RJ45 Ethernet port

- Energy-saving auto power-down function, Ethernet-controllable (when CDI-46 is fitted)

- Remote standby mode control by contact closure

- Variable–speed fan cooling

- 2U 19" rack-mounting unit

Optional system components

The following components may form part of the audio system and may be ordered separately if required. They may also be retrofitted to a system at a later time. Separate datasheets are available for each of the individual components; download them at www.cloud.co.uk.

Note that full installation and operation instructions are supplied with each optional component.

CDI-46 digital interface
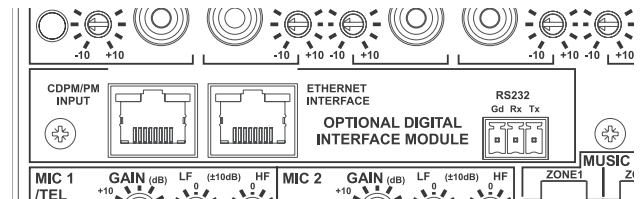
The CDI-46 card is an optional accessory which gives the 46-120 additional interface and control capabilities. The CDI-46 is equipped with both Ethernet and RS-232 ports, allowing the mixing amplifier's primary functions to be controlled from external systems (Crestron, AMX, etc.) using either protocol. The card also acts as an Ethernet-to-serial bridge, converting Ethernet commands to other equipment into RS-232 data. See page 18 and page page 24 for more details.

The CDI-46 is also fitted with a Cloud Digital Paging interface (the **CDPM/PM INPUT**). This provides the simplest method of connecting Cloud PM Series Paging Microphones, requiring only a single standard Cat 5 cable. See page 18 for more details.

LM-2 remote active modules
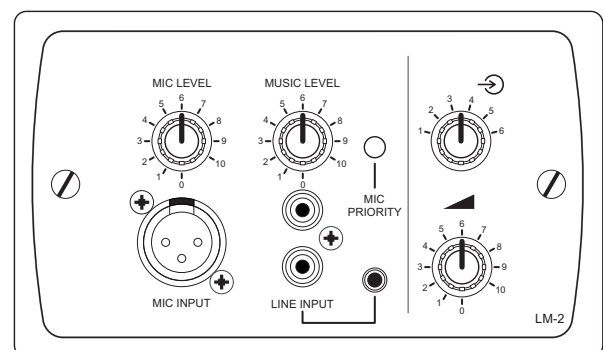
The LM-2 is an active input module which allows a microphone and a stereo line input in a remote location to be connected to the 46-120. The faceplate has both phonos and a 3.5 mm jack socket for connection of the line input, and provides a convenient access point for the connection of a DJ mixer, laptop, MP3 player or similar. Mic and line inputs have separate level controls. A **MIC PRIORITY** button activates the Mixer

Amplifier's priority circuitry; when enabled, a microphone signal, post level control, from the LM-2 will reduce the music level in the zone where it is installed. Changing a rear jumper alters the priority operation so that the mixed mic and line signals from the module cause the mixer's line input selected to the Zone to be fully muted.

The module also includes the functions of the RSL-6 Remote Control Plate (see below), permitting control of zone music level and source. See page 15 and page 26 for more information.

The LM-2 connects to the 46-120's **ZONE 1 FACILITY PORT** via screened Cat 5 cable, and the remote sources are routed to Zone 1. The mixer's Mic inputs remain available. Multiple LM-2s in Zone 1 may be daisy-chained to provide mic inputs in more than one position in the zone. The LM-2 is available in sizes to suit UK, US and German electrical back boxes; a choice of finishes is also available.

RL-1 Series
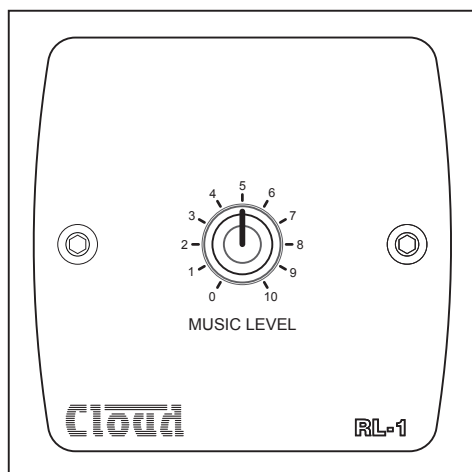
The RL-1 Series is a range of small plates with a single control for locally adjusting the music level in a zone. They connect to one of the 46-120's **REMOTE SOURCE + LEVEL** ports. See page 18 and page 26 for more information. RL-1s are available in sizes to suit UK, US and German electrical back boxes; a choice of finishes is also available.

RSL-6 Series
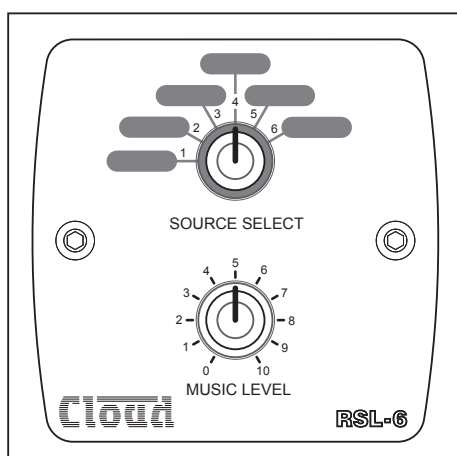
The RSL-6 Series is a range of plates allowing local (per-zone) music source selection as well as music level control. They are the same size as the RL-1s, and connect in a similar way. See page 18 and page 26 for more information. RSL-6s are available in sizes to suit UK, US and German electrical back boxes; a choice of finishes is also available.

PM Series paging microphones
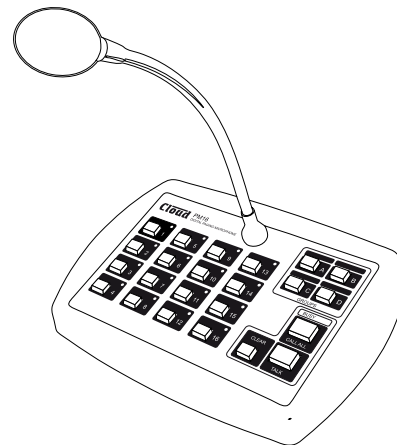
Cloud PM Series paging microphones (except the PM1 – see below) may be connected directly to the 46-120 in two ways: i) via the **CDPM/PM INPUT** on the CDI-46 digital interface card (if fitted); or ii) using **MIC 1** input and **ACCESS CONTACTS** port. Models are available which can page to 4, 8, 12 or 16 zones, and also to 4 or 8 zones with storage for built-in spot announcements. As the 46-120 only supports four zones, not all zones on the "higher" models can be accommodated by a single 46-120; the PM4 and PM4-SA (4-zone) models are most likely to be useful. See page 16 for more information.
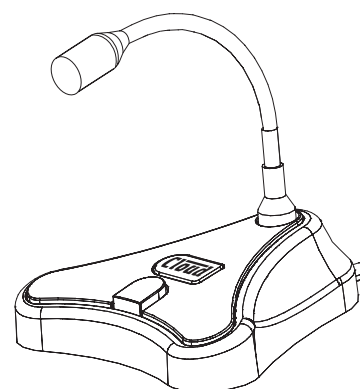
The Cloud PM1 paging microphone is also compatible with the 46-120. It is a much simpler unit which addresses a single zone (though zones may be paralleled for wider access). See page 17 for more information.

Block Diagram
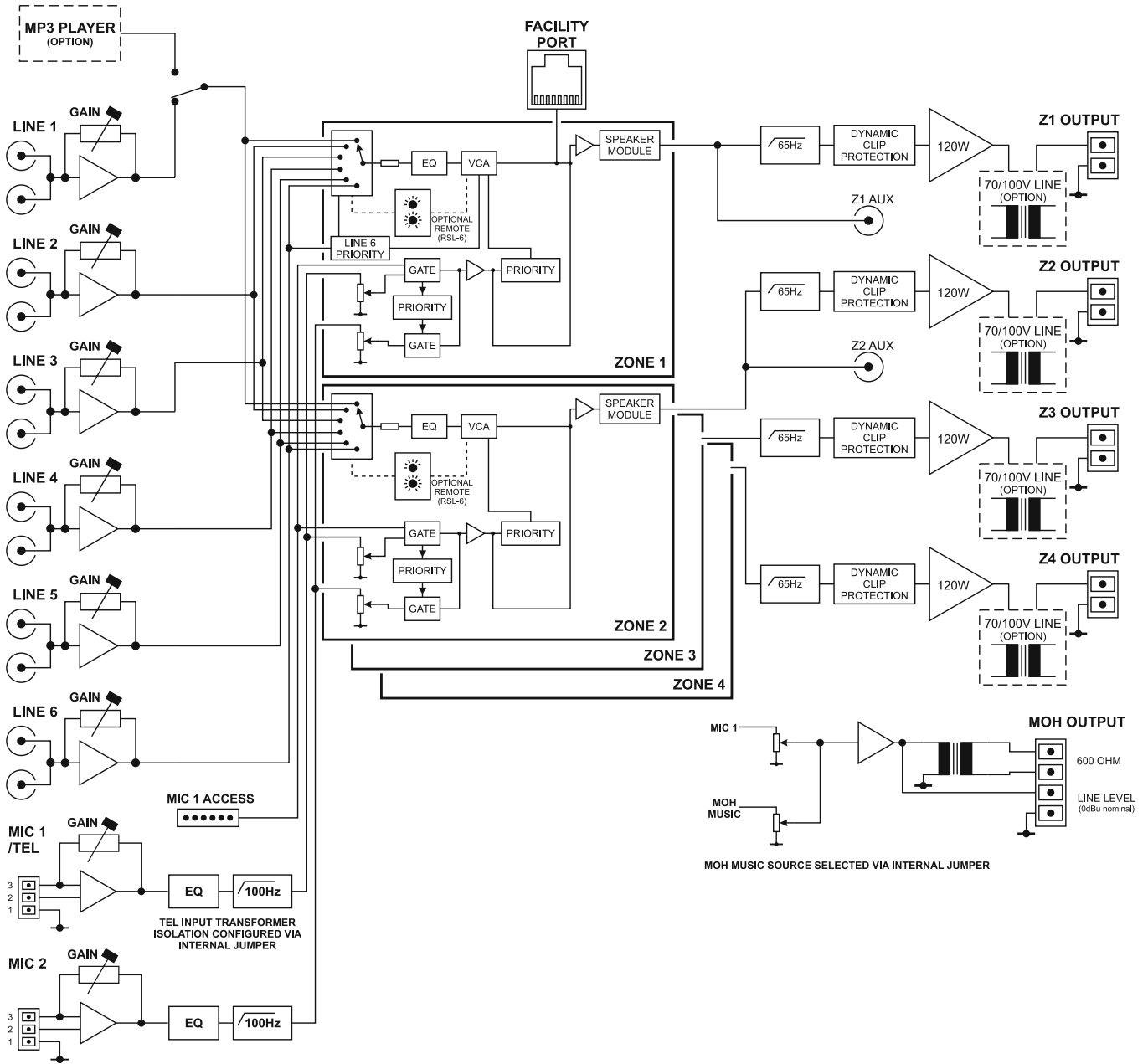
The simplified block diagram above illustrates the basic signal architecture of the 46-120.

Front panel description
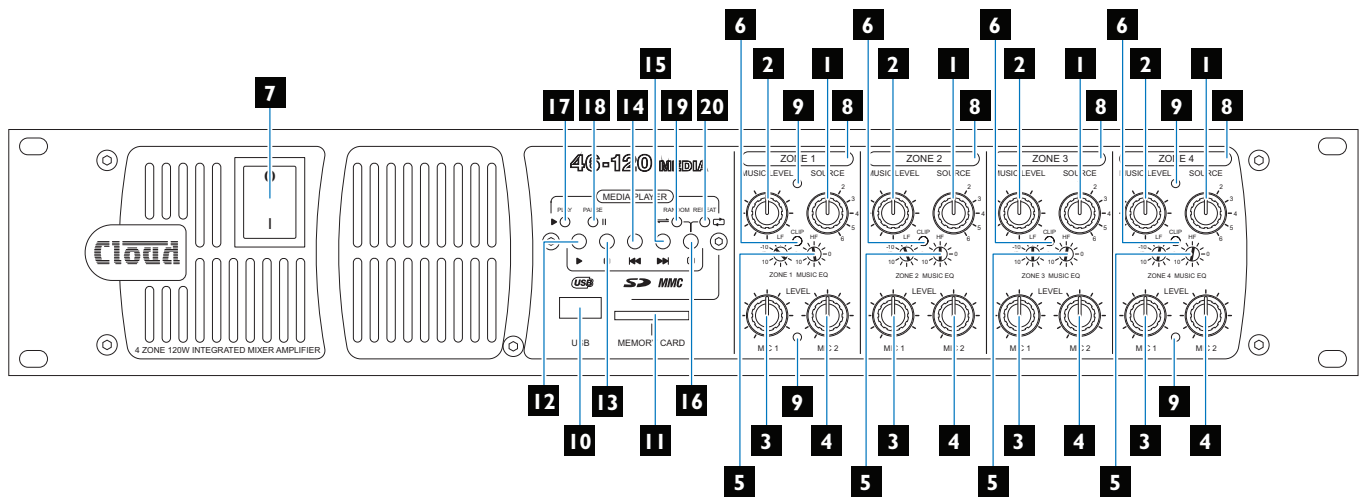
1. **MUSIC SOURCE** – 6-way rotary switch selecting which Line Input (**LINE 1*** to **LINE 6**) will be the music source for each zone. See page 21.

2. **MUSIC LEVEL** – adjusts the music level in each zone. See page 21.

3. **MIC 1** – adjusts the level of the microphone connected to the rear panel **MIC 1/TEL** input in each zone. See page 21.

4. **MIC 2** – as **MIC 1**, but controls level of **MIC 2** input.

5. **MUSIC EQ** – two preset controls for adjusting HF/LF EQ in each zone. See page 22.

6. **CLIP** – per-zone red LEDs; illuminate when the output stage's Dynamic Clip Limiter is active. This indicates that the level is too high.

7. Power – rocker switch.

8. Zone idents – a space is provided above each zone's controls for printed labels identifying the zone by name.

9. Fixing holes for security cover – prevents access to Zone EQ controls.

The following front panel items are only fitted to the 46-120MEDIA and 46-120TMEDIA:

10. **USB** port – Type 'A' USB 2.0 port for connection of memory device containing audio files.

11. **MEMORY CARD** – card slot, accepts SD or MMC memory cards containing audio files.

12. ▶ – Play/Pause button: starts or pauses playback of current track/file.

13. ■ – Stop button: stops playback.

14. ◄◄ – Previous button: moves playback point to start of previous track or file.

15. ►►| – Next button: moves playback point to start of next track or file.

16. Ⓜ – Mode button: selects Random and Repeat Modes.

17. **PLAY** – green LED, illuminates in PLAY mode.

18. **PAUSE** – green LED, illuminates in PAUSE mode.

19. **RANDOM** – green LED, illuminates when Random mode is selected.

20. **REPEAT** – green LED, illuminates when Repeat mode is selected.

*On the 46-120MEDIA and 46-120TMEDIA, switch position 1 will select the digital media player if it has been enabled by the rear panel **LINE 1/MEDIA** button (see Rear Panel description).

Rear panel description
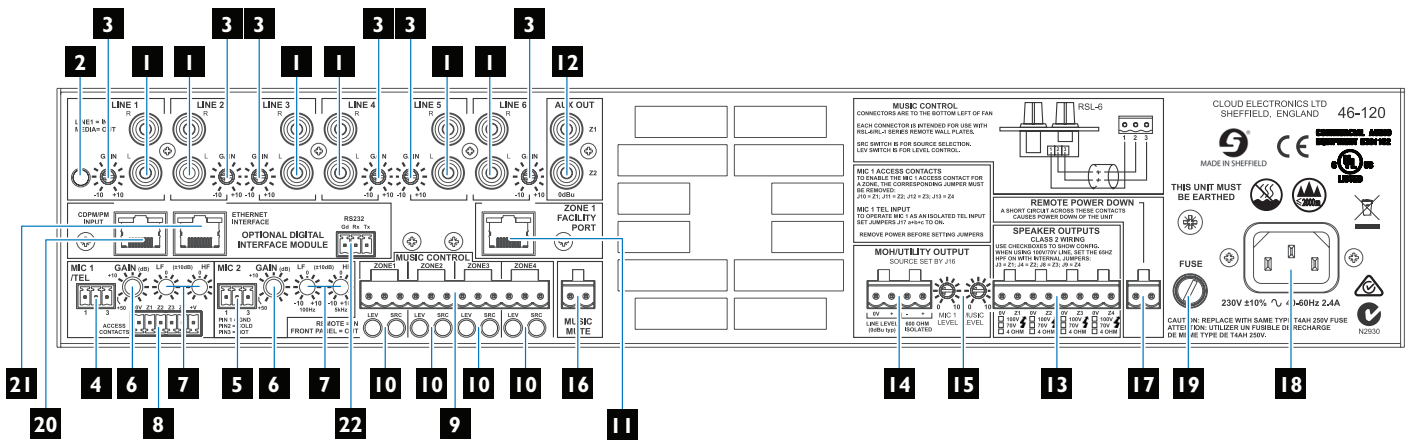
1. **LINE 1 to LINE 6** – 6 pairs of RCA (phono) sockets for connection of music sources. Inputs are stereo, summed internally to mono. See page 14.

2. **LINE 1/MEDIA** – selects whether Music Source 1 is fed from LINE 1 inputs or the internal digital media player. This push-button switch is only fitted to models 46-120MEDIA and 46-120TMEDIA.

3. **GAIN** – preset trim control for each line input, providing ±10 dB of gain adjustment for input level matching. See page 21.

4. **MIC 1/TEL** – balanced microphone input on 3-pin 3.5 mm-pitch screw-terminal connector. See page page 15. This input should be used in conjunction with the **ACCESS CONTACTS** connector [7] for paging; it can also be configured internally for use with a telephone system, See page 22.

5. **MIC 2** – balanced input for a second microphone; 3-pin 3.5 mm-pitch screw-terminal connector.

6. **GAIN** – preset mic gain controls for **MIC 1** and **MIC 2**, gain range 10 to 60 dB. See page 22.

7. **HF and LF** – preset mic EQ controls. See page 22.

8. **ACCESS CONTACTS** – 6-pin 3.5 mm-pitch screw-terminal connector for per-zone paging access by contact closure. See page 16.

9. **MUSIC CONTROL** – 12-pin 5 mm-pitch screw terminal connector for connection of RL-1/RSL-6 remote control plates. See page 17.

10. **MUSIC CONTROL LEV & SRC** – two push-button switches per zone which determine whether front panel music source (**SRC**) and level (**LEV**) controls will remain active when remote control plates are connected. See page 17.

11. **ZONE 1 FACILITY PORT** – 8-pin RJ45 socket, for connection of LM-2 remote active modules, or as an auxiliary input. See page 15.

12. **AUX OUT** – unbalanced line level outputs for Zone 1 and Zone 2 at 0 dBu. See page 20.

13. **SPEAKER OUTPUTS** – outputs for each zone on 8-pin 5 mm-pitch screw-terminal connector. See page 19. These will be low impedance (min. load 4 ohms) on the 46-120 and 46-120MEDIA models, and 70V-line on the 46-120T and 46-120TMEDIA models (as standard). If one or more CXL-46T transformers have been retrofitted to a 46-120 or 46-120MEDIA, they may be either 100V or 70V-line. A checkbox area is provided below the connector for the installer to indicate the configuration of each zone output.

14. **MOH/UTILITY OUTPUT** – an auxiliary output whose source can be set by internal jumpers. The output is available as both unbalanced line level (0 dBu) and a galvanically-isolated output suitable for driving 600 ohm inputs, as found on telephone system MOH (Music On Hold) inputs. See page 19.

15. **MOH/UTILITY MIC 1 & MUSIC LEVEL** – two pre-set controls, adjusting the level of the Mic 1 input and chosen music source respectively at the Utility Output. See page 23.

16. **MUSIC MUTE** – 2-pin 5 mm-pitch screw terminal connector for connection of external emergency muting relay (e.g., fire control panel). See page 20.

17. **REMOTE POWER DOWN** – 2-pin 5 mm-pitch screw-terminal connector allowing the 46-120 to be put into Standby Mode from external control systems. See page 20.

18. **Mains** – IEC receptacle for AC mains. See page 14.

19. **FUSE** – mains fuse. See page 14 for fuse details.

The following rear panel items are only present when the CDI-46 Digital Interface Card is fitted:

20. **CDPM/PM INPUT** – RJ45 Cloud Digital Paging interface; PM Series* microphones (excluding the PM1) may be connected here, using screened Cat 5 cable. See page 16 for more information.

21. **ETHERNET INTERFACE** – standard RJ45 network connector allowing the 46-120 to be controlled and configured from external equipment using TCP/IP commands. It can also be used as an Ethernet-to-serial bridge to pass TCP/IP commands from third-party control systems to the RS-232 connector [22].

22. **RS232** – a 3-pin 3.5 mm-pitch screw-terminal connector providing a bi-directional RS-232 interface. This permits control of the 46-120's functions from an external system and can also transmit serial commands to third-party equipment in response to Ethernet commands generated elsewhere.

*The earlier Cloud CDPM range of Paging Microphones is also compatible with this interface.

Cloud

INSTALLATION

Hardware considerations

The 46-120 Mixer Amplifier is built in a 2U-high 19" rack mount enclosure. It is recommended that the 46-120 is installed in a 19" rack wherever possible. The units are approx. 410 mm deep, but at least 500 mm of rack depth should be available to allow for rear connectors and cabling.

The 46-120 uses thermostatically-controlled, variable speed forced-air cooling. Depending on the ambient temperature and signal levels, the fan (on the rear panel) may or may not rotate; this is normal operation. The enclosure has air intake slots in the front panel; ensure that these are not obstructed once the unit is installed. Warmed air is expelled at the rear of the unit by the fan. It is recommended that 1U blank panels are fitted in the rack above and below the 46-120; do not fit slotted ventilation panels as these defeat the action of forced-air cooling.

If the unit is to be used free-standing (i.e., not mounted in a rack), the four feet supplied in the accessory pack should be fitted to the bottom of the chassis. These should be inserted into the four 5 mm dia. holes clearly identifiable in the corners of the bottom panel, and secured by then inserting the plastic rivets through the centre holes in the feet.

The choice of location will be dictated by the specifics of the system and building layout. It is recommended that wherever possible, the 46-120 should be mounted adjacent to as many of the music sources (CD players, music servers, TV receiver boxes, etc.) as practical.

When deciding the Mixer Amplifier's location, bear in mind that access to it (particularly the rear panel) will probably be required from time to time even if a full complement of remote controls is being fitted as part of the system, as certain adjustments can only be made on the unit itself.

Power Supply

The European version of the 46-120 operates on standard 230 V AC mains; an alternative version is available which operates on 115 V AC. An IEC mains cable with a plug appropriate for each country is supplied with the European unit. The unit's power consumption is 370 VA.

Fuses and ratings

The only externally-accessible fuse is an AC mains fuse on the rear panel. **Only replace a fuse with one of exactly the same type**. The table below gives the correct fuse types.

VERSION	RATING	FUSE TYPE
230 V	4 A	20 mm x 5 mm HBS T4A
115 V	8 A	20 mm x 5 mm HBS T8A

The fuseholder is of the "bayonet" type; press and twist the holder anticlockwise to remove the fuse. If a replacement fuse blows immediately, it indicates that the mixer amplifier has developed a fault, which should be referred to competent service personnel.

Internally, two 20 mm x 5 mm fast-blow F8.0A fuses protect each amplifier channel (eight in total). These are service components, and should not require attention. Failure of any of these fuses indicates a fault condition, which should be immediately referred to a competent technician or authorised service centre.

System connections

Music sources

Connect the system's various music sources to **LINE 1** to **LINE 6** as required. All line inputs offer unbalanced connection for stereo sources on a pair of standard RCA jacks (phono sockets). The sensitivity range available should allow most standard items of audio equipment such as computers/tablets, music servers and media receivers, etc., to operate at a satisfactory level. Most equipment of this type will have stereo unbalanced outputs, and as long as the source equipment is adjacent to the Mixing Amplifier, normal phono-phono (or 3.5 mm jack-to-phono) leads can be used. Always avoid using pre-made leads of an unnecessary length.

On 46-120MEDIA and 46-120TMEDIA models, the media player uses Music Input 1 (LINE 1); set the rear panel **LINE 1/MEDIA** button OUT for the media player to be available to the zones as Music Source 1. Press the button IN if the media player is not in use; this permits LINE 1 inputs to be used in the normal way.

Mono and stereo sources:

The mixing section of the 46-120 is mono; the stereo line inputs are summed internally. Stereo sources should be connected in a normal stereo configuration, using both L and R inputs. If connecting a mono source with only a single output, it may be connected to either the left or the right input.

Balanced sources:

If it is necessary to connect an item of source equipment with a balanced output to the 46-120, a balancing transformer should ideally be inserted between the source and the unbalanced input. Suitable audio transformers, which should have a ratio of 1:1, are readily available from major audio component suppliers. The transformer(s) should be mounted as close to the 46-120 as practical, and housed in a screened enclosure if they are not individually screened. The preferred connection method is shown on the following page.

Balanced outputs (XLRs):
pin 1 ground
pin 2 hot
pin 3 cold

Audio balancing transformers

LEFT

LEFT
Unbalanced inputs

RIGHT

RIGHT
Unbalanced inputs
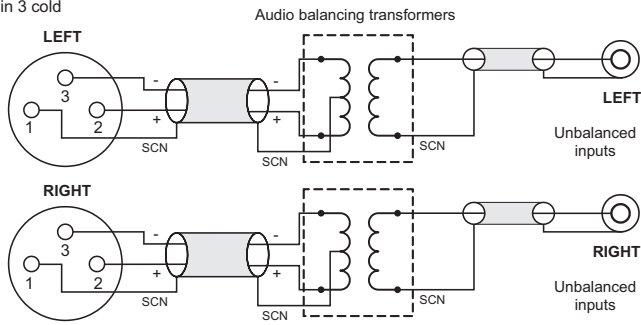
If transformers are not available, a balanced source may feed an unbalanced input directly as long as care is taken over how the connections are made. A variety of design techniques are in use to implement balanced outputs in audio equipment, and some designs require different wiring protocols to others. Installers are advised to check the manuals with each item for guidance on how the outputs should be connected to an unbalanced input.

However, the wiring methods shown below will work in a large number of cases. If hum or other distortion is found to result, try disconnecting the 'cold' leg of the balanced output (pin 3 on XLRs).

When using single-core cable, join 'cold' to screen at the source

Unbalanced inputs
LEFT   RIGHT

LEFT

RIGHT

Balanced outputs (XLRs):
pin 1 ground
pin 2 hot
pin 3 cold

Unbalanced inputs
LEFT   RIGHT

LEFT

RIGHT

Balanced outputs (XLRs):
pin 1 ground
pin 2 hot
pin 3 cold

When using twin-and-screen cable, join 'cold' to screen at 36-50 end
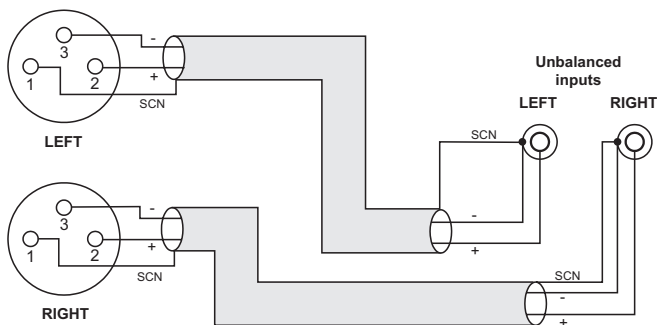
Microphone input

Inputs **MIC 1/TEL** and **MIC 2** are intended for the direct connection of microphones. They are electronically balanced and transformerless with an input impedance of greater than 2 kohms and optimised for use with microphones of 200 to 600 ohms impedance. The screw terminal input connectors should be wired thus:

PIN	CONNECTION
1	Screen
2	Signal '-' (cold)
3	Signal '+' (hot)

Unbalanced microphones may be used by connecting pin 2 to pin 1 (cable screen) in the mating (male) screw-terminal connector. 15 V phantom power is available, see page 22.

Either mic input may be routed to any of the zones in use, at any level in each zone. Microphone priority may be set so that any microphone announcements automatically reduce the music level in that zone while the announcement is in progress (see page 24 for more details.)

The **MIC 1/TEL** input may be reconfigured to accept an audio input directly from a compatible telephone system. This permits announcements to be made from some (or any) internal telephone extensions in a building. Not all telephone systems are suitable for this application, and the system documentation should be consulted in detail to ensure compatibility.

Internal jumpers J17A, J17B and J17C need to be moved for this application. See page 30 for further information regarding the internal jumpers. This inserts a transformer in series with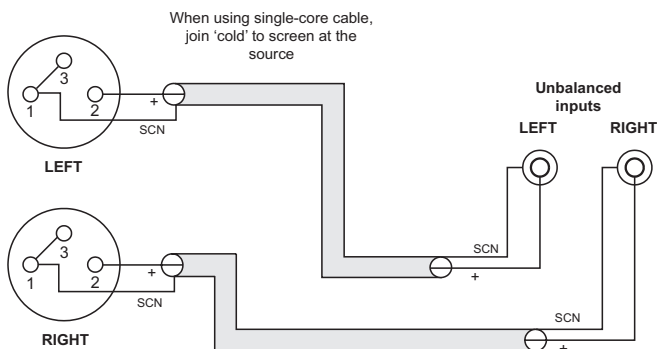 the input connector to provide full electrical isolation from the telephone system. Note that the mic input sensitivity is decreased by 10 dB when the transformer is enabled, and this results in the mic gain control operating over the range 0 dB to 40 dB.

The audio (or "paging") output of the phone system should be connected to the **MIC 1/TEL** input in the normal way. The telephone input is optimised for connection to an output of 600 ohms impedance; this should suit the majority of telephone systems. Note that the front panel **MIC 1 LEVEL** controls ([3] on page 11) are still operational.

Zone 1 Facility Port

Zone 1 of the mixer amplifier is provided with a **FACILITY PORT** in the form of a rear panel 8-way RJ45 connector. The primary use of the Facility Port is for the connection of an LM-2 remote active module, but it may also be used as a general-purpose auxiliary balanced input (see page 26 for more information on this application). Note that audio connected via the **FACILITY PORT** will only be available in Zone 1, and no other.

The active modules operate from DC power supplied by the 46-120. The current consumed by each module is minimal and

in the vast majority of installations there will be no power supply issues. See page 32 for more information about the 46-120's DC power capabilities.

The pinout of the Facility Port connector is given in the table below:

PIN	USE	Cat 5 CORE*
1	Audio 'cold' phase (-)	White + Orange
2	Audio 'hot' phase (+)	Orange
3	Priority VCA control	White + Green
4	+15V	Blue
5	0V	White + Blue
6	-15V	Green
7	Music level control (0 to 10V)	White + Brown
8	Music source select control (0 to 10V)	Brown
SCN	Screen for system music controls	Connector shell

* Standard wiring for pre-made cables

RJ-45 PLUG (PIN SIDE)   RJ-45 PLUG (LATCH SIDE)

RJ-45 SOCKET
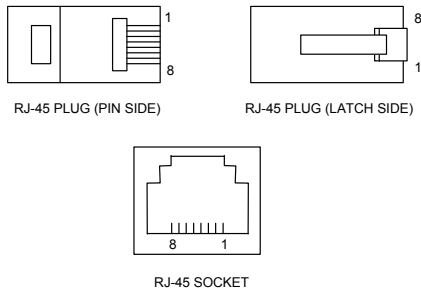
Please also refer to page 26 for further information regarding installation of remote active input modules.

Connecting an LM-2 remote active module

The LM-2 should be connected to the **FACILITY PORT** using screened Cat 5 cable. (Note that as the cable carries analogue audio, *only* screened Cat 5 should be used.) All eight cores are used. The LM-2 includes controls for local music level and source selection, the wiring for these functions being catered for on the Facility Port; thus it is not necessary to make any connections to Zone 1's **MUSIC CONTROL** port.

The LM-2's upper PCB is fitted with an RJ45 connector labelled **OUTPUT**. Connect this to the **FACILITY PORT** of the relevant Zone using screened Cat 5 cable with screened RJ45s at each end. Follow the colour coding shown in the table above. The metal screening of the connectors should be bonded to the screen of the cable. Full details can be found in the LM-2 Installation Guide.

The second RJ45 connector on the LM-2, **LINK**, may be used to "daisy-chain" additional LM-2s, thus allowing multiple input modules to be installed at different locations in the Zone. See the LM-2 Installation Guide for more details.

Before the LM-2's music source and level controls will operate, set the Zone 1 **MUSIC CONTROL LEV** and **SRC** push-button switches ([10] on page 12) to REMOTE (i.e., pressing

it in). In this setting, Zone 1's front panel **MUSIC LEVEL** and **MUSIC SOURCE** controls become inoperative. Sometimes it is desirable to permit remote control of music level but retain music source selection at the mixer amplifier. In this case, set only the **LEV** switch to REMOTE. This will render the LM-2's music source switch inoperative, and return source selection to the 46-120's front panel.

Paging system connections

Cloud PM Series paging microphones may be connected directly to the 46-120 in two ways:

- via the Cloud Digital Paging interface ([20] at page 12) – only available if the CDI-46 Digital Interface card is fitted.

- using the **MIC 1/TEL** input and **ACCESS CONTACTS** connector.

Connecting PM4/4SA paging microphones

Cloud PM Series microphones are available in 4, 8, 12 or 16-zone versions; the installer should be sure he/she understands how paging zones correspond to mixer zones before commencing wiring. Although the 46-120 only supports a maximum of four zones, there is no technical reason to prevent a PM microphone being used in a restricted manner.

Connection via the CDPM/PM port:

If a CDI-46 Digital Interface card is fitted, the PM4 may be simply connected to the **CDPM/PM INPUT** using screened Cat 5 cable. No other connections are required; a PM4 will be powered from the 46-120, but a PM4-SA will require an external PSU. Full installation instructions are supplied with the PM Series microphone and the CDI-46 card.

Connection via the Mic input

Two connections are required: the paging mic audio signal should be connected to the **MIC 1/TEL** input ([4] on page 12) and the control cable to the 6-pin Zone **ACCESS CONTACTS** port ([8] on page 12). The pinout of the **ACCESS CONTACTS** port is given below:

PIN NO.	FUNCTION
1	0V
2	Zone 1
3	Zone 2
4	Zone 3
5	Zone 4
6	+12V

Standard two-core screened audio cable should be used for the audio signal, and stranded multicore cable with an overall screen for the control cable.

Connections on the PM microphone are made via the rear cable access glands and screw terminal blocks on the internal PCB (**TERM1**, **TERM2** and **TERM8** in the case of a PM4). Full connection details can be found in the PM Series Installation and User Guide.

The diagram below shows the cable connections between a PM4 and a 46-120.
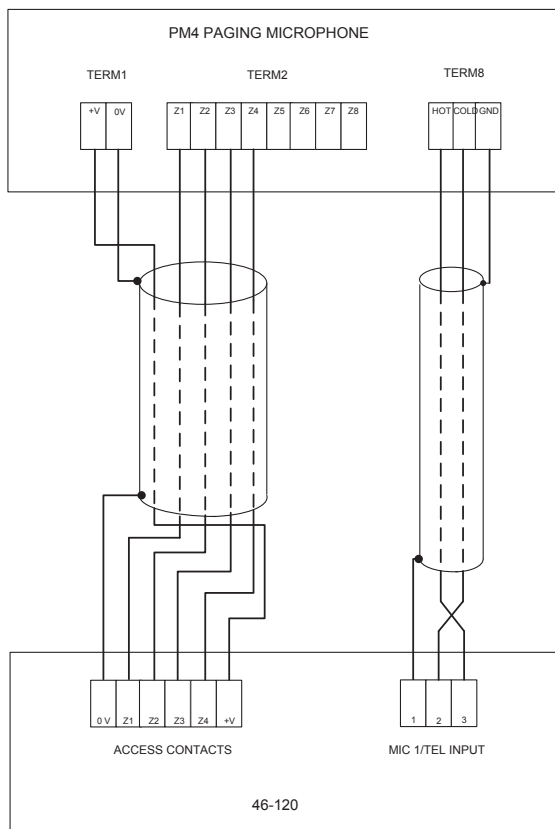
The following diagram shows the connections between a PM1 and a 46-120. Use of 2-pair cable is assumed; the same wiring principle is adopted if separate cables are being used for audio and control.

Note that the default factory setting is for all **ACCESS CONTACTS** port inputs to be permanently enabled. In order for the 46-120's mic input to function correctly with a paging mic, internal jumpers J10 to J13 (Zones 1 to 4 respectively) should be removed. See page 30 for jumper locations.

For automatic music ducking during an announcement, the internal jumper J6 should be set to ON (its factory default setting). See page 24 for further information.

Connecting a PM1 paging microphone

The PM1 is a simple, passive paging microphone suitable for situations where announcements are always made to the same zone(s). It can be connected directly to the 46-120 Mixer Amplifier, the control cable being wired to the pin(s) of the **ACCESS CONTACTS** connector corresponding to the zone(s) in which announcements are required. Any or all of the zones may be paralleled if multiple zones need to operate from the PM1.

Either a single 2-pair individually-screened cable may be used (this gives the neatest finish), or two separate standard microphone cables. Connections on the PM1 are made via the rear cable gland in the base and the screw terminal blocks on the internal PCB (U2 and U3). Full connection details can be found in the PM1 Installation and User Guide. Note that the PM1 does not require DC power.

Note that the default factory setting is for all **ACCESS CONTACTS** port inputs to be permanently enabled. In order for the 46-120's mic input to function correctly with a paging mic, internal jumpers J10 to J13 (Zones 1 to 4 respectively) should be removed. See page 30 for jumper locations.

For automatic music ducking during an announcement, the internal jumper J6 should be set to ON (its factory default setting). See page 24 for further information.

Connecting OEM paging microphones

Other manufacturers' paging microphones may be used with the 46-120, provided they make the microphone signal available at a suitable level (the 46-120's mic gain adjustment range should be sufficient to accommodate most types), and that paging zone selection is by simple "contact closure-to-ground". Providing these conditions are met, the connection method described above for a Cloud PM4 using the Mic Input/Access port method, or for the PM1 in the case of a single-zone mic, may be used.

Music control

Like many other Cloud products, the 46-120 allows remote control of music level and source selection in each zone. Cloud remote control plates from the RL-1 Series (music level only) and RSL-6 Series (music level and source selection) provide an elegant solution, though control via a DC voltage from third-party systems is also possible (see page 26).

Both types of plate connect via the **MUSIC CONTROL** port for the relevant zone (see [9] on page 12). Each zone uses a 3-pin 5 mm-pitch screw terminal type connector. Please refer to page 26 for additional information.

Connecting an RL-1 Series remote control plate

Wire the remote control plate as shown on the following page. Either single-core screened or twin-and-screen cable may be used; in the case of the latter, ignore one of the cores. Maximum reliable cable run is 100 m.

REMOTE LEVEL CONTROL WIRING

SINGLE-CORE SCREENED CABLE MAY BE USED
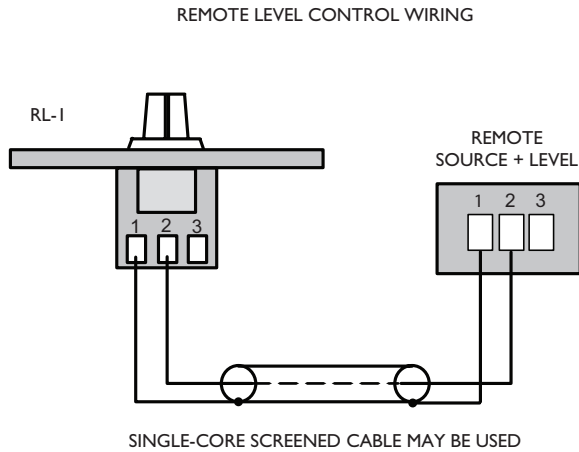
Before the RL-1 will operate, the zone's **MUSIC CONTROL** port must be enabled by setting the **LEV** push-button switch ([10] on page 12) to REMOTE (i.e., pressing it in). In this setting, the zone's front panel **MUSIC LEVEL** control becomes inoperative, but the **MUSIC SOURCE** control is still operative.

Connecting an RSL-6 Series remote control plate

Wire the remote control plate as shown below. Twin-and-screen cable should be used. Maximum reliable cable run is 100 m.

REMOTE SOURCE & LEVEL CONTROL WIRING

USE TWO-CORE SCREENED CABLE
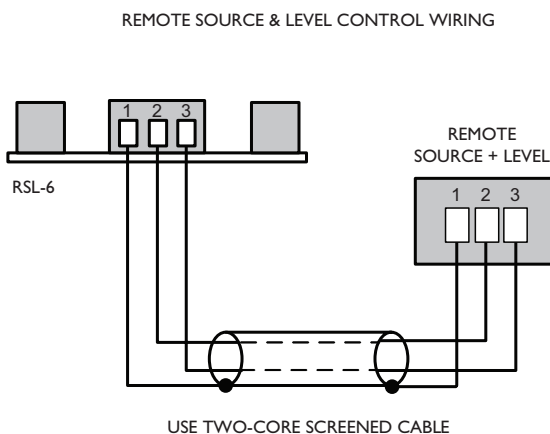
Before the RSL-6 will operate, the zone's **MUSIC CONTROL** port must be enabled by setting the adjacent push-button switch ([12] on page 12) to REMOTE (i.e., pressing it in). In this setting, both the zone's front panel **MUSIC LEVEL** and **MUSIC SOURCE** controls become inoperative.

CDI-46 digital interface

The optional CDI-46 Digital Interface card may be retrofitted to the 46-120 at any time. Full fitting instructions are supplied with the card itself.

The CDI-46 equips the 46-120 with the Cloud CDPM/PM Digital Paging Interface, and also allows the Mixer Amplifier's functions to be controlled from external systems using either RS-232 serial data or TCP/IP commands via Ethernet.

The card includes a web browser interface via the Ethernet port, allowing it to be configured using a simple Graphical User Interface (GUI).

CDPM/PM interface

The Cloud CDPM/PM Digital Paging Interface (see [20] at page 12) is an RJ45 socket allowing Cloud PM Series Paging Microphones to be connected to the 46-120 using standard screened Cat 5 cable. (Note that only screened Cat 5 should be used.)

Use the standard Cat 5/RJ45 wiring convention as shown below:

RJ45 PIN	CAT5
1	Brown + White
2	White + Brown
3	Green + White
4	White + Blue
5	Blue + White
6	White + Green
7	Orange + White
8	White + Orange
RJ45 Shell	Screen

Note that although multiple PM Series microphones may be "daisy-chained" using the Digital Paging Interface, the 46-120 is only able to provide power for the "first" microphone in the chain (i.e., the one connected directly to the 46-120). Any other microphones in the system must be powered by one or more external PSUs; see the PM Series Installation Guide for full details, and also page 32.

NOTE: The front panel **MIC 1** level controls will affect the paging level from a PM Series paging microphone connected via the CDPM/PM port.

RS-232 connection

The CDI-46 card is fitted with a bi-directional RS-232 port (see [22] at page 12) on a 3-pin 3.5 mm-pitch screw terminal connector. This should be wired as follows:

PIN	FUNCTION
1	Gnd
2	Data Rx
3	Data Tx

The port operates at default rate of 9600 baud; the data format is 8 bits, no parity, 1 stop bit. This can be changed using the card's web interface.

The CDI-46 Installation Guide supplied with the card includes examples of the most commonly-used commands. A full RS-232 protocol document is available at www.cloud.co.uk. See also page 24.

Ethernet connection

The 46-120's functions may also be controlled using TCP/IP commands sent via the **ETHERNET INTERFACE** RJ45 connector (see [21] at page 12). Industry-standard Cat 5 cabling may be used.

The CDI-46 card can operate at either 10base-T or 100base-T speeds, and auto-negotiates. The TCP/IP commands are the same as the RS-232 command set; see the CDI-46 Installation Guide and page 25 for more details.

The CDI-46 can also act as an Ethernet-to-serial bridge, whereby the serial port transmits RS-232 commands to other equipment on receipt of data received via the Ethernet port. See also page 25.

Speaker outputs (Lo-Z)

The speaker output connector is an 8-pin, 5 mm-pitch screw-terminal connector ([13] at page 12). Mating connectors are supplied. The power amplifier outputs for all four zones are on this connector. If less than four zones are being used, use as many of the mating 2-pin connectors as required.

Connect to speakers using pairs of terminals as shown in the table:

	Panel marking	Connect to:
1	**0V**	Zone 1 output '-'
2	**Z1**	Zone 1 output '+'
3	**0V**	Zone 2 output '-'
4	**Z2**	Zone 2 output '+'
5	**0V**	Zone 3 output '-'
6	**Z3**	Zone 3 output '+'
7	**0V**	Zone 4 output '-'
8	**Z4**	Zone 4 output '+'

Each output stage is designed to drive into an impedance of not less than 4 ohms. Check the impedance of the loudspeaker(s) in use and, taking into account any series and/or parallel wiring, ensure that the total load on each channel is not less than 4 ohms.

100/70 V-line operation

The 46-120 may be used with 100 V/70 V-line loudspeaker systems by the use of Cloud CXL-46T transformers. These are fitted internally, one per zone. Any or all zones may be converted, and may be used with 100 V and/or 70 V-line operation as required.

⚠ The same output connector is used for both Lo-Z and 100/70 V-line operation. It is not possible to drive loudspeaker systems of the two types simultaneously from the same zone output.

In the 46-120T and 46-120TMEDIA model variants, four CXL-46Ts are pre-installed at the factory, and wired for 100 V-line operation (70 V-line for the US). This can be changed to 70 V-line operation (per-output) if wished by moving an internal connector. Alternatively, the 46-120 or 46-120MEDIA may be modified for 100/70-V line operation by retrofitting the transformers, which are available from Cloud Electronics as an option. Installation instructions can be found at page 28, and a quick reference sheet is included with each transformer.

When using the 46-120 for 100/70 V-line operation, the 65 Hz high-pass filters in each zone to be used in this mode should be enabled. See page 23 for full details.

A checkbox area is provided below the connector to allow the installer to indicate the configuration of each zone.
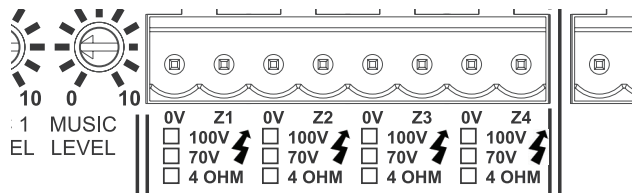
MOH/Utility output

The **MOH/UTILITY OUTPUT** (MOH = Music On Hold) is an auxiliary output which can be used for various purposes. The source is selectable by internal jumpers. The output is available both as a transformer-isolated 600 ohm feed and a non-isolated line level feed.

A common application for the isolated output is to provide continuous music-on-hold programme to a telephone system. The line level output may be used to drive additional external power amplifiers, for example.

The output connector is a 4-pin 5 mm-pitch screw terminal type ([14] at page 12), wired as follows:

PIN	LABELLED		USE
1	**0V**	LINE LEVEL	Unbalanced 0 dBu output
2	**+**		
3	**-**	600 OHM ISOLATED	Isolated output for telephone systems
4	**+**		

Note that one pin of the line level output is connected internally to 0 V.

The transformer-isolated output is suitable for connection to a nominal 600 ohm load. The output level is nominally 0 dBu, and the transformer provides full galvanic isolation from a telephone system. It should be noted that a fixed hi-pass filter is fitted in this output, to reduce bass frequencies when used for this purpose.
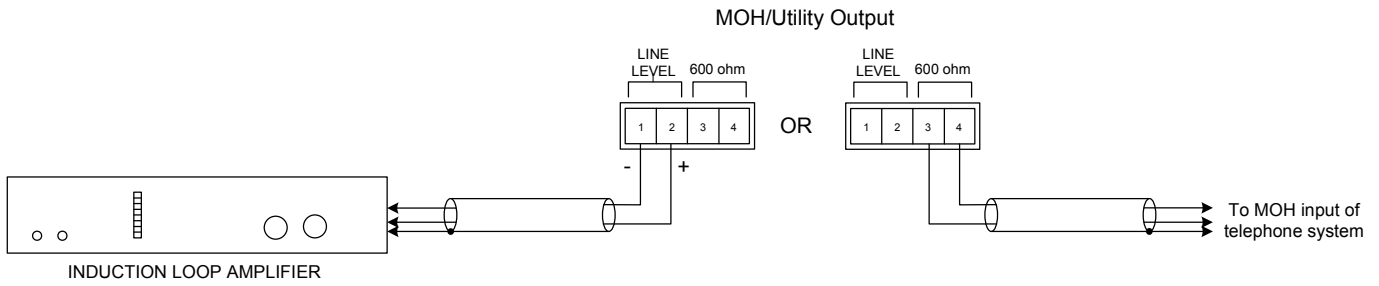
MOH/Utility Output

Before using the MOH/Utility output with a telephone system, it is recommended that the system manual is consulted to check suitable audio levels and any other compatibility issues.

See page 23 for further details of the MOH/Utility output.

Auxiliary line outputs

In large zones, it may be necessary to use additional amplifiers to obtain the necessary power to drive a greater number of loudspeakers, or to drive some loudspeaker types requiring high power levels than the 120 W available from the 46-120's channels. To permit the connection of further amplifiers (or any other equipment), unbalanced outputs from the 46-120's pre-amplifier sections for Zones 1 and 2 are available at the rear panel phono (RCA) connectors labelled **AUX OUT Z1** & **Z2**.

All Zone1 and 2 controls and settings on the front and rear panels (levels, source selection, priority settings, etc.) affect the Auxiliary line outputs. However, note that their source is pre the switchable 65 Hz high pass filters, thus any additional amplifiers connected at the **AUX OUT** outputs would need to have hi-pass filters applied if they were being used to drive 100 V/70 V-line circuits.

Music Mute

External muting of music may be commanded through the **MUSIC MUTE** connector. National or Local Authority regulations governing installed audio systems may require that normal programme material (i.e., music) should be muted in an emergency, to ensure that any evacuation messages are clearly audible. When active, it mutes the current music source in all four zones, leaving the microphone inputs active.

The Music Mute input is on a 2-pin 5 mm-pitch screw-terminal connector. It should be connected to the appropriate alarm output on whichever building management system registers the alarm (typically the Fire System). The alarm output must be volt-free; if no such output is available, an intermediate relay or other isolation device must be installed between the alarm output and the Music Mute input.

The Mute input can be set to operate on either normally open (N/O) or normally closed (N/C) contacts via internal jumper J5 (see page 30). The factory default setting is N/O, thus requiring a short-circuit to be applied across the two pins of the connector for muting to occur.

NOTE: The rear panel line input sub-board and Facility Port sub-board will need to be removed (undo M3 screws on rear panel) to gain access to jumper J5.

NORMALLY OPEN (NO) CONNECTION
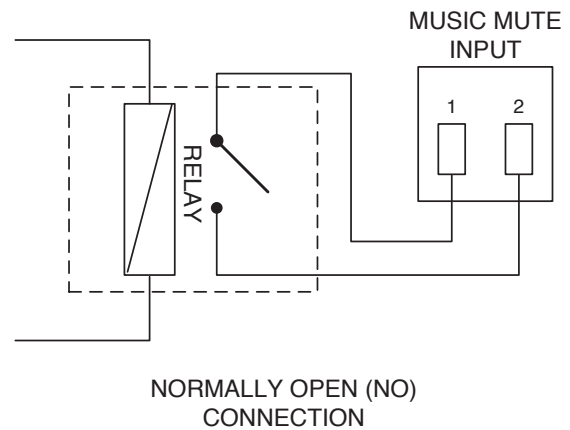
Remote Power Down

The 46-120 may be powered-down remotely, typically from an external control system. A 2-pin, 5 mm-pitch screw-terminal connector, **REMOTE POWER DOWN** ([17] at page 12) is provided for this purpose. A short-circuit applied across the pins will power the 46-120 down; thus wiring this connector to the contacts of an external relay (typically one within a control processor) is all that is required to implement this feature. The short-circuit must be kept applied to maintain the 46-120 in an OFF state; on removing the short-circuit, the 46-120 immediately powers-up again.

SETTING UP & OPERATION

Music Inputs

Gain & level

To avoid dramatic changes in volume when switching between sources, the 46-120's music inputs are provided with preset gain trim controls ([3] on page 11). These vary the input sensitivity from -12 dBu (195 mV) to +8 dBu (2.0 V). When setting the system up, play audio from all the sources in use and listen to them one at a time in a convenient zone (ideally that in which the mixer is located) at a reasonable volume. Taking a source of "average" volume as the reference, the gain controls of the others should be adjusted so that there is no appreciable difference in volume between any of the sources. (With a typical music source, setting the gain on its channel to mid-way is a good starting point.) Note that consideration may need to be given to the type of programme in use, particularly if the sources include TV sound.

In normal operation, the music level in each primary zone is set with the **MUSIC LEVEL** control on the front panel ([2] on page 11). This control will not be operative if the corresponding rear panel **MUSIC CONTROL LEV** push-button is set to REMOTE. The music level at the MOH/Utility output is set with the rear panel **MOH/UTILITY MUSIC LEVEL** preset control ([15] on page 12).

Note that the setting of the music level has no effect on microphone volume.

Local/remote control

If a zone is to have its music level and/or source controlled remotely – typically by an RL-1 or RSL-6 Series remote control plate - the corresponding rear panel **MUSIC CONTROL** push-button(s) must be set to REMOTE (button in) for the remote controls to be operative and for the corresponding front panel controls to be disabled. Zones without such plates should be set to FRONT PANEL (button out).

The 46-120 features separate **MUSIC CONTROL** buttons for assigning control of music source and level in each zone to a remote control plate. The four **LEV** buttons determine whether music level will be controlled from the 46-120's front panel or from a remote location, and should be set to REMOTE for zones in which an RL-1 or RSL-6 Series plate is installed. The corresponding front panel **MUSIC LEVEL** controls will be disabled. The four **SRC** buttons determine whether music source selection will be controlled from the 46-120's front panel or from a remote location, and should be set to REMOTE for zones in which an RSL-6 Series plate is installed. The corresponding front panel **MUSIC SOURCE** controls will be disabled.

Note that the 46-120 supports additional methods of remote control of music level and source. These are:

- use of an LM-2 remote active module connected to the ZONE 1 FACILITY PORT (applicable to Zone 1 only)

- RS-232 serial or TCP/IP control from external control systems via a CDI-46 Digital Interface card.

In both cases, the **MUSIC CONTROL SRC** and **LEV** buttons for the relevant zone(s) should be set to REMOTE for correct operation and for the front panel controls to be disabled.

Note that independent remote control of music level or source selection in areas fed by the Utility output is not possible.

46-120MEDIA digital media player

This section of the manual applies to models 46-120MEDIA and 46-120TMEDIA only.

MEDIA versions of the 46-120 include an integral digital audio player, which can play audio recorded as WMA or MP3 files from either USB memory devices or SD cards plugged into their respective sockets on the front panel [10] and [11].

A standard set of "transport" controls is provided on the front panel to play, stop, pause, etc., programme material.

The stereo audio output of the media player is mixed to (L+R) mono and routed internally via the **LINE 1/MEDIA** switch ([2] at page 12) to Line Input 1. Thus to route the media player to one or more zones, the rear panel switch must be set to MEDIA (button OUT), and the front panel **MUSIC SOURCE** switch set to 1.

Compatible media

- USB: USB 2.0-compatible memory devices.

- SD: SD cards up to 4 GB capacity, or SDHC cards up to 32 GB. MMC cards of the same capacity are also compatible.

Filing systems supported are FAT16 or FAT32.

File types and rates supported

The 46-120MEDIA versions will replay audio files recorded in either WMA or MP3 formats, as follows:

- WMA: bitrates from 32 kpbs to 384 kbps

- MP3: MPEG 1/2/2.5, layer 2 or 3 decoding at bit rates from 32 kpbs to 384 kpbs, including VBR.

Sample rates supported are: 8 kHz, 11.025 kHz, 12 kHz, 16 kHz, 22.05 kHz, 24 kHz, 32 kHz, 44.1 kHz and 48 kHz

Both types of audio file may be present on the memory device; the media player will not differentiate between them in any way. The files may be in the root directory of the memory, or in folders, or folders within folders. When the memory device is plugged in, the media player will scan it and identify all compatible files in all folder locations, and make them available for playing. Only one memory device at a time (USB device or SD card) may be connected. Note that it is not possible to create a playlist from the 46-120MEDIA's front panel controls.

Basic operation

The front panel transport controls operate in a similar manner to the standard controls on, say, a CD player.

Plugging a memory device into one of the front panel sockets will activate the player and after a short delay, the player will enter PLAY mode, confirmed by the illumination of the **PLAY** LED ([17] at page 11). In Normal Mode (see below), the first track played is the one whose filename starts with the lowest numeric/alpha characters.

The track playing may be momentarily paused by pressing the ▶ button [12]; the **PLAY** LED goes out and the **PAUSE** LED [18] illuminates to indicate this. Play is resumed from the point at which it was paused by a further press of the ▶ button. The track may be stopped from either Play or Pause modes by pressing the ■ button [13]; both LEDs go off.

The next or previous track may be selected for immediate play by pressing the ▶▶ or ◀◀ button respectively. These buttons operate in any transport mode. (Unlike a CD player, the ◀◀ button will cause the play point to jump to the start of the previous track, not that of the current one).

Three operational modes are available, selected by the **MODE** button [16] (marked with the symbol Ⓜ). Successive presses of the MODE button step through the modes:

| NORMAL Mode | → | REPEAT Mode | → | RANDOM Mode |
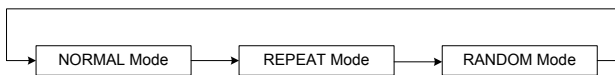
The **REPEAT** and **RANDOM** LEDs [20] and [19] illuminate to confirm these two particular modes. Both LEDs off indicates Normal Mode.

Normal Mode

In Normal Mode, the media player plays through all the available audio files in order of filename, regardless of which folder they are in on the memory device.

Numeric characters are given higher priority than alphabetic ones, so audio tracks whose filenames begin with numbers will be played first. This makes it very simple to pre-ordain track playing order; if the tracks are given filenames beginning "01", "02", etc., they will always be played in that order in Normal Mode.

Random Mode

In Random Mode, the next track to be played is selected at random from all the tracks available on the memory device. Note that this is not the same as the "Shuffle" mode found on portable MP3 players - a fresh random selection from all available tracks is made at the end of each track, and thus there is a possibility that the same track may be played twice in succession.

Repeat Mode

If Repeat Mode is enabled while a track is playing, the track will be repeated when it has finished. This repetition will continue until Repeat Mode is cancelled. Repeat Mode may also be selected from Stop Mode; the next track played when ▶ is pressed will then repeat until Repeat Mode is cancelled.

Note that Repeat Mode only applies to individual tracks; it is not possible to repeat a sequence of tracks.

Microphone inputs

Phantom power

Both microphone inputs have 15 V phantom power available. This will be adequate to power a wide range of condenser microphones. (Some "studio quality" mics may require a higher phantom voltage and thus necessitate an external PSU.) To enable phantom power at a mic input, internal PCB jumpers J1 (MIC 1/TEL) or J2 (MIC 2) should be moved to their ON position. See page 30 for jumper location.

Phantom power should NOT be enabled if dynamic microphones are to be used.

Gain & level

Both microphone inputs are provided with a rear panel preset **gain** control ([3] on page 12). A wide range of gain (10 to 50 dB) is available and there should be no problem in obtaining a satisfactory level from any normal microphone.

The **GAIN** controls should be adjusted by speaking normally into a microphone of the correct type. Turn the corresponding front panel **MIC LEVEL** control up to maximum and listen in a convenient zone; the rear panel gain control should be carefully advanced until the mic volume is as loud as it is ever likely to be needed, and then reduced slightly. There should be no audible distortion. The use to which the microphone is to be put should be borne in mind – karaoke is more likely to overload the mic preamplifier than spoken announcements, if the gain is not set correctly.

In normal operation, the mic level in each primary zone is set with the **MIC LEVEL** controls on the front panel ([3] and [4] on page 11). The mic level at the Utility output is set with the rear panel **MOH/UTILITY MUSIC LEVEL** preset control ([15] on page 12).

EQ

Each mic input has associated **HF** and **LF** EQ controls ([7] on page 12) These provide 10 dB of cut or boost at 5 kHz and 100 Hz respectively and should be adjusted by listening to achieve a clear mic sound. Again, the application should be borne in mind when making adjustments.

High-pass filter

The mic input has a fixed 100 Hz high-pass filter to remove the lowest frequencies. This helps to reduce the effects of breath blasts and microphone handling noise. The filter is always in circuit.

Use of Mic 1 with a telephone system

The **MIC 1/TEL** input on the 46-120 may be reconfigured to accept an audio input directly from a compatible telephone

system. This permits announcements to be made from some (or any) internal telephone extensions in a building. Not all telephone systems are suitable for this application, and the system documentation should be consulted in detail to ensure compatibility.

Internal jumpers J17A, J17B and J17C need to be moved for this application. See page 30 for further information regarding the internal jumpers. This inserts a transformer in series with the input connector to provide full electrical isolation from the telephone system. Note that the mic input sensitivity is decreased by 10 dB when the transformer is enabled, and this results in the mic gain control operating over the range 0 dB to 40 dB.

The audio (or "paging") output of the phone system should be connected to the **MIC 1/TEL** input in the normal way. The telephone input is optimised for connection to a 600 ohm output; this should suit the majority of telephone systems. Note that the front panel **MIC 1 LEVEL** controls [3] are still operational.

Zone and MOH/Utility outputs

In normal operation, the music level in each zone will be set by the front panel **MUSIC LEVEL** control, or by a corresponding control on a remote plate or module (or other control system). The music level at the Utility/MOH output will be set by the rear panel **MOH/UTILITY MUSIC LEVEL** preset control.

EQ

The various zones in a building often have different acoustic properties, and may also have different models of loudspeaker installed. The 46-120 is fitted with per-zone HF and LF EQ adjustments for the music signal ([5] on page 11) to enable the audio frequency response to be best matched to each zone's acoustics. The controls should be adjusted by listening; up to 10 dB of cut or boost at 10 kHz (HF) and 50 Hz (LF) is available. Note that these EQ adjustments do not affect the frequency response of the microphone signal.

After the EQ has been adjusted during system commissioning, the EQ presets may be made inaccessible by fitting the security cover (one supplied with each Mixer Amplifier). See page 29 for fitting instructions.

MOH/Utility output settings

The **MOH/UTILITY** output of the 46-120 can be used for various purposes: a common application is to drive loudspeakers (using additional power amplifiers) in secondary areas such as corridors, lobbies or toilets, where there is no necessity to make frequent alterations to the music source or level.

Eight source options are available for the signal at the MOH/Utility output, selected by internal jumper J16. This jumper is in the form of a 2x8-way header, with a link being positioned on one pair of pins only. The options are:

- The output is always fed with the music signal connected to any one of LINE 1 to LINE 6. When in use with a telephone system as an MOH source, it is generally more desirable for the music source to remain constant; these options are available for this purpose.

- The output always follows the music source selection made for Zone 1 (either on the front panel or via remote control). The **MUSIC LEVEL** control for Zone 1 does not affect the level at the MOH/Utility output. This option is the factory default setting.

- The output is always fed with the output of the media player. The rear panel LINE 1/MEDIA switch setting is not relevant, and the media player may be used simultaneously as Music Source 1, or not, as wished. This option is only operative on models 46-120MEDIA and 46-120TMEDIA.

See page 30 for locations and settings of PCB jumpers.

The signal at the **MOH/UTILITY** output may be any required mix of the selected music signal and the microphone signal connected at the **MIC 1/TEL** input, and is set using the rear panel presets **MOH/UTILITY MIC 1 LEVEL** control and **MUSIC LEVEL** (see [15] at page 12). Each signal is effectively 'off' with the preset control in its fully anticlockwise position. Note that the signal at this output is NOT altered by any front panel **MUSIC LEVEL** or **MIC LEVEL** controls, or any front panel MUSIC EQ preset adjustments.

⚠️ The **MOH/UTILITY MIC 1 LEVEL** control should be turned fully down if the output is to be used for MOH with a telephone system, otherwise paging announcements will be heard by telephone callers.

If Zone 1 is selected as the MOH/Utility source (the factory default setting), and Line 6 Priority is enabled (see page 24), the MOH/Utility output will switch to Line 6 along with Zone 1 output if the input becomes active.

High-pass filters

When the 46-120 is used to drive 70/100 V-line loudspeaker systems via internally-fitted CXL-46T transformers (as in the 46-120T and 46-120TMEDIA), there is a risk of transformer saturation at high levels and low frequencies. To prevent this, each of the 46-120's four channels is provided with a switchable 65 Hz high-pass filter. These should be enabled for any channels being used to drive 70/100 V-line systems.

The filters are enabled by moving internal PCB jumpers J3 (Zone 1), J4 (Zone 2), J8 (Zone 3) and/or J9 (Zone 4). See page 30 for locations of PCB jumpers.

In models 46-120T and 46-120TMEDIA, the jumpers are set at the factory in the 'ON' position (filters enabled) for all zones.

Priorities

The 46-120 offers several options for determining what happens to music signals when announcements are made.

Mic-over-Music priority

Fully automatic, voice operated priority is available for the mic inputs. This is selected by internal PCB jumper J6, which should be set ON (the factory default setting) to enable priority operation. When enabled, all music signals will attenuate by approximately 30 dB when the microphone is used (a process often referred to as "ducking"); after the announcement, the music signals will restore smoothly to their former level, over a period of approx. 0.5 s.

The Priority setting applies to both microphone inputs, and a signal at either **MIC 1/TEL** or **MIC 2** input will initiate ducking.

If Mic-over-Music Priority is not enabled, microphone inputs will be mixed with the selected music signal in each zone at a level determined solely by the front panel controls.

See page 30 for location of the internal jumpers.

Line 6 priority

It may sometimes be necessary for one music input to have priority over all the others; for example, a jukebox in a bar, or a digital sound store programmed to make automatic announcements in a public space. Input **LINE 6** may be set to have priority in Zone 1 over whichever source is selected for the zone by its **MUSIC SOURCE** control. This priority is set by moving internal jumpers J14A and J14B to the 'ON' position. (The default setting is 'OFF'.)

When the priority is selected, a signal present at Line 6 will force Zone 1's source selection to that input; when the signal disappears, the previously-selected source will be restored over the time constant selected by J15 (3, 6 or 12 s).

Note that on the 46-120, Line 6 Priority is only effective in Zone 1. During Line 6 Priority operation, Zones 2, 3 and 4 will continue to output their currently-selected music source.

See page 30 for location of the internal jumpers.

### Mic-over-Facility Port priority

If an LM-2 remote active module is in use in Zone 1, it is possible to give a microphone connected at the 46-120 itself (at **MIC 1/TEL** or **MIC 2**) priority over input sources connected at the module. This might be desirable in function rooms, for example, where building-wide announcements may need to interrupt any local use.

This priority is set by internal PCB jumper J7. The default setting is 'OFF'; in this position microphones or other sources connected at remote input modules will be autonomous and will not be overridden by announcements made via the mixer's mic inputs. Setting J7 to 'ON' will give priority to Mic 1 or Mic 2. The release time following an announcement is approx. 0.5 s.

Note that this priority is independent of the local MIC PRIORITY function which can be selected on the remote module.

Control

CDI-46 digital interface
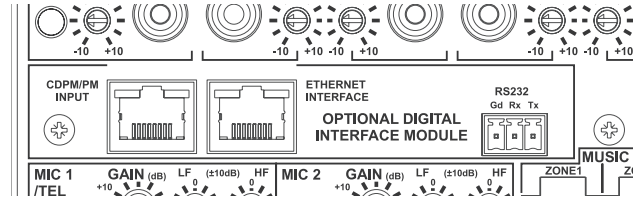
The optional CDI-46 Digital Interface card permits the 46-120 to be controlled by either RS-232 serial data or TCP/IP commands via an Ethernet connection. Abridged fitting instructions can be found at page 27, and connection information at page 18.

> ⚠ Full operating instructions for the CDI-46 are included with the card itself. The following manual sections are intended to give a brief overview of the card's remote control features.

> ⚠ For the CDI-46 to control the 46-120's music level and source selection via browser pages, or via serial control using either RS-232 or Ethernet, it is necessary to set the rear panel **MUSIC CONTROL** buttons to **REMOTE** (buttons 'in'). If the CDI-46 is to have full control over music source and level in all four Zones, then all eight buttons should be set to **REMOTE**.

Remote control via RS-232

The RS-232 serial port's default parameters are as follows:
- Baud rate: 9600
- Word length: 8 bits
- Stop bits: 1
- Parity: none

The port is bi-directional.

The port parameters may be altered using the web browser GUI accessed through the Ethernet port (see following page).

Examples of some basic commands are given on the following page:

COMMAND	ASCII	NOTES
Select source y for Zone x	`<Zx.MU,Sy/>`	1≤x≤4, 1≤y≤6
Increase music level in Zone x by n dB	`<Zx.MU,LUn/>`	1≤x≤4
Decrease music level in Zone x by n dB	`<Zx.MU,LDn/>`	1≤x≤4
Mute Mic p in Zone x	`<Zx.Mp,M/>`	1≤x≤4, p=1 or 2
Unmute Mic p in Zone x	`<Zx.Mp,O/>`	1≤x≤4, p=1 or 2
Enable paging in Zones 2 & 3	`<M1,PAOXXO/>`	X=route paging mic, O=don't route; position in string defines Zone
Release paging	`<M1,PR/>`	

Expanded command information is included in the CDI-46 Installation Guide and a full RS-232 Protocol document is available from www.cloud.co.uk.

Remote control via Ethernet

The card includes a web server which will generate GUI pages on a browser logged in to the CDI-46's IP address. Access is password-protected. Even though the CDI-46 has DHCP functionality, we recommend that it should be set with a static IP address (i.e., DHCP disabled) or uses a reserved address on your routing hardware. It will then have a fixed IP address on the network for other devices to browse to. Ensure that a suitable IP address is reserved on the network to which you intend to connect the device. If the CDI-46 changes IP address, client security settings will not be preserved. (Installers may need to consult the IT Manager of the installation premises for guidance.)

As well as the browser control from the GUI, serial commands may be sent to the 46-120 via the CDI-46 card in TCP/IP format through the Ethernet port. This allows external Ethernet-equipped control systems to be interfaced to the 46-120 using standard IT industry infrastructures.

The same serial protocol used with the RS-232 port is valid for the Ethernet port.

Ethernet-to-Serial bridge

The CDI-46 card can be configured to accept incoming ASCII commands via the Ethernet port and re-transmit these as serial data from the RS-232 port. These commands can be used to provide serial control of external devices.

Auto Power Down

The 46-120 can be made more energy-efficient by enabling its Auto Power-Down feature. This monitors the signal level in each zone, and after an installer-determined idle time, will put the power amplifier stage into a standby state, minimising power consumption. If a signal is detected while the channel is in standby, the amplifier stage is re-powered and operational within 40 ms.

Selection of idle time is by setting the internal PCB jumpers J18A, J18B and J18C. The time is definable in 15 minute increments from zero (i.e., Auto Power Down is disabled) to 105 minutes.

The three jumpers use binary weighting to set the idle time; J18A is the MSB, J18C the LSB. The table below summarises the required settings for each idle time value.

Idle time	J18A	J18B	J18C
No APD (Disabled)	OFF	OFF	OFF
15 mins	OFF	OFF	ON
30 mins	OFF	ON	OFF
45 mins	OFF	ON	ON
60 mins	ON	OFF	OFF
75 mins	ON	OFF	ON
90 mins	ON	ON	OFF
105 mins	ON	ON	ON

See page 30 for details of jumper locations.

Cloud

OPTIONS AND ADDITIONAL INFORMATION

LM-2 remote active module – general considerations

Cloud LM-2 remote input modules are available in three form factors, to fit double-gang UK, American or German DIN-standard electrical back boxes. Back boxes of either the recessed type or surface-mounting type may be used, providing they are at least 35 mm deep.

The modules should be connected to the **ZONE 1 FACILITY PORT** using screened Cat 5 cable as described at page 15. The **OUTPUT** connector on the module and the **ZONE 1 FACILITY PORT** on the mixer are both screened RJ45 sockets.

Great care must be taken when connecting active input modules; power is derived from the mixer and some wiring errors may cause failure of the mixer. Please check all wiring before testing the system.

Connecting multiple LM-2s

It may be desirable to connect local microphones or music sources at more than one location in Zone 1 (which may be a large function room, for example). LM-2 input modules may be "daisy-chained" using their second **LINK** RJ45 connectors to achieve this.

Remember to consider the current drawn by any additional input modules – see page 32 for details of current consumption and PSU capability.

In-zone sources

An LM-2 module has an input for a dynamic microphone on an XLR socket and a stereo line input on both two phono sockets and a 3-pin 3.5 mm jack socket. The mic and line inputs have separate level controls and all signals are mixed to mono for routing to the 46-120.

If multiple LM-2s are "daisy-chained" as described above, the mono sums from all modules are summed together.

The microphone input may be assigned priority over both the line inputs and the music source selected for Zone 1 on the 46-120 by pressing the module's **MUSIC PRIORITY** button. See the LM-2 Installation Guide for full details of this feature.

The Facility Port input circuitry includes a Noise Gate to minimise residual noise when the microphone is not in use or during gaps in music programme.

In-zone remote control

In addition to the mic and line inputs, LM-2 modules also have controls for music level and music source selection; these function in an identical manner to RSL-6 remote control plates. No connection to the 46-120's **MUSIC CONTROL**

ports is required, all control is via the single screened Cat 5 cable. However, for the remote controls to operate, it is necessary to set the **MUSIC CONTROL SRC** and/or **LVL** buttons (as required) for Zone 1 to REMOTE.

If multiple LM-2s are "daisy-chained", only one may have its music controls operative; see the LM-2 Installation Guide for full details.

Using the Facility Port as an auxiliary zone input

The Facility Port provides a balanced audio input. If a port is not connected to an LM-2 remote input module, it may be used as a direct input to the zone from other equipment forming part of the system (for example, a permanently installed DJ mixer which only ever needs to feed its output to that particular zone).

Wire an external balanced source to the facility port as shown below:
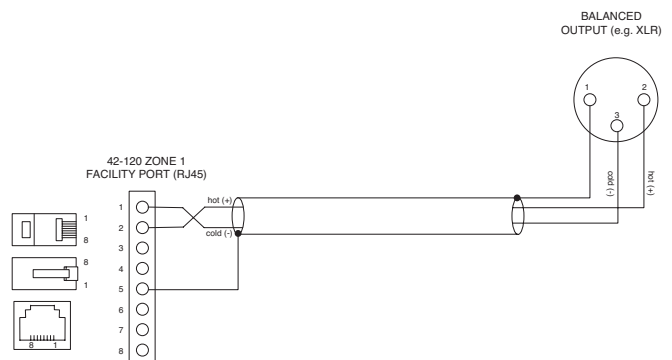
An unbalanced source may also be connected; the use of balancing transformers is recommended.

RL-1 and RSL-6 Series remote control plates – general considerations

Cloud RL-1 Series and RSL-6 Series remote control plates are available in three form factors, two fit single-gang UK or American electrical back boxes respectively; the third is a 50 x 50 mm "Media" module, suitable for "Euro-module" mounting frames available in most European countries. Back boxes of either the recessed type or surface-mounting type may be used, providing they are at least 25 mm deep.

The plates should be connected to the **MUSIC CONTROL** port of the relevant zone using single- or twin-core screened cable as described at page 18. The plate terminations are conventional screw terminals and the **MUSIC CONTROL** port on the mixer is a 3-pin 5 mm-pitch screw terminal connector.

The remote control plates are passive and thus do not draw any current from the mixer.

Control of music source and level via external DC

It may be necessary in some installations to adjust the music level and select music source in one or more zones from an external control system (e.g., Crestron, AMX, etc.) If the **MUSIC CONTROL** ports are not required for RL-1/RSL-6 Series remote control plates, they may be used to receive DC voltages from the external system to effect these adjustments.

Both music source selection and level can be controlled over their full ranges with a DC voltage of 0 to +10 V. The pinout of the **MUSIC CONTROL** port is as follows:

PIN	USE
1	0 V ref.
2	Music level control (0 to +10 V)
3	Music source selection (0 to +10 V)

42-120
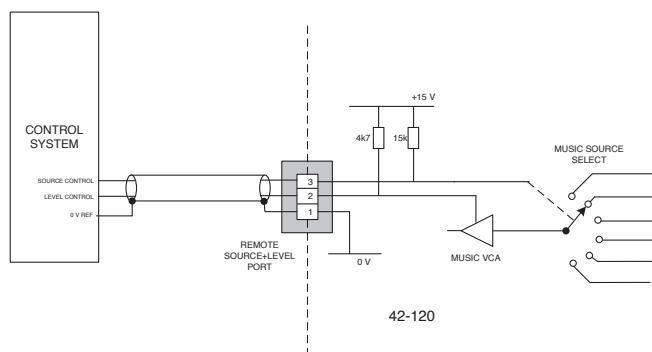
NOTE: If the control voltage source is not isolated from the power earth, there is a small risk of creating a 'ground loop' by linking the mixing amplifier technical ground (0 V) to the ground (0 V) of the equipment supplying the control voltages. To minimise this risk, we suggest that all pieces of equipment be in close proximity, and supplied from the same power outlet.

Music level

Music level in a zone may be varied over its full range by applying a DC voltage of between 0 and +10V to pin 2, the 0V reference being connected to Pin 1. 0 V on pin 2 corresponds to maximum level and +10V will produce 60 dB of attenuation. The rate of attenuation is approximately 165 mV/dB.

Note that there is an internal 4k7 "pull-up" resistor between pin 2 and the internal +15 V rail. If pin 2 is left "floating", this pull-up will result in full attenuation. The output impedance of the control voltage source should be low enough to overcome the effect of this resistor.

Music source

Music source for a zone may be controlled by applying various DC voltages of between 0 and +10V to pin 3, the 0V reference

being connected to pin 1. 0 V at pin 3 will select Line input 6 and between +7.5 and +9 V will select Line input 1. The other line inputs will be selected with intermediate voltages. Taking pin 3 above +9 V will deselect all inputs, making the zone effectively 'off' for music.

The table below lists the DC voltages required at pin 3 to select each line input. The third column is the value of a resistor which should be connected between pins 1 and 3 to permanently 'force' a zone to a particular line input.

INPUT	DC VOLTAGE	RESISTOR VALUE
OFF	>+9.0 V	
Line 1/Media	+7.5 V	16k
Line 2	+6.0 V	11k
Line 3	+4.5 V	6k8
Line 4	+3.0 V	3k9
Line 5	+1.5 V	1k8
Line 6	0 V	short-circuit

Note that there is an internal 15k "pull-up" resistor between pin 3 and the internal +15 V rail. If pin 3 is left "floating", this pull-up will cause 'OFF' to be selected. The output impedance of the control voltage source should be low enough to overcome the effect of this resistor.

Fitting the CDI-46 digital interface

Full fitting and set-up instructions are provided in the Installation Guide included with the optional CDI-46 Digital Interface card.

Below is an abridged set of fitting instructions:

⚠️ Note that some main PCB jumpers will become inaccessible once the CDI-46 card is fitted. Installers are advised to check that all jumpers are in their required positions before fitting this card.

1. Disconnect the 46-120 from the AC mains.

2. Remove the top cover (10 screws) and orient the unit with the rear panel towards you.

3. Unplug the 20-pin ribbon cable from CON13 on the line input sub-board.

4. Remove two M3 screws from the main PCB; these are behind the line input sub-board, adjacent to CON21 and CON23.

5. Replace the screws with the M3x15 hex pillars supplied with the card.

6. Remove the two jumpers from the header CON21 and four from header CON23 (both on the main PCB).

7. Locate the CDI-46 card below the line input sub-board so that the three connectors and two tapped M3 holes align with the empty holes on the rear panel. The two hex pillars should be aligned with the two holes in the rear of the card.

8. Fix the card in place: use the four M3 x 6 screws supplied to secure the rear to the hex pillars and the connector end to the 46-120 rear panel.

9. Plug the 20-way ribbon cable from CON4 on the card into CON13 on the line input sub-board.

10. Plug the ribbon cable removed in Step 3 into CON6 on the card.

11. Plug the 10-way ribbon cable from CON8 on the card into header CON21 on the main PCB.

12. Plug the 20-way ribbon cable from CON7 on the card into header CON22 on the main PCB.

13. Plug the 10-way ribbon cable from CON5 on the card into header CON23 on the main PCB.

14. Replace the top cover using the same screws (Step 2).

Fitting loudspeaker EQ cards

The 46-120 is compatible with various popular installed-sound loudspeakers; a single-channel loudspeaker equalisation module may be fitted to any or all of the four zone outputs as required, to optimise the frequency response of the channel to the loudspeaker type being used.

The cards may be obtained from Cloud Electronics as optional accessories. Please check the Cloud website (www.cloud.co.uk) for makes and models of loudspeakers for which compatible EQ cards are available.

To install equalisation modules, first remove the top cover from the 46-120 (10 screws). The modules plug into the white 12-pin connectors labelled CON19 (Zone 1), CON9 (Zone 2), CON17 (Zone 3) and CON8 (Zone 4) on the main PCB. Note the header connectors on the PCB have two notches on one side only; these engage with lugs on the equalisation module's mating connector to ensure correct orientation.

See the Appendix section "PCB jumper locations and settings" page 30 for further details. Replace the top cover with the original screws after fitting.

Fitting CXL-46T transformers

CXL-46T transformers allow the 46-120 and 46-120MEDIA to be used with 100/70 V-line loudspeaker systems. They may be fitted to any or all of the four zone outputs. (Models 46-120T and 46-120TMEDIA will have four CXL-46Ts pre-fitted at the factory, connected for 100V-line operation (70V-line, US only).

The transformer connections are as shown below:
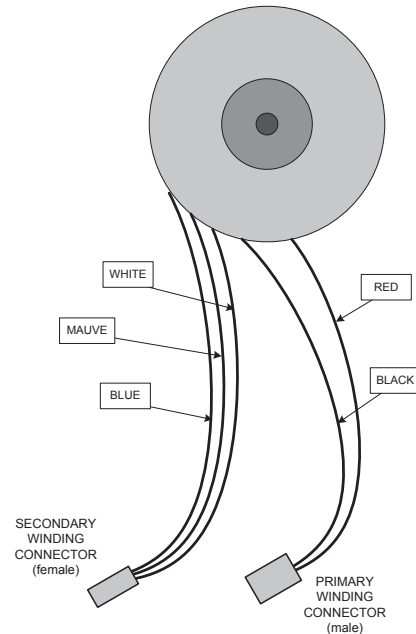
To fit CXL-46T transformers, proceed as follows:

1. Disconnect the 46-120 from the mains.

2. Remove the top cover (10 screws) and orient the unit with the rear panel towards you.

3. Mount the CXL-46T transformer(s) on the right-hand side of the 46-120 chassis, using the holes in the side of the chassis and the M5 x 40 screw, washer and locknut supplied with each transformer. The bolt passes through the centre of the toroid, and the screw head should be on the outside of the chassis. If fitting fewer than four CXL-46Ts, any of the fixing positions may be used. Orient the transformers so that the flying leads face the rear of the chassis.

4. For the first zone being converted to 100/70 V-line operation, unplug the 4-pin female connector from the **ZONE O/P** sockets on the main PCB immediately behind the rear panel **SPEAKER OUTPUTS** connector. These are: CON38 (Zone 1), CON39 (Zone 2), CON40 (Zone 3) and CON41 (Zone 4) - see diagram below. Note that CON38 is orientated at 180° relative to the other three. The wires on these connectors are colour-coded to aid zone identification:

ZONE	OUTPUT WIRING
1	Red & Black
2	Orange & Black
3	Yellow & Black
4	Purple & Black

5. Identify the first transformer's primary winding – this is the red/black flying lead fitted with a male connector. Plug the female connector removed in Step 4 into this. Note the pin and latch orientation – the connectors will only mate one way.

6. If configuring the zone output for 100 V-line operation, plug the transformer's secondary winding – the other flying lead (blue/mauve/white) - into the second **ZONE O/P** socket; this will be the one paired with the socket unplugged in Step 4, and closer to the **SPEAKER OUTPUTS** connector. These are: CON43 (Zone 1), CON44 (Zone 2), CON45 (Zone 3) and CON46 (Zone 4). Note that CON43 is orientated at 180° relative to the other three. See diagram below.

7. If configuring the zone output for 70 V-line operation, plug the transformer's other flying lead (blue/mauve/white) into the **ZONE O/P** connector vacated in Step 4.

8. For each zone being converted to 100/70V-line operation, enable the channel's 65 Hz hi-pass filter by moving the appropriate jumper from OFF to ON: these are J3 (Zone 1), J4 (Zone 2), J8 (Zone 3) and J9 (Zone 4). See page 30 for location of PCB jumpers.

9. Repeat Steps 3 to 8 for the other zones being converted.

10. Replace the cover.

Bypassing transformers in the 46-120T and 46-120TMEDIA

It may occasionally be necessary to revert one or more zone outputs of a 46-120T or 46-120TMEDIA to low-impedance operation. In this case, follow the procedure below:

1. Disconnect the 46-120 from the mains.

2. Remove the top cover (10 screws) and orient the unit with the rear panel towards you.

3. For the first zone being converted to low impedance operation, unplug the 4-pin female transformer secondary connector from its **ZONE O/P** socket on the main PCB immediately behind the rear panel **SPEAKER OUTPUTS** connector. See diagram below.

4. Unplug the transformer's 4-pin male primary winding connector from the zone output flying lead. Check it is for the correct zone - see table on page 28 for colour coding.

5. Plug the zone output flying lead into the **ZONE O/P** socket in the row further from the **SPEAKER OUTPUTS** connector These are: CON38 (Zone 1), CON39 (Zone 2), CON40 (Zone 3) and CON41 (Zone 4). See diagram below.

6. For each zone being reverted to low impedance operation, disable the channel's 65 Hz hi-pass filter by moving the appropriate jumper from ON to OFF: these are J3 (Zone 1), J4 (Zone 2), J8 (Zone 3) and J9 (Zone 4). See page 30 for location of PCB jumpers.

7. Repeat for the other zones being converted.

8. Replace the cover.
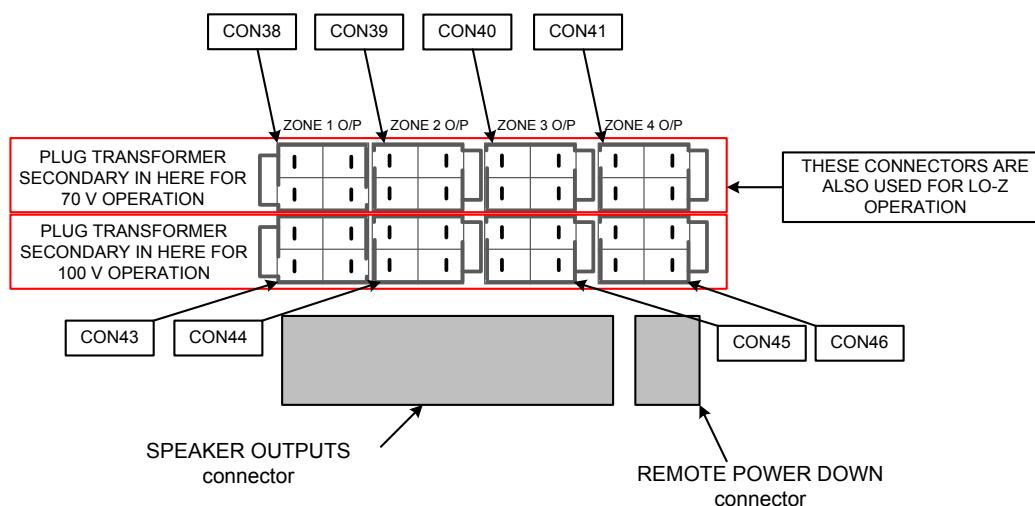
Fitting the EQ security cover

A security cover is supplied with the 46-120 which can be fitted to the front panel to prevent access to the Zone EQ preset controls. The **MIC LEVEL, MUSIC LEVEL** and **MUSIC SOURCE** controls remain accessible and the **CLIP** LED is still visible.

The panel is simply placed over the rotary control knobs and secured in place with the four M3 x 6 hex-head screws supplied.

APPENDIX

PCB jumper locations

The 46-50 has various internal jumpers, the setting of which may require alteration during installation. The diagram below shows the locations of the internal jumpers (not to scale) on the internal PCBs, and the table below lists each jumper and its purpose, together with the factory default setting.

Note that the 46-120 has three sub-boards in addition to the main PCB, which also carry one or more jumpers. The sub-boards are i) the line input sub-board (immediately behind the rear panel line input connectors, ii) the mic control sub-board and iii) the music control sub-board. Sub-boards ii) and iii) are mounted immediately behind the front panel rotary controls, and vertically stacked with the music control sub-board uppermost.

Most jumpers have two possible positions; the black square in the symbol indicates the default setting. If any jumpers need to be changed, turn the 46-120 off and disconnect it from the mains. Undo the 10 screws securing the top cover of the unit and remove it. Use a pair of small pliers to gently remove the jumpers from the PCB headers and reposition them as required. Refit the top cover using the original screws.

The main PCB diagram also shows the locations of the sockets for the optional loudspeaker EQ cards (CON2, CON3 & CON4), the connectors relevant to the CDI-46 Digital Interface card and the Zone output connectors .
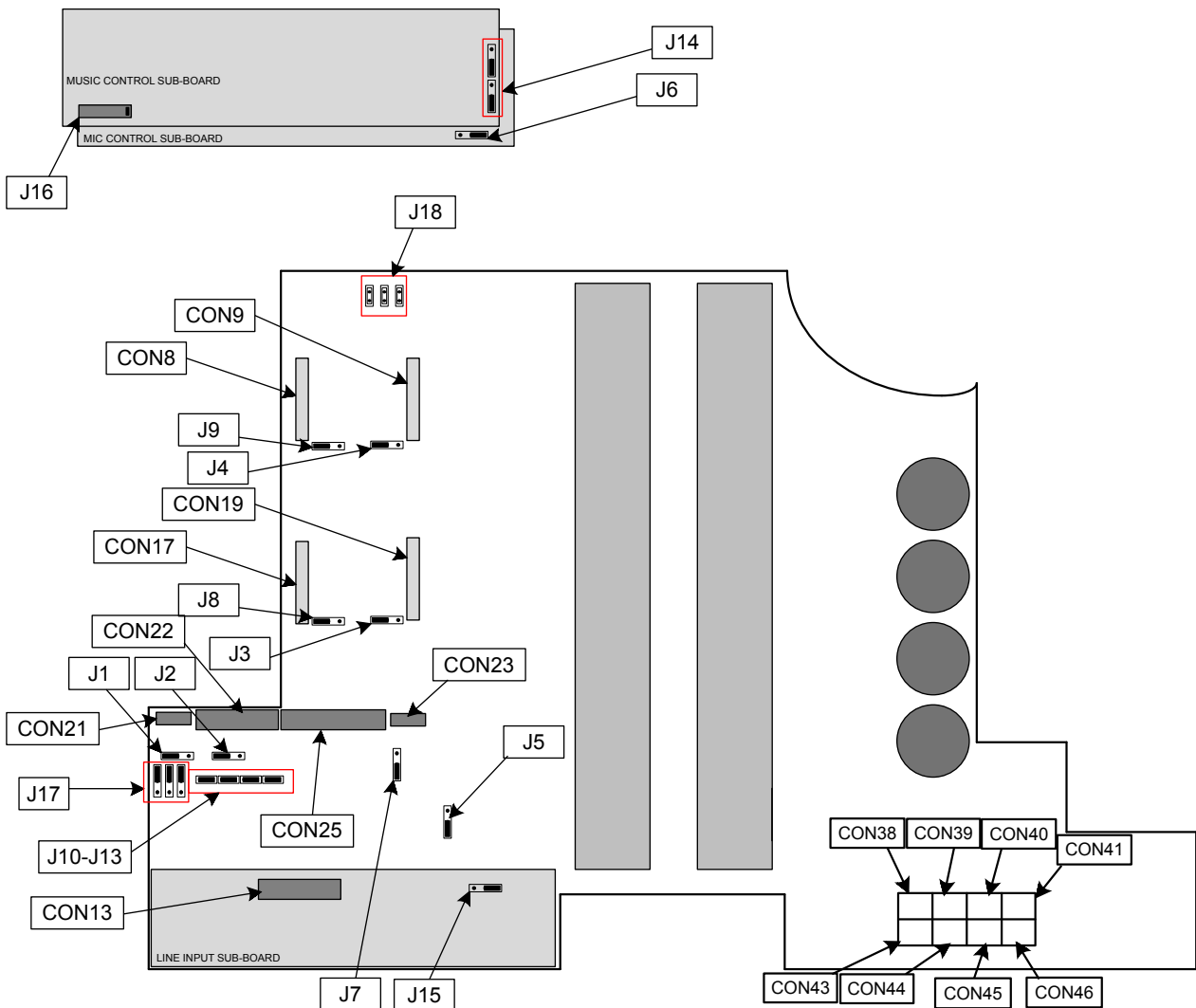
Table of internal jumpers and default settings

JUMPER	LOCATION	DESCRIPTION	EFFECT	DEFAULT
J1	Main board	Mic 1 phantom power	OFF: MIC 1 phantom power OFF ON: MIC 1 phantom power ON	OFF
J2	Main board	Mic 2 phantom power	OFF: MIC 2 phantom power OFF ON: MIC 2 phantom power ON	OFF
J3	Main board	Zone 1 65 Hz High Pass Filter	OFF: full frequency response ON: 65 Hz hi-pass filter enabled for Zone 1	OFF[1]
J4	Main board	Zone 2 65 Hz High Pass Filter	OFF: full frequency response ON: 65 Hz hi-pass filter enabled for Zone 2	OFF[1]
J5	Main board	NO/NC Mute contacts	N/O: contact closure required for muting N/C: contact opening required for muting	N/O
J6	Mic Control sub-board	Mic over music priority	OFF: No priority – mics mix with music ON: Music ducks when mics in use	ON
J7	Main board	Mic over Facility input priority	OFF: No priority ON: MIC 1 & 2 have VOX-triggered priority over signals at facility port	OFF
J8	Main board	Zone 3 65 Hz High Pass Filter	OFF: full frequency response ON: 65 Hz hi-pass filter enabled for Zone 3	OFF[1]
J9	Main board	Zone 4 65 Hz High Pass Filter	OFF: full frequency response ON: 65 Hz hi-pass filter enabled for Zone 4	OFF[1]
J10	Main board	Mic1, Zone 1 Access Bypass	PRESENT: Mic 1 has permanent access to Z1 ABSENT: Use access port to enable access to Z1	ON
J11	Main board	Mic1, Zone 2 Access Bypass	PRESENT: Mic 1 has permanent access to Z1 ABSENT: Use access port to enable access to Z2	ON
J12	Main board	Mic1, Zone 3 Access Bypass	PRESENT: Mic 1 has permanent access to Z1 ABSENT: Use access port to enable access to Z3	ON
J13	Main board	Mic1, Zone 4 Access Bypass	PRESENT: Mic 1 has permanent access to Z1 ABSENT: Use access port to enable access to Z4	ON
J14A, B[3]	Music Control sub-board	Zone 1 Line 6 priority	OFF: No priority ON: Line 6 has VOX-triggered priority over other sources in Zone 1	OFF
J15	Line input sub-board	Zone 1 Line 6 priority release time	3S: 3 seconds. release time 6S: 6 seconds release time ABSENT: 12 seconds release time	6S
J16	Music Control sub-board	MOH/Utility source select	L1: MOH/Utility output always Line 1 input L2: MOH/Utility output always Line 2 input L3: MOH/Utility output always Line 3 input L4: MOH/Utility output always Line 4 input L5: MOH/Utility output always Line 5 input L6: MOH/Utility output always Line 6 input MP3: L1: MOH/Utility output always media player[2] Z1: MOH/Utility output follows Zone 1 selection	Z1
J17A, B, C[3]	Main board	MIC 1/TEL input transformer	OFF: MIC 1 input accepts standard mics ON: MIC 1 input suitable for connection to telephone system	OFF
J18A, B, C	Main board	Auto Power down time	Binary weighting applies: see table at page 25.	OFF (APD disabled)

1. On models 46-120T and 46-120TMEDIA, default setting is ON.

2. Operative on Models 46-120MEDIA and 46-120TMEDIA only.

3. All jumpers in the set must be moved together.

PSU capability and optional device current consumption

In addition to supplying the Mixer Amplifier's circuitry, the internal PSU has the capacity to power some additional items which may form part of a complete system. These include LM-2 active remote input modules (via the Facility Port), loudspeaker EQ cards (fitted internally), and possibly a PM Series paging microphone (powered via an optional CDI-46 Digital Interface card).

The maximum current capacity of the PSU available for powering additional items is 250 mA. Individual device component limits are as follows:

- 150 mA for internal EQ cards

- 50 mA for LM-2s via the Facility Port

- 240 mA for PM Series paging mics via the **CDPM/PM** port

Current consumption of the various items is listed in the table below.

ITEM	CURRENT PER UNIT
LM-2 mic/line input module	25 mA
PM4 paging microphone	72 mA
PM8 paging microphone	83 mA
Loudspeaker EQ cards (each)	see note*

*Model-dependent. See separate datasheets at www.cloud.co.uk

The installer should ensure that the total current drawn by all the additional items in a system does not exceed 250 mA under any circumstances. If, for example 150 mA is needed by EQ cards and 25 mA by an LM-2, only 75 mA is available for a PM4 or PM8 paging microphone. If no EQ cards or fitted and there are no LM-2s in the system, then the full 250mA is available

⚠ Note that PSU performance – and hence current availability - will be degraded at ambient temperatures in excess of 35°C.

EMC considerations

The Cloud 46-120 fully conforms to the relevant electromagnetic compatibility (EMC) standards and is technically well behaved; you should experience no operational problems and under normal circumstances, no special precautions need to be taken. If the unit is to be used within close proximity to potential sources of HF disturbance such as high power communications transmitters, radar stations and the like, the performance of the mixing amplifier may be reduced; we suggest that the microphone cable screen be connected to the shell of the XLR type connector and the line input leads are kept as short as possible.

Ground loops

If, despite your best efforts, the completed sound system 'hums' you probably have a 'ground loop'. The offending signal source can often be identified by setting the volume control to minimum, then disconnecting the input leads (both left & right channels) on each line input until the 'hum' disappears. This problem is often caused by terminating a screened input cable into a signal source positioned a significant distance from the mixer. A good way of avoiding this potential problem is to use signal sources (typically 'consumer' equipment) that are double insulated with no connection to the mains supply earth. If a signal feed were derived from a second mixer (a club or microphone mixer for example) it would be perfectly normal to expect this to be earthed; we suggest that a transformer be used to isolate the signal and prevent a noisy loop (see page 14).

Technical specifications

Line Inputs	
Frequency Response	20 Hz to 20 kHz: +0/-0.5 dB
THD + N	0.04% @ 1 kHz; 22 kHz bandwidth
Sensitivity	195 mV (-12 dBu) to 2.0 V (+8 dBu)
Input gain control range	20 dB
Input Impedance	47 kohms
Headroom	17 dB
Noise	-90 dB rms; 22 kHz bandwidth
Equalisation	HF: ±10 dB @10 kHz; LF: ±10dB @ 50 Hz

Microphone Inputs	
Frequency Response	100 Hz -3 dB (fixed filter) to 20 kHz ±1 dB
Distortion	<0.03% @ 1 kHz, 80 kHz bandwidth
Gain Range	10 dB to 50 dB
Input Impedance	3.3 kohms (balanced)
Common mode rejection	70 dB typical
Headroom	17 dB
Noise	-127 dB EIN, 20 Hz to 22 kHz (R_s = 150 ohms)
Equalisation	HF: ±10 dB @ 5 kHz; LF: ±10 dB @ 100 Hz

Outputs		
Low Impedance Outputs	4 ohm load	120 W (170 W one channel driven) @ 1 kHz & 0.1% THD+N
	8 ohm load	85 W (100 W one channel driven) @ 1 kHz & 0.1% THD+N
	Frequency response	-1 dB @ 20 kHz, -0.5 dB @ 20 kHz
	Distortion	<0.04% @ 1 kHz, 80 kHz bandwidth
100/70 V-line output*	Min. load	70 V balanced – 42 ohm min. load
		100 V balanced – 83 ohm min. load
	Frequency response	-3 dB @ 65 Hz (filter), -2.5 dB @ 20 kHz
	Distortion	<0.06% @ 1 kHz, 80 kHz bandwidth

*with optional CXL-46T transformer(s)

General specifications

Amplifier protection		Dynamic Clip Protection, VI Limiting, DC Offset, thermal & switch-on delay	
Cooling		Variable speed DC fan (stationary in Idle Mode)	
Power input		230 V ±5% (115 V ±5% by internal connection)	
Fuse rating		230 V: T4A; 100/115 V: T8A	
Fuse type		20 mm x 5 mm HBC	
Power consumption (For thermal dissipation subtract power in the load)	External remote power-down	4.7 W	7.75 VA
	Idle – 4 chs. APD	13.4 W	16.75 VA
	Idle – 3 chs APD	16.3 W	20.5 VA
	Idle – 2 chs APD	19.2 W	24.9 VA
	Idle – 1 ch APD	22.2 W	29.4 VA
	Idle, all chs active	25.2 W	33.6 VA
	Noise input, 1/3 rated power, 4 ohms	440 W	560 VA
	Noise input, 1/3 rated power, 8 ohms	275 W	362 VA
	Noise input, 1/8 rated power, 4 ohms	280 W	370 VA
	Noise input, 1/8 rated power, 8 ohms	175 W	240 VA
Dimensions	Net	482.6 mm x 88 mm (2U) x 406.9 mm 19 in x 3.46 in (2U) x 16.02 in	
	Shipping	59.8 cm x 15.7 cm x 54.2 cm 23.5 in x 6.2 in x 21.3 in	
Weight	Net	46-120/46-120MEDIA: 11.75 kg (26.32 lbs) 46-120T/46-120TMEDIA: 15.75 kg (35.28 lbs)	
	Shipping	46-120/46-120MEDIA: 13.95 kg (31.25 lbs) 46-120T/46-120TMEDIA: 17.95 kg (40.21 lbs)	