

CAM-16

Audio Distribution Matrix

CAS-16

Audio Distribution Sub-Station



Installation and User Guide

Important Safety Instructions

WARNING:


To reduce the risk of fire or electric shock, do not expose this appliance to rain or moisture.


CAUTION:

Use of controls or adjustments or performance of procedures other than those specified may result in hazardous radiation exposure.




WARNING: SHOCK HAZARD - DO NOT OPEN
AVIS: RISQUE DE CHOC ÉLECTRIQUE - NE PAS OUVRIR

 The lightning flash with the arrowhead symbol within an equilateral triangle, is intended to alert you to the presence of uninsulated dangerous voltages within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

 The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Clean only with dry cloth.
6. Do not use this apparatus near water.
7. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
8. 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. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
9. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
10. Only use attachments/accessories specified by the manufacturer.
11. 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.
12. Unplug this apparatus during lightning storms or when unused for long periods of time.
13. 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.
14. No naked flames, such as lighted candles, should be placed on the apparatus.

 **WARNING:** Excessive sound pressure levels from earphones and headphones can cause hearing loss.

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Safety Information

Safety notes regarding installation

- Do not expose this 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 45°C
- The unit has no internal user adjustable parts. Do not remove any panel.
- Refer any servicing to qualified service personnel.
- Do not replace the power transformer with any other type

Conformities

The Cloud CAM-16 and CAS-16 conform to the following European EMC Standards:

BS EN 55103-1:2009

BS EN 55103-2:2009

These products have been tested for normal use in the commercial and light industrial environment. If the equipment 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 units may be degraded.

The Cloud CAM-16 and CAS-16 conform to the following European electrical safety standard:

BS EN 60065:2002

The power transformers for the Cloud CAM-16 and CAS-16 conform to the following standards:

Power transformer for the UK market:

BS EN60742 + BABT

Power transformer for the European market:

EN60742 + EN60950

Power transformer for USA and Canada:

C-UL Approved

Power supply information

The CAM-16 and CAS-16 are each shipped with a 15V AC, 1.25 A transformer. When powering the CAM-16 and CAS-16, please ensure that your local AC supply is within the range of voltages required by the adaptor **BEFORE** you plug it into the mains. We strongly recommend that you only use the supplied transformer.

When the power switches are in the off ('O') position, the CAM-16 and CAS-16 are disconnected from the power transformers.

CAUTION – Servicing

The unit contains no user serviceable parts. Refer servicing to qualified service personnel. Do not perform servicing unless you are qualified to do so. Disconnect the power cable from the unit before removing the top or bottom panel. Only reassemble the unit using bolts/screws identical to the original parts.

General Description

The Cloud CAM-16 is a headphone distribution matrix designed to provide headphone monitoring of up to eight stereo sound sources at up to sixteen remote locations. The CAM-16 has eight stereo line inputs and a balanced 'global' input with priority. A remote music mute facility is also provided, that may be used to satisfy the requirements of the Local Fire Officer.

Up to 16 RH-8 or WP-8 remote headphone stations can be connected to the CAM-16. Both are fitted with a headphone socket, rotary source selection switch and volume control. The RH-8 is a small, self-contained unit intended to be fitted to the framework of an exercise machine or to a flat surface. The WP-8 is a wall-mounting panel version, and fits a standard single-gang electrical back box, either flush or surface-mounting. The WP-8 also has the provision for connecting loudspeakers. Each headphone station is wired to one output of the CAM-16 using standard CAT-5 cable and RJ-45 connectors.

The CAS-16 Sub-Station provides the capacity for another sixteen RH-8 or WP-8 headphone stations. The CAM-16 can drive up to 15 CAS-16 units, allowing a maximum of 256 outputs. The CAM-16 and the sub-stations are 'daisy-chained' together, a multi-core cable being supplied with each unit for this purpose.

The only front panel control on either unit is the power switch. All input and output connectivity and gain controls are on the rear panels. The units are intended to be rack-mounted in a protected area, with only the headphone stations available to the users.

CAM-16 and CAS-16 main features

CAM-16:

- Stereo audio matrix with eight line inputs
- Outputs for sixteen headphone stations
- Global input with priority override
- Short-to-ground access port for global input
- Gain controls for all inputs
- LED signal level indicators for easy balancing of line inputs
- Output 16 also available as a balanced mono feed
- Music Mute control input for interface with emergency systems
- Connects to headphone stations via CAT-5 cable and RJ-45 connectors
- No front panel controls except power switch

CAS-16:

- Expansion unit for CAM-16
- Outputs for sixteen headphone stations
- No front panel controls except power switch

Applicable Models:

This manual describes the installation, wiring and set-up procedures for the CAM-16 Audio Distribution Matrix and the CAS-16 Sub-Station. Both the CAM-16 and CAS-16 require RH-8 and/or WP-8 headphone stations to realise a functional system; installation instructions for these are included with each headphone station.

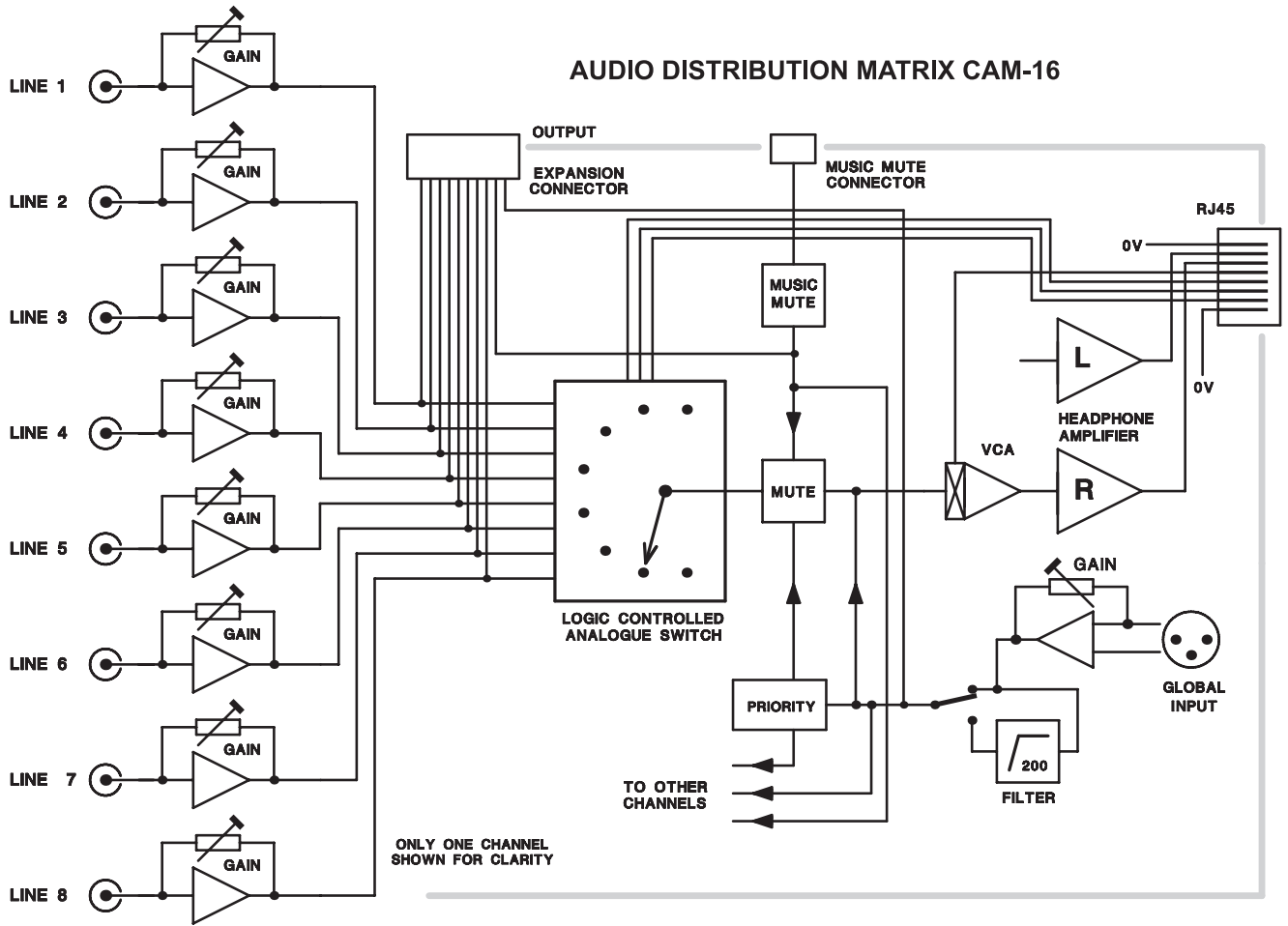
What's in the Box

Please check the shipping carton for damage before opening. If there is damage, please contact your Cloud agent and the shippers.

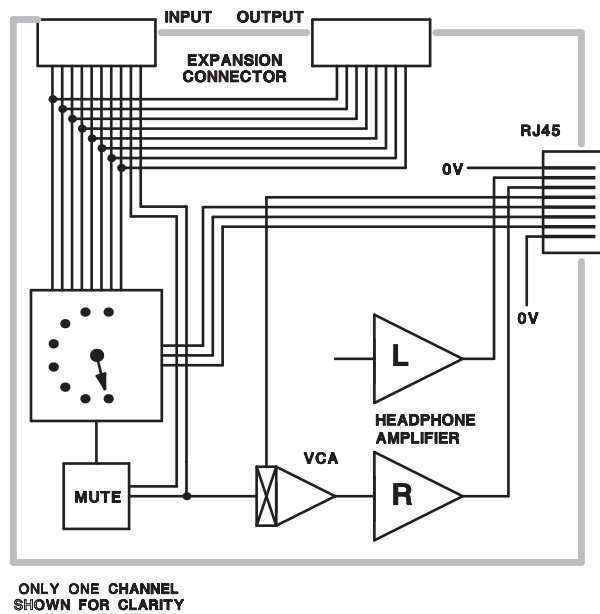
The packing carton should contain the following items:

- CAM-16 or CAS-16 unit
- AC mains adaptor (transformer)
- Set of mating plug-in screw-terminal connectors (CAM-16 only)
- 25-pin Dsub multicore expansion cable, 350 mm, male-to-female (CAS-16 only)
- This manual

Block Diagrams



AUDIO DISTRIBUTION SUB-STATION CAS-16

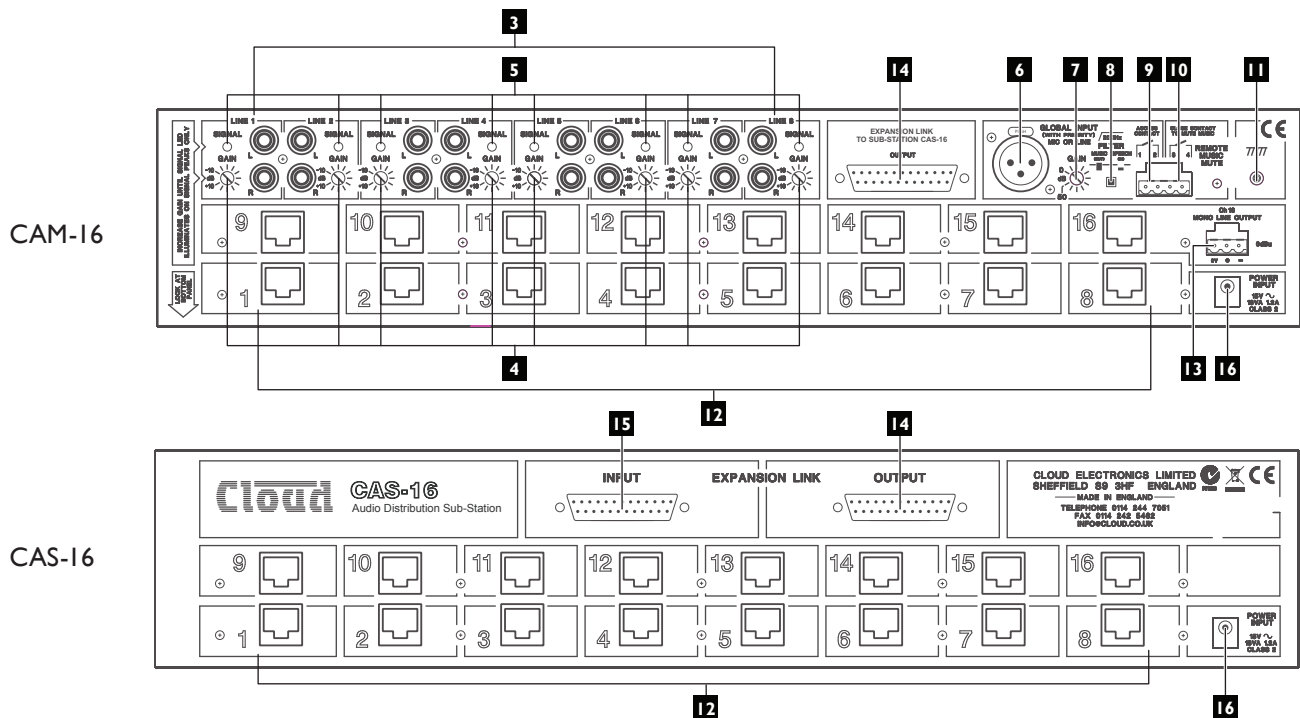


Front panel descriptions



1. Power switch with integral LED
2. Ventilation grille

Rear panel descriptions



3. LINE 1 to LINE 8 – stereo line inputs for music sources (phono sockets)*
4. GAIN 1 to GAIN 8 – level trims for each line input*
5. SIGNAL 1 to SIGNAL 8 - LEDs to aid gain setting of line inputs*
6. GLOBAL INPUT – mic or line level input routes to all outputs with priority*
7. GAIN – Global Input gain adjustment*
8. FILTER – in/out switch for hi-pass filter (200 Hz) in Global Input signal path*
9. ACCESS – short pins together to enable Global Input*
10. REMOTE MUSIC MUTE – short pins together to mute all music sources*
11. Earth (Ground) binding post*
12. OUTPUT 1 to OUTPUT 16 – RJ45 sockets for connection of headphone stations
13. CH16 MONO LINE OUT – balanced mono output for external amplifier and speakers*
14. EXPANSION LINK OUTPUT – daisy-chain output to first (or next) CAS-16
15. EXPANSION LINK INPUT – daisy-chain input from CAM-16 (or previous CAS-16)**
16. POWER INPUT – connects to supplied AC mains transformer

* these items only fitted to CAM-16 ** this item only fitted to CAS-16

Installation

Mechanical

Both the CAM-16 and CAS-16 are suitable for mounting in a standard 19" equipment rack. Each occupies two units of rack space (2U). The units are 170 mm deep, but the rack should have at least 235 mm of depth available to permit clearance of the rear panel connectors. Wherever possible, avoid positioning the units in close proximity to strong magnetic fields or equipment which may operate at a high temperature (e.g., high-power amplifiers).

The CAM-16 and CAS-16 are both convection-cooled and generate no significant heat. Apart from observing the guideline above (re hot-running equipment), no special provision for ventilation need be made. However, note that it is good practice not to enclose any rack containing electronic equipment in an enclosed or sealed space, such as a cupboard.

Connections and adjustments

Power supply

Both the CAM-16 and CAS-16 operate from external in-line transformers, which are supplied with each unit. The transformer outputs are in the form of a flying lead terminated with a 2.2 mm coaxial connector. Plug this into the POWER INPUT socket **16** on the rear of the unit. Plug the transformers into a suitably positioned AC power socket within the rack.

Only use the in-line transformers supplied with the units. Only use one transformer per unit – do not attempt to wire multiple units to a single transformer.

Line inputs

The CAM-16 has eight stereo line inputs; these are suitable for most music sources such as CD and DVD players, TV receivers, MP3 players, music servers, etc. All the inputs are unbalanced and use phono (RCA) sockets **3**. The input impedance is 47k ohms. If possible, install the music sources in the same rack so that the length of the connecting cables is as short as possible.

Sensitivity and gain adjustments

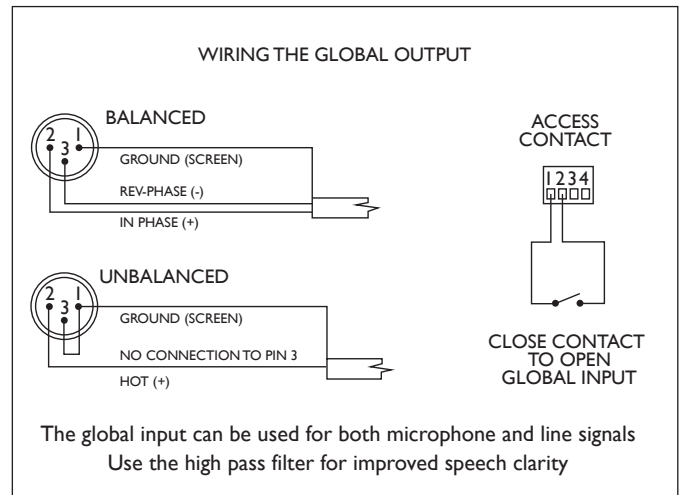
Each line input has a preset gain control **4** on the rear panel, adjacent to the respective input. The input sensitivity can be varied from -14 dBu (155 mV) to +6 dBu (1.55 V). The gain of each input should be set using the SIGNAL LED **5**. With the music sources playing, increase the gain control from the fully anti-clockwise position until the LED illuminates briefly on signal peaks. Repeat this process for the other inputs in use. This process ensures that all the inputs are at roughly the same level in the matrix, and there will be no irritating change in headphone volume when switching between sources. Do not increase the gain further as this may result in a distorted signal when the RH-8 or WP-8 volume control is set to maximum.

Global input

A 'global' microphone/line input is provided to permit system-wide paging, announcements or emergency messages. The global signal is routed to all headphone amplifiers with automatic priority over the music signal.

The input stage is electronically-balanced, and configured for optimum noise performance. The global signal is mixed into the signal path before the volume control stage, so that announcements are heard at the user-set level. The input impedance is 5k ohms and is suitable for 600 ohm microphones and general line level signals. The input connector is a standard XLR3F, located on the rear panel **6**.

The global input is compatible with general purpose paging microphones fitted with a 'push-to-talk' switch, or open-collector 'mic active' output, which should be connected to the Access Input **9**. To enable the global input, the two pins of the Access Input should be shorted together. If the input is to be used for purposes other than paging, it will be necessary to permanently link pins 1 and 2 on the 4-way screw-terminal connector to make the input continuously active. (Note that pins 3 and 4 of this connector are concerned with the separate Remote Music Mute function – see "Remote Music Mute" on page 9).



Note that if feeding the global input from an unbalanced source, pins 1 and 3 should be linked on the mating XLR plug as shown above.

Gain control

A gain control of the preset type **7** is located next to the input socket. The gain range is 0 to 50 dB. This range allows direct connection of both microphones and units with line level outputs (such as radio mic receivers) without the need for additional attenuation. A high overload margin is maintained at all gain settings.

Hi-pass filter

A switchable high-pass filter **8** is provided for the global input; this can help improve speech intelligibility with paging mics by attenuating breath blasts and low frequency handling noise. The filter has a -3 dB frequency of 200 Hz and a slope of 18 dB/octave. If the global input is used for music, the filter should be switched 'out'.

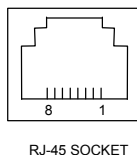
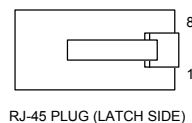
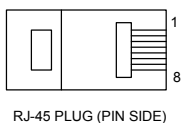
Priority

The global input includes an automatic priority circuit to ensure that it always has priority over all music sources. When a signal is detected at the global input, all music signals are attenuated by approximately 30 dB; once the global input stops, the music levels smoothly restore to their former levels.

Outputs 1 to 16

RH-8 and/or WP-8 headphone stations should be connected as required to Outputs 1 to 16 **12**, using standard IT industry CAT-5 UTP cable and RJ45 connectors. Pre-made CAT-5 patch cables may be used if they are available in adequate lengths. Otherwise, use unterminated CAT-5 cable, and wire the RJ-45 plugs as shown below:

PIN	CAT-5 CORE
1	White + Orange
2	Orange
3	White + Green
4	Blue
5	White + Blue
6	Green
7	White + Brown
8	Brown



The total cable length from a headphone station to the CAM-16 should not exceed 100 m (328 ft).

See the Installation Guides supplied with the RH-8 and/or WP-8 headphone stations for additional connection information.

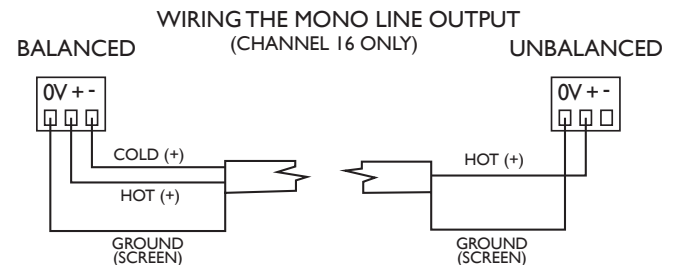
Balanced Line Output (CAM-16 Output 16 only)

A mono sum of the signal at Output 16 of the CAM-16 is available as a balanced line level output on a 3-pin 5 mm-pitch screw terminal connector **13**.

This may be used to provide a signal for a separate sound system using an external amplifier and loudspeakers. A headphone station will still need to be connected to Output 16, and we recommend that a WP-8 is wall mounted in a convenient location in the area covered by the loudspeakers.

The WP-8's volume control and source selector can then be used to control the signal fed to the external system. Do not plug headphones into a WP-8 being used for this purpose.

The nominal output level is 0 dBu (775 mV). To connect to a balanced input (typically a professional amplifier with XLR inputs), use 2-core screened cable. Single-core screened cable may be used if connecting to an unbalanced input (typically a 'hi-fi' amplifier with phono sockets). Wire the output connector as shown below.



Remote Music Mute

In public and commercial premises, it is often necessary to ensure that any background music – via either speakers or headphones – is muted when an emergency arises. In most territories, the Local Authority or Fire Service make this a legal requirement. The Remote Music Mute input on the CAM-16 allows an external system (typically BMS or Fire Control) to mute all music signals throughout the whole system.

The input uses pins 3 and 4 of the 4-pin 5 mm-pitch screw-terminal connector **10**; these pins should be connected to a set of NO (Normally Open) relay contacts in the external system. (Note that pins 1 and 2 of this connector are concerned with the separate Global Input Access function – see “Global input” on page 8). The two-wire connection should not be connected to any other circuit or voltage. In many cases, the fire alarm installation company will provide an auxiliary relay located close to the sound equipment rack. The global input continues to operate normally when the music mute is active, to permit evacuation announcements to be made.

The CAS-16 Sub-Station

If the system being installed requires more than 16 headphone stations, one or more CAS-16 Audio Distribution Sub-Stations will be needed. Each CAS-16 provides 16 further outputs, and up to 15 CAS-16s may be connected, giving a maximum system capability of 256 headphone stations.

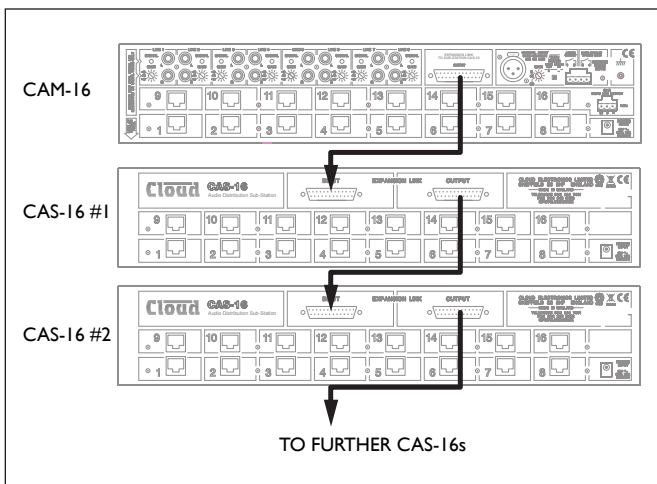
CAS-16s should always be fitted in the same rack as the CAM-16 forming the system's base unit. See note below regarding interconnecting cables.

The CAS-16 has no controls other than the front panel power on/off switch. Like the CAM-16, each unit is supplied with an external in-line type mains transformer, and only this transformer should be used.

Connecting the CAS-16

Each CAS-16 is shipped with a multicore cable terminated with 25-pin Dsub connectors, male-to-female. Plug the male connector into the Expansion Link Output **14** on the rear panel of the CAM-16, and the female connector into the Expansion Link Input **15** on the rear of the CAS-16. Tighten all the locking screws.

If the system needs more than one CAS-16 (i.e., more than 32 headphone stations are required), simply “daisy-chain” the additional CAS-16(s) in the same manner, by connecting the Expansion Link Output of one to the Expansion Link Input of the next, using the multicore cables provided in each case.



Only the multicore cable supplied with each CAS-16 should be used for interconnecting a CAM-16 and a CAS-16, or two CAS-16s. Do not attempt to locate a CAS-16 remotely from its CAM-16 base unit, or from other CAS-16s in the system, by the use of a longer cable.

Outputs

Each of the CAS-16’s outputs is identical to the headphone outputs on the CAM-16, and may be wired to headphone stations in exactly the same way. See “Outputs 1 to 16” on page 9, and also refer to the manuals supplied with the RH-8 and WP-8 headphone stations.

Chassis Ground Terminal

The rear panel of the CAM-16 is fitted with an Earth (Ground) binding post **11**. This is provided for protection purposes; the CAM-16 will normally be connected to a number of different consumer-type sources - TV sets, radio receivers, satellite receivers, etc., and grounding the CAM-16 is a safety measure to protect the users of the system. The terminal should be connected to a convenient earth point in the rack’s mains distribution system.

Appendix

EMC considerations

The CAM-16 Audio Distribution Matrix and CAS-16 Audio Distribution Sub-Station fully conform to the relevant electromagnetic compatibility (EMC) standards and are technically well behaved. You should experience no problems interfacing units to other items of equipment and under normal circumstances, no special precautions need to be taken. If the unit is to be used in close proximity to potential sources of HF disturbance such as high power communication transmitters, radar stations and the like, it is suggested that input signal leads be kept as short as possible. If the CAM-16 is mounted in a 19” rack, do not locate the unit in close proximity to a powerful amplifier of any kind, which may radiate a strong magnetic field from the power transformer.

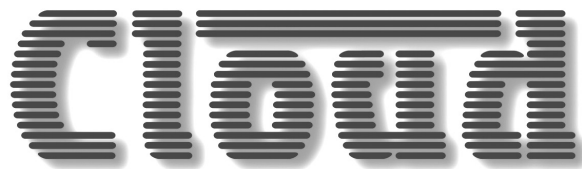
Earthing

When several mains powered units are connected together via their signal cables, there is a risk of one or more earth loops, which may cause an audible hum on the system even with the gain controls set to minimum. The 0V rail of a CAM-16 is directly coupled to the chassis ground. No interconnection problems should be encountered, but if there is any hum or other extraneous noise when source equipment is connected, the situation can generally be remedied by observing the following guidelines:

- Always connect sources using balanced connections wherever possible. Note that, for EMC reasons, the cable screen should be connected at both ends.
- Use audio isolating transformers (readily available from trade suppliers) at the inputs if necessary. These will ensure that the amplifier is electrically isolated from the source equipment.
- The signal source units should be located as close as possible to the CAM-16 and the metal housing of the various units should not be electrically connected together through the equipment rack. If this is a problem, rack isolating kits are available from specialist hardware suppliers. If the problem persists, try to connect all interconnected units, including power amplifiers to a common power source to ensure a common ground is provided.

Technical Specifications

		CAM-16	CAS-16
Line Inputs	Frequency response	20 Hz – 20 kHz ± 0.5 dB	
	Input level	-14 dBu (155 mV) to +6 dBu (1.55 V)	
	Input impedance	47k ohms	
	Input gain range	20 dB	
	Input level indicator	LED – illuminates above a fixed threshold	
	Input connector	2 x RCA phono jack (stereo)	
Global Input	Frequency response	20 Hz – 20 kHz ± 1 dB	
	High pass filter	-3 dB @ 200 Hz – 18 dB/oct (with in/out switch)	
	Gain range	0 dB to 50 dB	
	Input impedance	5k ohms	
	CMR	>70 dB @ 1 kHz	
	Access contact	Channel off/on by closing contact	
Line Output Channel 16	Nominal output level	0 dBu (775 mV)	
	Minimum load	600 ohms	
Headphone Output via RH-8 or WP-8	Nominal output level	100 mW per channel with 32 ohm load	
	Optimum load impedance	32 ohms	
	Recommended headphones	Cloud CP32	
Speaker Output via WP-8	Nominal output level	150 mW per channel with 8 ohm load	
	Optimum load impedance	>8 ohms	
Other	Power consumption	25 VA with approved external transformer	20 VA with approved external transformer
	Width	482.6 mm (19.0")	
	Height	88.0 mm (3.50") – 2U	
	Depth	170.0 mm (6.70") + connectors	
	Weight	4.0 kg net	3.3 kg
PSU	Output	15 V AC 1.25 A 18.5 VA	
	Weight	0.52 kg net	



Cloud Electronics Limited
140 Staniforth Road
Sheffield S9 3HF
England
Tel: +44 (0)114 244 7051
Fax: +44 (0)114 242 5462
email: info@cloud.co.uk
web: www.cloud.co.uk