CLEAR-COM ECLIPSE

AES-6 DIGITAL INTERFACE

INSTRUCTION MANUAL

AES-6 Digital Interface Instruction Manual

Part Number 810383Z Rev. 2

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IMPORTANT SAFETY INSTRUCTIONS

Please read and follow these instructions before operating this product.

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 dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as a radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Only use attachments/accessories specified by the manufacturer.
10. 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.
11. Unplug this apparatus during lightning storms or when unused for long periods of time.
12. 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.
13. **WARNING:** To reduce the risk of fire or electric shock, do not expose this product to rain or moisture.

Please familiarize yourself with the safety symbols in Figure 1. When you see these symbols on this product, they warn you of the potential danger of electric shock if the station is used improperly. They also refer you to important operating and maintenance instructions in the manual.

This symbol alerts you to the presence of uninsulated dangerous voltage within the product's enclosure that might be of sufficient magnitude to constitute a risk of electric shock. Do not open the product's case.

This symbol informs you that important operating and maintenance instructions are included in the literature accompanying this product.

Figure 1: Safety Symbols

EMC AND SAFETY

The GPI-6 General Purpose Inputs Interface meets all relevant CE and FCC specifications set out below:

EN55103-1 Electromagnetic compatibility. Product family standard for audio, video, audio-visual, and entertainment lighting control apparatus for professional use. Part 1: Emissions.

EN55103-2 Electromagnetic compatibility. Product family standard for audio, video, audio-visual, and entertainment lighting control apparatus for professional use. Part 2: Immunity.

And thereby compliance with the requirement of Electromagnetic Compatibility Directive 2004/108/EC and Low Voltage Directive 2006/95/EC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

OPERATION

INTRODUCTION

This chapter describes how to use the AES-6 Digital Interface. You can use this chapter once the Eclipse matrix system has been correctly installed and configured with the Eclipse Configuration System. To configure an Eclipse system with AES-6 interfaces Eclipse Configuration System (ECS) software V4.2 or later is required.

Some of the facilities described in this manual require the AES-6 to be running Eclipse V5.0 or later firmware.

For information on configuring the AES-6 please refer to Chapter 2 “Installation”.

DESCRIPTION

The AES-6 digital interface consists of a front card with indicators for power, status and connectivity and four DIP switches for configuration. A 3.5mm jack socket for software update and a recessed reset button are also present on the front card. Two rear cards also form part of the AES-6 digital interface; the AES-6-RJ and the AES-6-CX. The AES-6-RJ rear card provides twelve RJ-45 ports and the AES-6-CX rear card provides six RJ-45 ports and six BNC ports. Each rear card requires a separate AES-6 front card.

The AES-6-RJ rear card is used to connect up to six AES sources with RJ45 interfaces to an Eclipse system using CAT5 cable.

The AES-6-CX rear card is used to provide up to six mono connections between digital panels fitted with coax interfaces and an Eclipse system. Coax cable is used from the panel to the AES-6-CX and CAT5 cable from the AES-6-CX to the Eclipse matrix card. Only V-Series panels fitted with the AES-3 options card and Eclipse 4000 panels fitted with the PDE4536 options card are supported by AES-6. Digital ICS panels (designated by “T” number) such as the ICS-52T and ICS-92T are not supported by the AES-6 interface.

The AES-6 front card will auto-detect the type of rear card fitted and adapt to driving a panel interface or 3rd party interface accordingly.

The AES-6 interface will also automatically detect whether a 96KHz AES data stream is being received or a data stream at 48KHz or lower and adjust the codecs transparently.

Figure 1-1: AES-6 Digital Interface Cards

The AES-6 digital interface occupies one slot in an IMF-3 or IMF-102 interface module frame or a Median matrix. Connections to the Eclipse matrix are via 8-pin RJ-45 connectors on the rear panel. Connections to the panel may either be via RJ-45 and CAT5 cable or BNC and coax cable depending on the rear card fitted.

OPERATION

In normal use, the AES-6 digital interface does not require operator interaction. The front panel features CPU and port status indicators, switches to set stereo feeds, a power indicator LED, a port for connecting to a PC and a recessed reset switch.

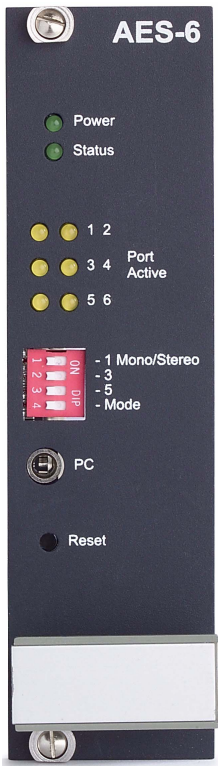

Figure 1-2: AES-6 Front Interface Card

POWER LED

The green power indicator LED lights when DC power is supplied to the interface. The interface is powered by the interface rack or Median matrix.

STATUS LED

The green status LED indicates CPU activity on the card. This LED will indicate if the card CPU is functioning correctly. The status LED flash modes are:

CPU STATUS LED STATE	MEANING
Off	Card software failed to boot
Slow flash (approx 1Hz) 50:50	Software is running OK
Quick blink flash (approx 1Hz) 25:75	FPGA image download in progress
Fast flash (approx 5Hz) 50:50	Software has detected a hardware failure.

Table 1-1: CPU Status Codes

Note: The flash ratios in the table are the mark/space ratio for the LED flashing.

If the FPGA image fails during card bootup the FPGA image will be erased and the AES-6 will prompt for a new FPGA image to be downloaded by switching the CPU status LED and all six ports LEDs to quick blink mode.

During a FPGA download the six port LEDs will flash in a rotating display with one LED lit at a time until the download stops. The sequence (by port number) is 2-4-6-5-3-1. When the flash programming is complete the AES6 card will reboot.

Hardware errors are indicated by the CPU LED flashing rapidly together with various port LEDs which constitute the fault code. The current fault codes are given in the table below.

CPU LED	CODE	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6	MEANING
Flash	1	Flash	Off	Off	Off	Off	Off	RAM test fail
Flash	2	Off	Flash	Off	Off	Off	Off	Corrupt Code Image
Flash	3	Flash	Flash	Off	Off	Off	Off	FPGA Flash Erase Fail
Flash	4	Off	Off	Flash	Off	Off	Off	FPGA Load Fail
Flash	5	Flash	Off	Flash	Off	Off	Off	FPGA Test Fail
Flash	6	Off	Flash	Flash	Off	Off	Off	UART Check Fail
Flash	7	Flash	Flash	Flash	Off	Off	Off	UART Local Loop Fail
Flash	8	Off	Off	Off	Flash	Off	Off	Not Used
Flash	:	Flash	Flash	Off	Flash	Off	Off	Not Used
Flash	63	Flash	Flash	Flash	Flash	Flash	Flash	FPGA Image missing, waiting for download

Table 1-2: AES-6 Hardware Fault Codes

PANEL CONNECTIVITY

The amber port status LEDs on the front panel display the connection status of each port on the rear card. If a panel connection is detected on a port the status LED for that port lights continuously.

In mono mode each LED shows the status of the port as described in Table 1-3. In stereo mode the LEDs operate in pairs reflecting the pairing of the ports. The first LED in each pair (LED 1,3 and 5) provides the connection status for the primary channel as described for mono mode (Table 1-3) while the second LED in the pair will flash at 1Hz with a mark:space ratio of 25:75 indicating that the port is in stereo mode. This will occur as a result of the DIP switch setting rather than a connection and the LED will flash even if nothing is connected to the primary port.

LED STATE (PORTS 1-6)	PANEL MODE USAGE	THIRD PARTY USAGE
Off	No panel connected or panel failed	No equipment connected or equipment failed
On	Panel connected OK	AES source connected
Flash 1Hz	Panel connected but no matrix connection	Third party mode selected, no AES connection
Fast Flash	Fault, see table Table 1-1	96K detected
LED1 = primary status LED2=Flash	Stereo mode Primary Channel status as above Secondary channel flash 1Hz 25:75	Stereo mode Primary Channel status as above Secondary channel flash 1Hz 25:75

Table 1-3: Part Status LEDs

PORT CONFIGURATION SWITCHES

There are four DIP switches for port configuration on the front panel of the AES-6 interface (Figure 1-2). Three of the DIP switches configure the rear card ports between mono and stereo modes. The fourth DIP switch (Mode) is used to configure the card for either Clear-Com panels (OFF) or third party equipment (ON).

An AES-6 interface can only be configured for either Clear-Com panels or third party equipment; Clear-Com panels and third party equipment cannot be mixed on a single AES-6 interface.

Each of the first three DIP switches corresponds to a pair of ports on the rear card which may be set up as two monaural audio ports (OFF) or a single stereo port (ON). When a DIP switch is set for stereo mode the first port in the pair acts as the primary channel while the second port acts as the secondary channel and the port LED will flash to indicate this. The possible DIP switch settings are shown in Figure 1-3 and Figure 1-4.

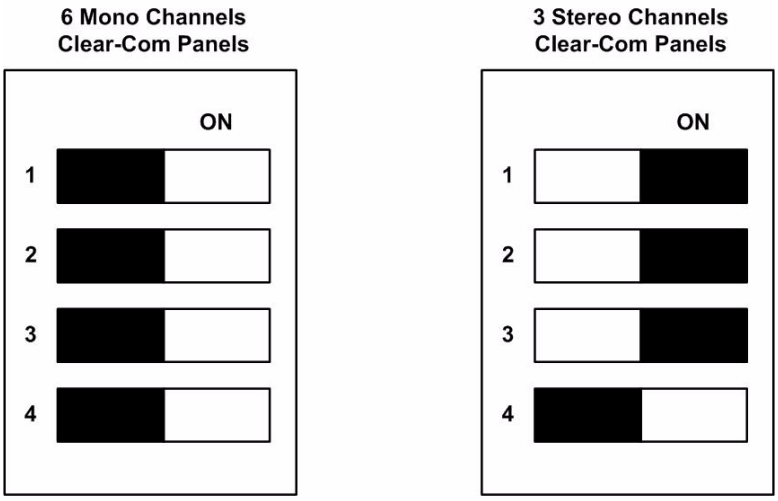

Figure 1-3: AES-6 DIP Switch Settings for Clear-Com Panels

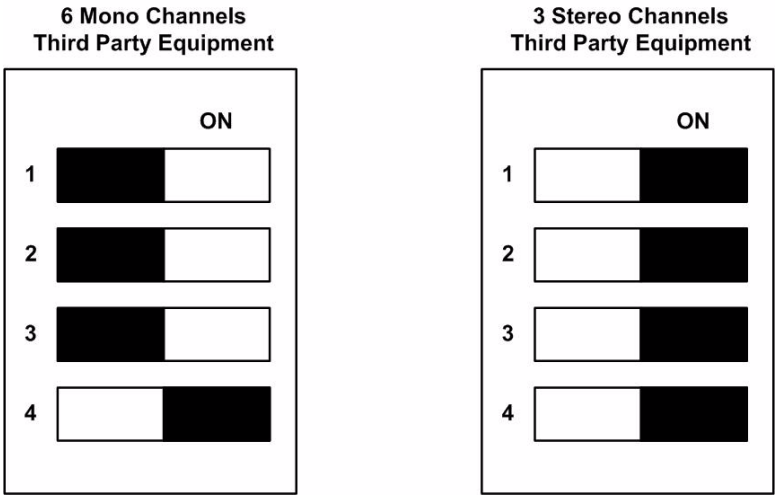

Figure 1-4: AES-6 DIP Switch Settings for Third Party Equipment

DATA PORT

The data port is a 3.5mm jack socket allowing the AES-6 to be connected to a PC for software/diagnostics download. To connect to a PC a PD4007 download cable is required.

RESET BUTTON

The reset button is behind a hole in the front panel to prevent it being accidentally pressed. To press the reset button insert a narrow rod or stiff piece of wire such as a paper clip through the hole to press the reset button.

2 INSTALLATION

INTRODUCTION

This chapter describes the installation of the AES-6 digital interface, including setting DIP switches and wiring to external devices.

INSTALLATION IN INTERFACE FRAME

To install the AES-6 digital interface module in the IMF-3 or IMF-102 interface frame or Eclipse Median:

1. Select a slot in which to install the interface.
2. Remove the blank plate covering the slot.
3. Slide the AES-6 front card in the front slot and ensure that the card is fully seated.
4. Select the required AES-6 rear card and slide it into the rear slot corresponding to the AES-6 front card and ensure that the card is fully seated.
5. Tighten the AES-6 front panel mounting screws.
6. Tighten the AES-6 rear panel mounting screws.

Note: When hot-plugging any other card in the IMF-3 interface frame all AES-6 cards in the interface frame should be reset to ensure correct operation.

CONNECTING THE REAR CARDS

The rear card connections will depend on the type of rear card fitted and the type of panel or audio link required.

AES-6-CX INTERFACE CARD

The BNC interface rear card provides six RJ-45 ports for connection to an Eclipse matrix and six BNC ports for connection to 4000 Series II panels fitted with the PDE4536B interface option, V-Series main panels fitted with the AES-3 interface option or third party equipment. These cards may be configured for monaural or stereo use. The 4000 Series II panel types supported by this card are:

- 4224E
- 4215E
- 4226E
- 4294E
- 4212E

- 4222E

The V-Series panel types supported by this card are:

- V12LD
- V12PD
- V24LD
- V24PD
- V12LDD

This card is for use with installation where the data connections to the 4000 Series II and V-Series panels or third party equipment are made using coaxial cable rather than CAT5 cable. Each audio source is connected to a BNC port on the card and the corresponding RJ-45 port is connected to a port on a matrix serial port. All format conversion between the 4000 Series II or V-Series panel and the matrix is carried out by the AES-6 card.

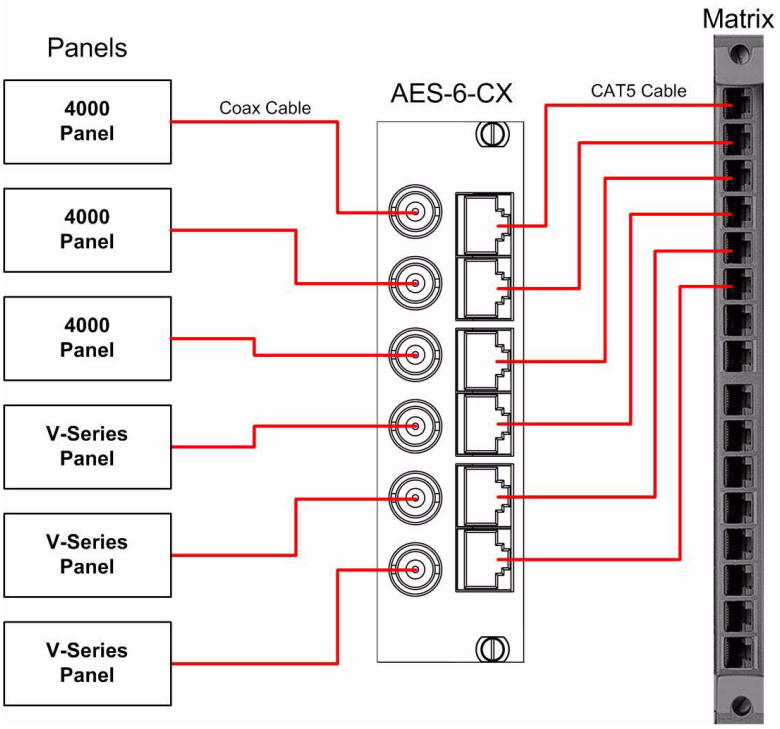

Figure 2-5: AES-6-CX Card Connected for Mono

For stereo use i.e. separate left and right ear audio streams only half the BNC ports can be used with the panels being connected to alternate BNC ports. For each stereo BNC connection two RJ-45 matrix connections are required which must be specially configured in

ECS. Currently it is required that the pair of matrix ports comprising a single stereo channel must be adjacent ports.

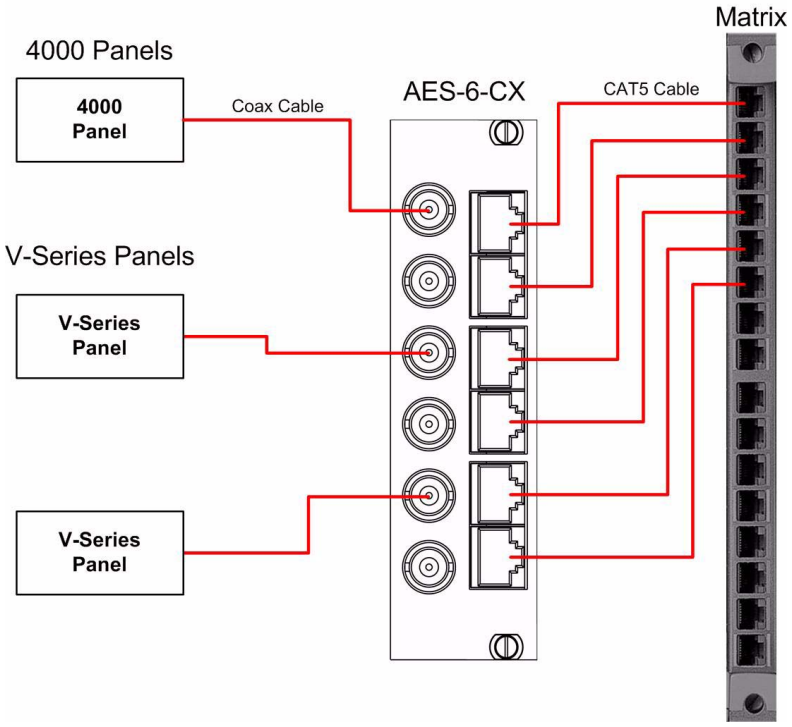

Figure 2-6: AES-6-CX Card Connected for Stereo

For each BNC port to be connected in stereo mode the front DIP switch must be set to the 'ON' position.

An example of the type of panel that could be used with the AES-6-CX card in either mono or stereo mode is the Clear-Com 4222E panel.

AES-6-RJ INTERFACE CARD

The AES-6-RJ rear card has six pairs of RJ-45 ports allowing 4000 Series II panels, V-Series panels with an AES-3 interface and third party equipment to be connected using CAT5 cable. The third party equipment may be of any compatible type that provides a digital interface. These cards may be configured for monaural or stereo use.

Mono Configuration

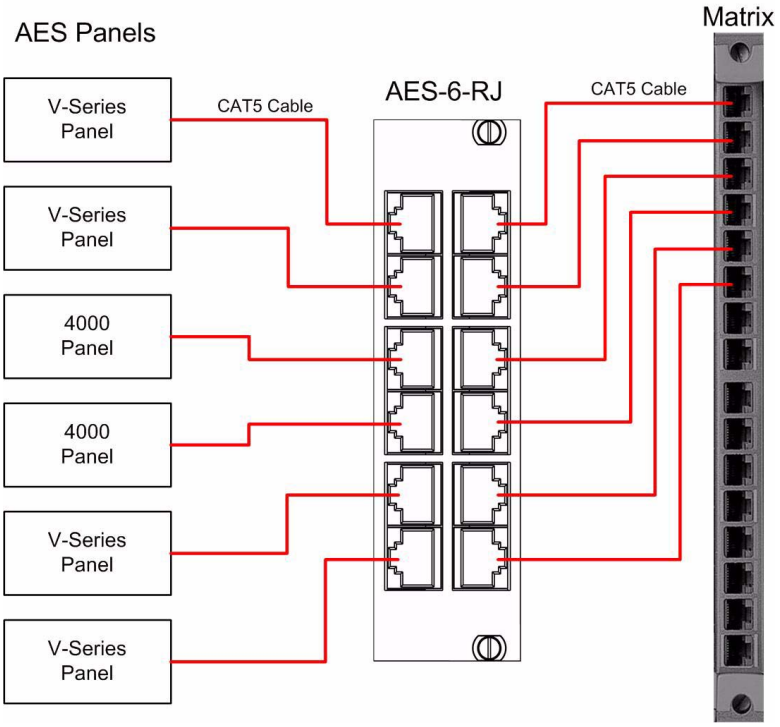

Figure 2-7: AES-6-RJ Connected for Mono Panels

For AES-6-RJ connected panels standard straight through CAT5 cable may be used to connect panels to the AES-6 interface and the AES-6 interface to the matrix.

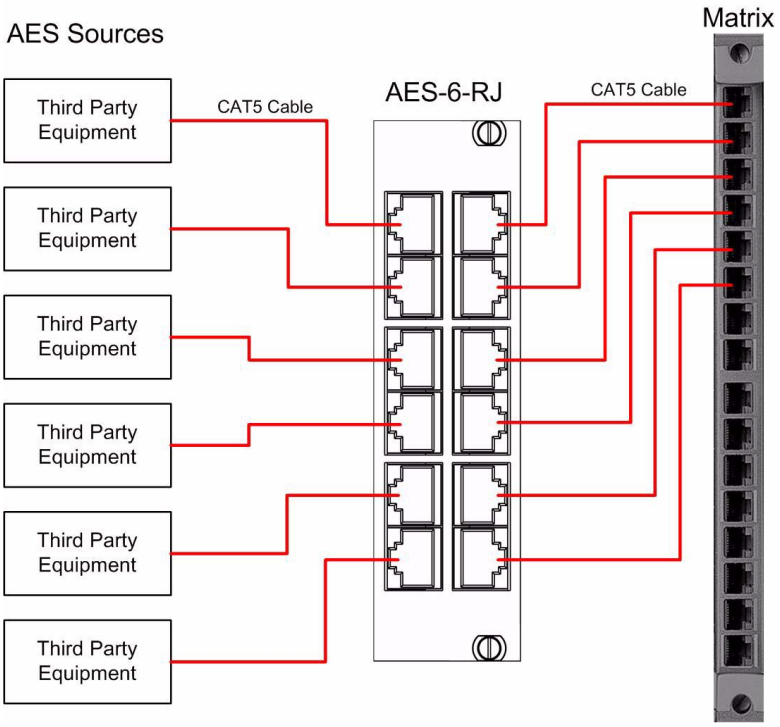

Figure 2-8: AES-6-RJ Connected for Mono Third Party Equipment

When a matrix port is connected to an AES-6 interface for audio only operation the matrix port should be configured as “AES Mono” in ECS (Setup Matrix Hardware).

Stereo Configuration

For stereo use i.e. separate left and right ear audio streams only half the RJ45 ports can be used with the sources being connected to alternate ports. For each stereo RJ45 connection two RJ-45 matrix connections are required which must be specially configured in ECS. Currently it is required that the pair of ports comprising a single stereo channel must be adjacent ports. The first port of the pair must be configured as a V-Series or 4000 Series panel and the second port must be configured as type “Panel Aux”.

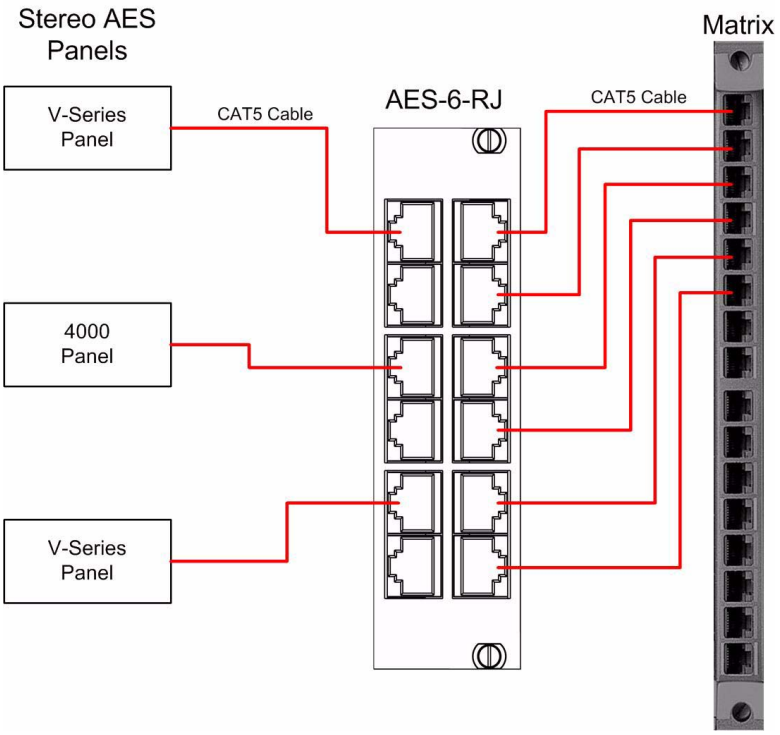

Figure 2-9: AES-6-RJ Connected for Stereo Panels

When operating in stereo mode the matrix will send two audio streams to the panel consisting on the main intercom audio and auxiliary audio. The panel will return the panel microphone audio to the matrix.

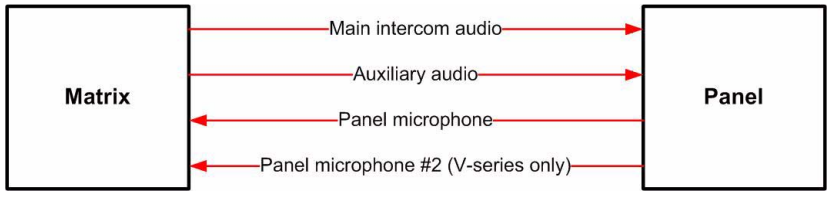

Figure 2-10: Stereo Audio Flow in AES-6 Systems

When configuring V-Series panels for stereo mode in ECS the Audio Mixer should be set to “Layout Binaural coax/AES” or “Layout Binaural coax/AES using D25”. For Elcipse 4000 series panels the appropriate links must be configured on the main PCB and PDE4536B card. Refer to the Eclipse 4000 panel installation guide part STA0530 rev 4 or later for information on stereo configuration.

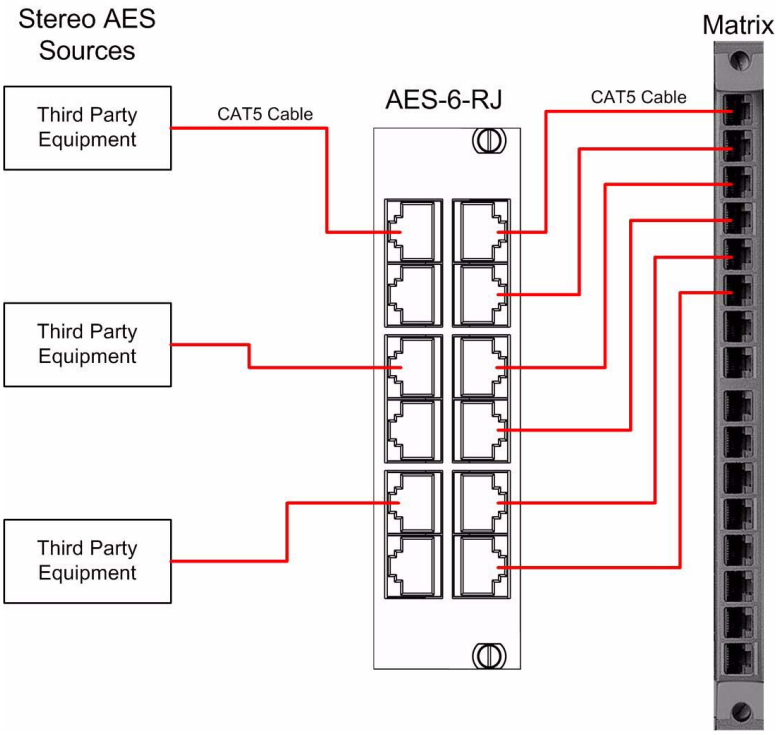

Figure 2-11: AES-6-RJ Connected for Stereo Third Party Equipment

V-Series panels with AES-3 option cards can also be connected to an AES-6 interface via an AES-3 compliant network.

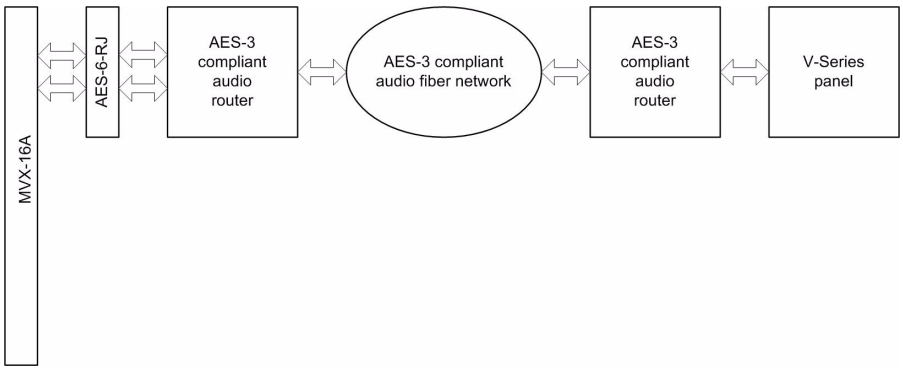

Figure 2-12: AES-3 Networking

The V-Series panel ES-3 option card uses a data format of 24-bit audio data and 8-bit user control data. Any AES-3 router used with a V--Series panel must not strip off the user control data but must pass it through.

Eclipse 4000 panels cannot be networked in this way with PDE4536B option cards as they use a different form of the AES-3 data structure.

CABLE PINOUTS

The CAT5 cables used to connect either type of AES-6 rear card (AES-6-CX and AES-6-RJ) to a matrix use the following pinout.

PIN NUMBER	WIRE COLOR	FUNCTION
1	White/Orange	Data Transmit (Tx+)
2	Orange	Data Transmit (Tx-)
3	White/Green	Audio Output (+)
4	Blue	Audio Input (+)
5	White/Blue	Audio Input (-)
6	Green	Audio Output (-)
7	White/Brown	Data Receive (Rx+)
8	Brown	Data Receive (Rx-)

Table 2-4: AES-6 to Matrix Wiring

Standard straight-through CAT5 cables may be used for this purpose.

The pinout for the CAT5 cable to connect an AES-6-RJ to a panel is given in the table below.

PIN NUMBER	WIRE COLOR	FUNCTION
1	White/Orange	not used
2	Orange	not used
3	White/Green	Tx (+)
4	Blue	Rx (+)
5	White/Blue	Rx (-)
6	Green	Tx (-)
7	White/Brown	not used
8	Brown	not used

Table 2-5: AES-6 to Panel Wiring

Standard straight-through CAT5 cables may be used for this purpose.

Up to 200m of cable run between the panel or AES source and the AES-6-RJ interface or between the AES-6 interface and the matrix at a 48K sample rate is possible using 24AWG cable. If 26AWG cable is used the maximum cable run will be less than 200m.

Note: As the matrix connections are non-isolated the AES-6 interface must be sited local to the matrix and on the same mains supply.

The specification for the coaxial cable required to connect panels to the AES-6-CX card is given below.

Nominal impedance	75 Ohm
Insulation	solid polythene
Screen	double braided copper
Capacitance	68pF/m or better
Equivalents	BBC PSF 1/3M BICC TM 3304 Brand Rex GT 851

Table 2-6: Coaxial Cable Specification

This type of cable will allow up to 500 metres of cable run between the AES-6-CX interface and the panel at the standard 48K sample rate.

3 MAINTENANCE

The AES-6 functional block diagram is shown below.

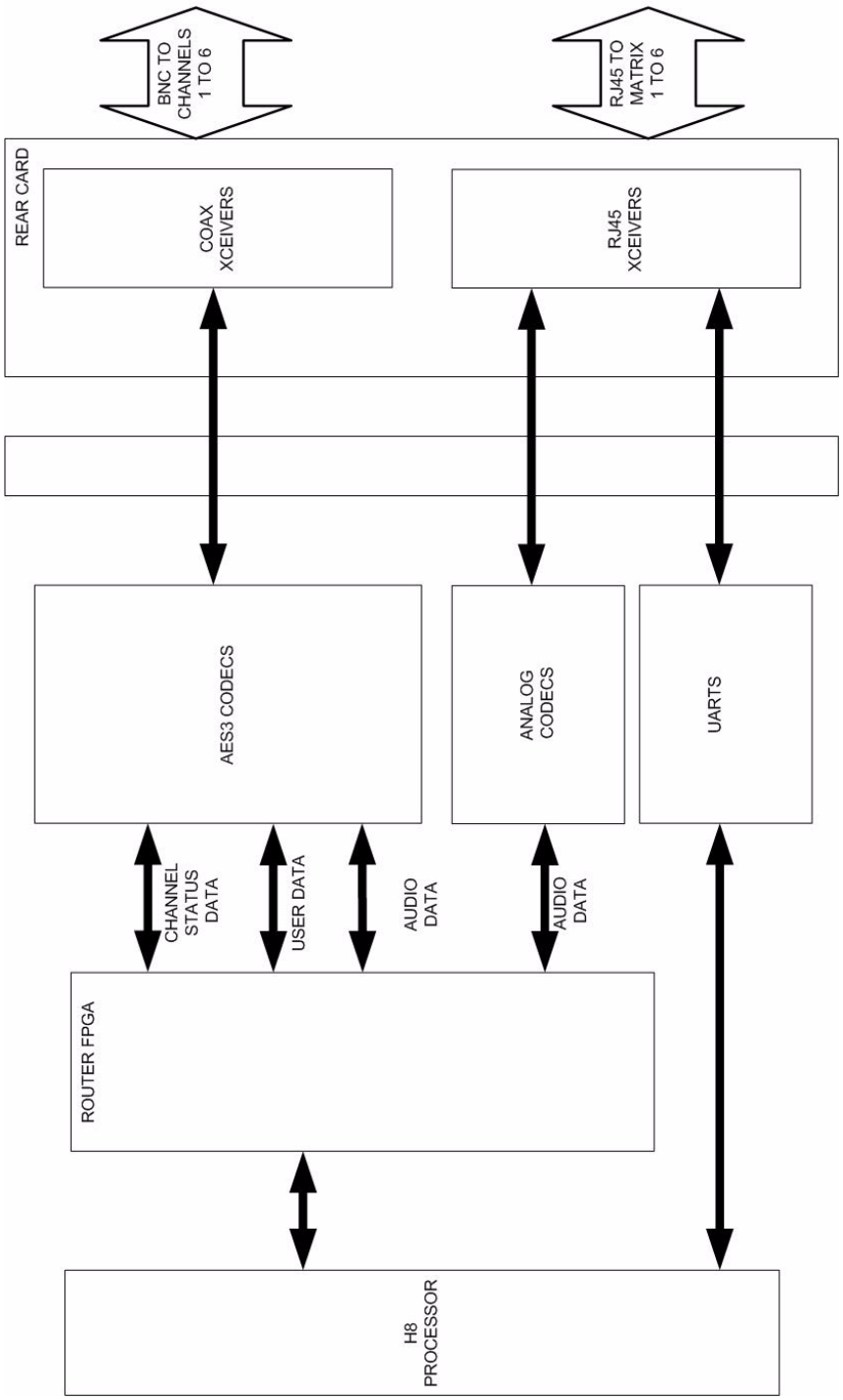

Figure 3-1: AES-6 Functional Block Diagram

4 SPECIFICATIONS

AES-6 DIGITAL INTERFACE

0 dBu is referenced to 0.775 volts RMS

Audio

Audio Sample Rate	44.1 kHz - 96.0 kHz
CODEC Resolution	24 bits
Frequency Response	30Hz - 22 kHz ± 3dB
Signal to Noise Ratio	< -65 dB (22 - 22kHz filter RMS)
Crosstalk (adjacent channel)	< -75 dB @ 1kHz
Nominal Level	0 dBu
Input Impedance	> 10 K
Output Impedance	150 R
Headroom	+18 dBu
Distortion	< 0.1% @ +18 dBu 300Hz - 10 kHz
	< 0.5% @ +18 dBu 100 Hz - 20 kHz

Cable lengths

AES-6-CX to Panel	Up to 500m using 75 Ohm coax cable
AES-6-RJ to Panel	Up to 200m using 24AWG CAT5 cable
AES-6-RJ to AES-3 third party device	Up to 200m using 24AWG CAT5 cable

Data Format

Audio data	24 bits
User Control data	8 bits

Physical Specifications

Operating Temperature Range	32^{o} to 104^{o} F (0^{o} to $+40^{o}$ C)
Storage	-22^{o} to 158^{o} F (-30^{o} to $+70^{o}$ C)
Humidity	40 - 90% non-condensing

Notice About Specifications

While Clear-Com makes every attempt to maintain the accuracy of the information contained in its product manuals, that information is subject to change without notice. Performance specifications included in this manual are design-center specifications and are included for customer guidance and to facilitate system installation. Actual operating performance may vary.

LIMITED WARRANTY

Vitec Group Communications (VGC) warrants that at the time of purchase, the equipment supplied complies with any specification in the order confirmation when used under normal conditions, and is free from defects in workmanship and materials during the warranty period.

During the warranty period VGC, or any service company authorized by VGC, will in a commercially reasonable time remedy defects in materials, design, and workmanship free of charge by repairing, or should VGC in its discretion deem it necessary, replacing the product in accordance with this limited warranty. In no event will VGC be responsible for incidental, consequential, or special loss or damage, however caused.

WARRANTY PERIOD

Return Material Authorization (RMA) numbers are required for all returns.

Both warranty and non-warranty repairs are available.

The product may consist of several parts, each covered by a different warranty period. The warranty periods are:

- Cables, accessories, components, and consumable items have a limited warranty of 90 days.
- Headsets, handsets, microphones, and spare parts have a limited warranty of one year.
- UHF wireless IFB products have a limited warranty of one year.
- UHF wireless intercom systems have a limited warranty of three years.
- All other Clear-Com and Drake brand systems and products, including beltpacks, have a limited warranty of two years.

The warranty starts at the time of the product's original purchase. The warranty start date for contracts which include installation and commissioning will commence from the earlier of date of the Site Acceptance Test or three months from purchase.

TECHNICAL SUPPORT

To ensure complete and timely support to its customers, VGC's User Support Center is staffed by qualified technical personnel. Telephone and email technical support is offered worldwide by the User Support Center.

The User Support Center is available to VGC's customers during the full course of their warranty period.

Instructions for reaching VGC's User Support Centers are given below.

Telephone for Europe, Middle East and Africa: +49 40 6688 4040 or +44 1223 815000

Telephone for the Americas and Asia: +1 510 337 6600

Email: vitec.support@AVC.de

Once the standard warranty period has expired, the User Support Center will continue to provide telephone support if you have purchased an Extended Warranty.

For latest contact information please refer to the Service and Support section at www.clearcom.com.

WARRANTY REPAIRS AND RETURNS

Before returning equipment for repair, contact a User Support Center to obtain a Return Material Authorization (RMA). VGC representatives will give you instructions and addresses for returning your equipment. You must ship the equipment at your expense, and the support center will return the equipment at VGC's expense.

For out-of-box failures, use the following contact information:

Europe, Middle East and Africa

Tel: +44 1223 815000 Email: customerservicesEMEA@vitecgroup.com

North America, Canada, Mexico, Caribbean & US Military

Tel: +1 510 337 6600 Email: customerservicesUS@vitecgroup.com

Asia Pacific & South America

Tel: +1 510 337 6600 Email: customerservicesAPAC@vitecgroup.com

VGC has the right to inspect the equipment and/or installation or relevant packaging.

For latest contact information please refer to the Service and Support section at www.clearcom.com.

NON-WARRANTY REPAIRS AND RETURNS

For items not under warranty, you must obtain an RMA by contacting the User Support Center. VGC representatives will give you instructions and addresses for returning your equipment.

You must pay all charges to have the equipment shipped to the support center and returned to you, in addition to the costs of the repair.

EXTENDED WARRANTY

You can purchase an extended warranty at the time of purchase or at any time during the first two years of ownership of the product. The purchase of an extended warranty extends to five years the warranty of any product offered with a standard two-year warranty. The total warranty period will not extend beyond five years.

Note: VGC does not offer warranty extensions on UHF wireless intercom systems, or on any product with a 1-year or 90-day warranty.

LIABILITY

THE FOREGOING WARRANTY IS VGC'S SOLE AND EXCLUSIVE WARRANTY. THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY OTHER REQUIRED IMPLIED WARRANTY SHALL EXPIRE AT THE END OF THE WARRANTY PERIOD. THERE ARE NO OTHER WARRANTIES (INCLUDING WITHOUT LIMITATION WARRANTIES FOR CONSUMABLES AND OTHER SUPPLIES) OF ANY NATURE WHATSOEVER, WHETHER ARISING IN CONTRACT, TORT, NEGLIGENCE OF ANY DEGREE, STRICT LIABILITY OR OTHERWISE, WITH RESPECT TO THE PRODUCTS OR ANY PART THEREOF DELIVERED HEREUNDER, OR FOR ANY DAMAGES AND/OR LOSSES (INCLUDING LOSS OF USE, REVENUE, AND/OR PROFITS). SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES OR THE LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. IN ANY EVENT, TO THE MAXIMUM EXTENT PERMITTED UNDER APPLICABLE LAW, VGC'S LIABILITY TO CUSTOMER HEREUNDER SHALL NOT UNDER ANY CIRCUMSTANCES EXCEED THE COST OF REPAIRING OR REPLACING ANY PART(S) FOUND TO BE DEFECTIVE WITHIN THE WARRANTY PERIOD AS AFORESAID.

This warranty does not cover any damage to a product resulting from cause other than part defect and malfunction. The VGC warranty does not cover any defect, malfunction, or failure caused beyond the control of VGC, including unreasonable or negligent operation, abuse, accident, failure to follow instructions in the manual, defective or improperly associated equipment, attempts at modification and repair not approved by VGC, and shipping damage. Products with their serial numbers removed or defaced are not covered by this warranty.

This warranty does not include defects arising from installation (when not performed by VGC), lightning, power outages and fluctuations, air conditioning failure, improper integration with non-approved components, defects or failures of customer furnished components resulting in damage to VGC provided product.

This limited warranty is not transferable and cannot be enforced by anyone other than the original consumer purchaser.

This warranty gives you specific legal rights and you may have other rights which vary from country to country.