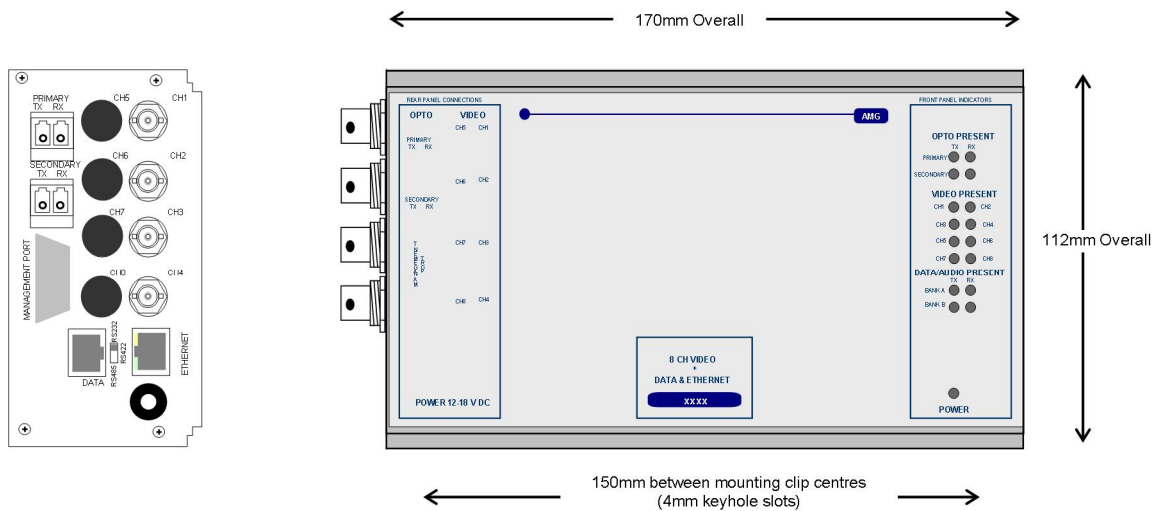# 4 Channel Video Transmit Unit with Bi-directional Data Channel and Ethernet for a Dual Redundant Multimode Fibre Link

The **AMG4643E-DR** is a standalone four channel video transmit unit designed to transmit 4 video signals and transmit and receive 1 data signal plus full duplex 100BaseT Ethernet connectivity over four Multimode fibres providing Dual Redundant operation.

The **AMG4643E-DR** is designed to be powered using an **AMG2003** standalone power supply.

The **AMG4643E-DR** is designed to operate with **AMG4644E-DR** or rackmount equivalent **AMG4644ER-DR** four channel video receive unit in a point to point configuration.

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Introduction

Unit Functional Schematic

The **AMG4643E-DR** transmits and receives optical signals from both a primary and secondary optical channel. The primary and secondary channels operate at the same wavelength (1310nm) and are transmitted on separate optical fibres.

The **AMG4643E-DR** receives and drops off data signals transmitted from an **AMG4644E-DR** receiver. It then inserts video and data signals onto the outgoing optical signal.

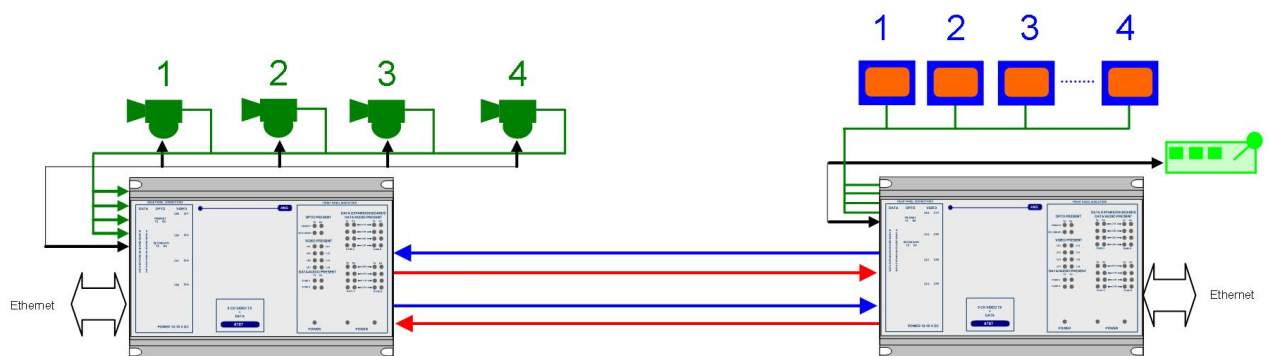Ethernet connectivity is also provided between the two units.
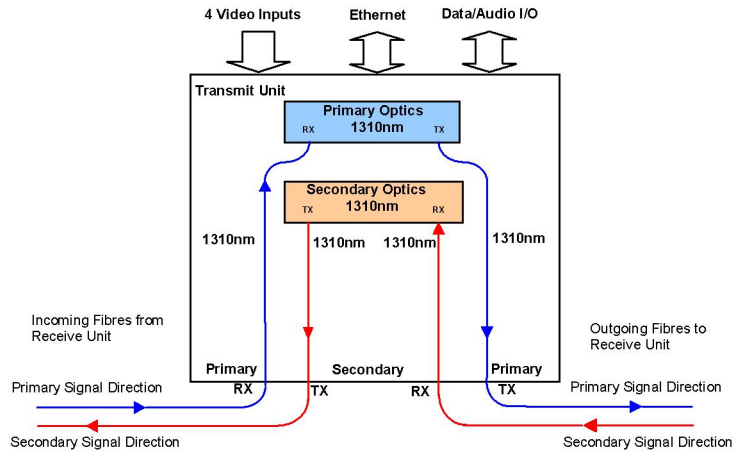
Dual Redundant Operation

In normal operation the video and data signals are transmitted on the primary output and the data received from the primary input.

At the **AMG4644E-DR** or **AMG4644ER-DR** rackmount receive unit, the secondary optical input is independent and is regenerated on the secondary output. However if the primary input signal is not present, the receive unit will shut down its secondary output to inform the **AMG4643E-DR** transmit unit that the signal route is not OK. The **AMG4643E-DR** transmit unit will then send out the video and data signals on its secondary output along the alternative optical route. At the **AMG4644E-DR** receive unit, since the primary input is no longer present, the data signal is now taken from the secondary optical input, thus maintaining integrity of the data transmission.

Optical Connection

The **AMG4643E-DR** is connected as illustrated below when used with an **AMG4644E-DR** receive unit acting as a point to point system.

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Connections

Video Input Connections

No. of channels....................................4
Connector ....75 ohm BNC Socket.
Input Impedance ....75 ohm terminated.
Input Level ....1 volt p-p nominal
Frequency Response..........................10Hz to 7MHz.

Optical Connections

PRIMARY OPTO OUT

Connector ....LC/PC
Primary Optical Launch Power ....-5dBm
Wavelength...1310nm
Optical Fibre ....Multimode 50/125 or 62.5/125**

PRIMARY OPTO IN

Connector ....LC/PC
Primary Optical Sensitivity...................-22dBm
Wavelength...1310nm
Optical Fibre ....Multimode 50/125 or 62.5/125**

SECONDARY OPTO OUT

Connector ....LC/PC
Primary Optical Launch Power ....-5dBm
Wavelength...1310nm
Optical Fibre ....Multimode 50/125 or 62.5/125**

SECONDARY OPTO IN

Connector ....LC/PC
Primary Optical Sensitivity...................-22dBm
Wavelength...1310nm
Optical Fibre ....Multimode 50/125 or 62.5/125**

**Note: the transmission distance is limited by the bandwidth of the Multimode optical fibre. The optical data rate is 1.25Gbits/s. The maximum bandwidth specification at this data rate for Multimode fibre is 2km. although in most cases the units will operate successfully over longer fibre lengths. It is advisable however for distances greater than 2km, to have the optical fibre tested.

Power Connection

Connector Type ....2.1mm screw lock long power jack – centre positive
Connector Partno................................Switchcraft S761K, AMG G16125-00
Supply Voltage....................................13.5 to 18.0 Volts DC.
Maximum Power ....10 Watts

Data and Audio Channel Connections

DATA CHANNEL A

Data Channel A ....1 channel
Data Connector...................................RJ45
Channel A Interface ....On Board Data Interface – RS232, RS422 or RS485. Selected by slide switch above the RJ45 connector.

RS232 – switch position - high (closest to BNC connections)
RS422 – switch position – middle
RS485 – switch position – low (furthest from BNC connections)

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DATA CHANNEL B

Data Channel B .... Not Present

Ethernet Connection

Ethernet Data Connector RJ45
Interface... Auto-negotiation up to 100BASE-TX full duplex
Ethernet Data Rate.............................. Maximum 50Mbits/s total Ethernet traffic on fibre

Ethernet Operation

In order for the AMG system to transmit Ethernet signals, an onboard RJ45 Ethernet interface or
X16003 Ethernet interface adaptor should be fitted to both the Transmit unit and the Receive unit.

The Ethernet interface can operate at either 10Mbits/s half duplex, or 100Mbit/s full duplex, and data is
transmitted from one port the other port with the minimum of delay or buffering. The maximum
bandwidth (at 100Mbit/s full duplex) available for transmission across the fibre link is nominally
50MBit/s.

The 100BaseT port does not implement MDI/MDIX; it should be connected with a straight though
cable to an external switch port and with a cross over cable when connected directly to a PC or DTE.

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Data and Audio Channel Configuration

Data and Audio Channel Configuration

The **AMG4643E-DR** and rackmount equivalent **AMG4643ER-DR** sends and receives data to/from Channel A. Channel B is not available. Channel A is a single data interface selectable by the user with the slide switch on the rear panel.

Data Interface Connections Channel A

RJ45 Pin No.	Channel A			Cat 5/6 Cable Colour Code T568B
	RS485 [switch low]	**RS422 [switch mid]**	**RS232 [switch high]**	
1		IN + (A)	GND	White/orange
2		IN - (B)	IN	Orange
3				White/green
4				Blue
5				White/blue
6				Green
7	IN/OUT + (A)	OUT + (A)	N/A	White/brown
8	IN/OUT - (B)	OUT - (B)	OUT	Brown

Note: (A) or (B) in brackets in above table refers to RS485 / RS422 data specification, not Channel A, Channel B.

Data Channel A Configuration

Channel A is always present and allows for a RS232, RS422 (full duplex, four wire) or RS485 (half duplex, two wire) interface depending on the position of the switch located above the RJ45 connector. The switch signifies the presence of the X16004 Low Speed Data/Audio Interface Board. If there are LED's present on the RJ45 connector then an X16003 Ethernet Interface Board is fitted.

The data input for both the RS485 and the RS422 modes detects a tri-state input condition by monitoring the differential voltage level across the input. A differential level below 600mV positive or negative will be detected as a tri-state condition. A level above 600mV positive or negative will be detected as a logic 1 or logic zero respectively. It is important therefore to terminate the RS485 bus or the RS422 input bus using 120Ω if a pre-bias is present on the RS485 or RS422 bus.

A large number of third party equipment manufacturers apply a pre-bias on their RS485 bus. This pre-bias is applied by pulling one arm of the RS485 bus high (+5 volts) and the other arm low (0 volts) using high value resistors within the third party equipment. In order to ensure that the AMG equipment detects a tri-state condition, then these resistors should have a value above 5kΩ. If the third party bias resistors are less the 750Ω the bus can be double or triple terminated as required to ensure that a tri-state level is detected.

Note: The Data Channel A is shipped from the factory set up for RS485 operation unless otherwise requested.

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Front Panel Indicators

Power LED

Power .... Green	-	unit powered
Off	-	no power applied to unit

Video Input LED's

Video Present CH1-4 .... Green	-	video signal present on input BNC
R/G	-	channel present but no video on I/P BNC

Fibre Optic LED's

Primary Opto Sync TX.......................... Green	-	optical channel transmitting
Off	-	optical channel not transmitting

Primary Opto Sync RX .... Green	-	optical channel receiving
Org	-	optical channel receiving but not sync.
Off	-	optical channel not transmitting

Low Speed Data LEDs

Channel A

Data Present TX (RS485 or RS422) ... Green	-	logic zero (+V, -V) present on IN+, IN-
Red	-	logic one (-V,V+) present on IN+, IN-
Off	-	tri-state off or no connection on IN+, IN-

Data Present TX (RS232) .... Green	-	logic zero (+V) present on input IN+
Red	-	logic transitions present on input IN+
Off	-	logic one (-V) present on input IN+

This represents the data signals being transmitted on the optical fibre

Data Present RX (RS485 or RS422) ... Green	-	logic zero (+V,-V) present on OUT+, OUT-
Red	-	logic one (-V,+V) present on OUT+, OUT-
Off	-	tri-state off or no connection on OUT+, OUT-

Data Present RX (RS232) .... Green	-	logic zero (+V) present on OUT+
Red	-	logic transitions present on OUT+
Off	-	logic one (-V) present on OUT+

This represents the data signals being received on the optical fibre

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Physical Information

Dimensions

Height..112mm
Width..170mm (excluding connectors)
Depth 70mm
Weight...750grams

Mounting Details

The AMG unit is supplied with a clip-on mounting bracket which should be attached to a panel or wall using 2 off 4.0mm screws, see diagram on page 1 for dimensions. The unit is clipped into the mounting bracket, and is then held firmly in position.

Removal / replacement from / to the Case

Note: - The AMG unit PCB's are static sensitive. Handle with proper care and use normal electrostatic discharge (ESD) procedures. Use properly grounded protection (for example, wrist straps) when handling the PCB.

To remove units from the case to access the data expansion boards and the daughter boards, remove the 2 or 4 fixing screws on the rear panel and slide the PCB's out of the case.
Ensure that the fibres do not snag or get trapped.

To replace the PCB's into the case, slide the PCB's gently into the case aligning the boards with the appropriate slots. Ensure that the fibre do not snag or get trapped.

Safety

AMG Optical Fibre Products use Class 1 laser systems in accordance with EN 60825-2:2000.

It is always advisable to follow good practice when working with optical fibre systems. This includes:

- Do not stare with unprotected eyes or with any unapproved collimating device at fibre ends or connector faces, or point them at other people.
- Use only approved filtered or attenuating viewing aids

For other safety issues and advice on good practice associated with optical fibre systems, please see EN 60825-2:2000 or your local safety officer.

Maintenance and Repair

There are no user serviceable parts within AMG products. See unit data sheet for full specification.

In case of problem or failure, please call your local support centre or contact: **AMG Systems Ltd.** at 3 The Omega Centre, Stratton Business Park, Biggleswade, Beds., SG18 8QB, UK.

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