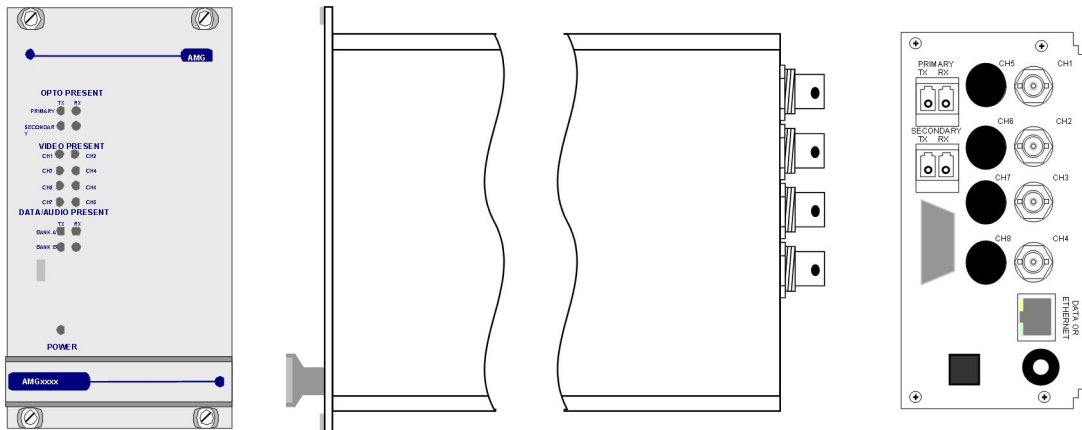# 4 Channel Video Insert Unit with Ethernet for a Dual Redundant Fibre Ring

The **AMG3741EG-DR** is a rackmount four channel video insert unit designed to transmit 4 video signals onto a dual singlemode optical fibre ring with Dual Redundant operation. It also provides full duplex 100BaseT Ethernet connectivity around the ring.

The **AMG3741EG-DR** is designed to be powered using an **AMG2003** standalone power supply.

The **AMG3741EG-DR** is designed to operate with an **AMG3782E-DR** or rackmount equivalent **AMG3782EG-DR** eight channel video, data and Ethernet receive unit. The receive unit will 'drop off' up to eight video channels which are being transmitted around the fibre ring from up to eight single channel or equivalent number of multi-channel insert units.

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Introduction

Unit Functional Schematic

The **AMG3741EG-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 **AMG3741EG-DR** receives and drops off Ethernet signals transmitted from an **AMG3782E-DR** receiver. It then inserts video and Ethernet signals onto the outgoing optical signal.
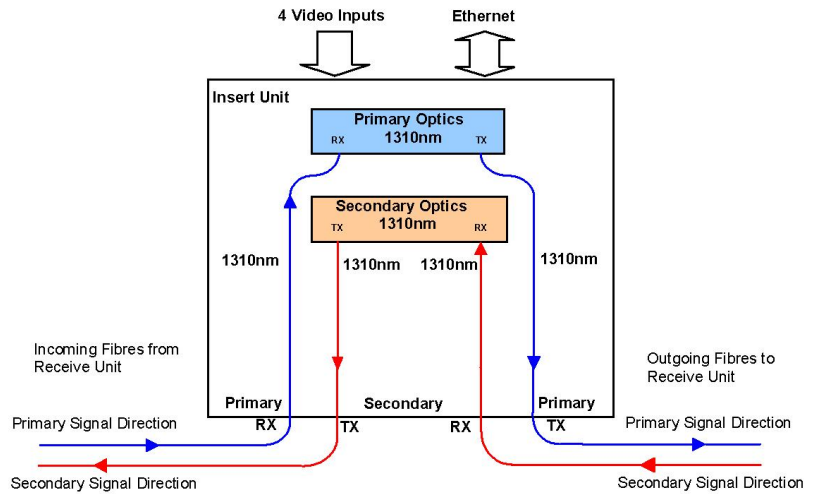
As each unit regenerates the optical signal, the optical dynamic range between each optically connected node is 17dB.

Video Input Channel Configuration

At the **AMG3741E-DR** or rackmount **AMG3741EG-DR** insert unit, video signals present at the BNC inputs can be inserted on one to eight video channels transmitted on the optical fibre. The first video channel number of each insert unit is set by the rotary switch on the front panel of the unit.

It is normal to set each insert unit to a different channel number. If the same number is used twice, an insert unit connected 'down stream' on the primary optical route will 'over-write' any coincident video channels coming from the previous insert unit and those video signals will be lost.

The switch channel numbers 1 to 8, correspond to video channels 1-8. Unused switch channel numbers 0 & 9 duplicate video channel selections 1 & 8 respectively. i.e. setting switch to position 0 or 1 selects video channel 1 and setting switch to position 8 or 9 selects channel 8.

Optical Connection

The **AMG3741E-DR** or rackmount **AMG3741EG-DR** is designed to be connected in a ring or point to point system.

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In a ring system, single, dual and four channel insert units respectively can be combined to make up an 8 channel video transmission system as illustrated below.
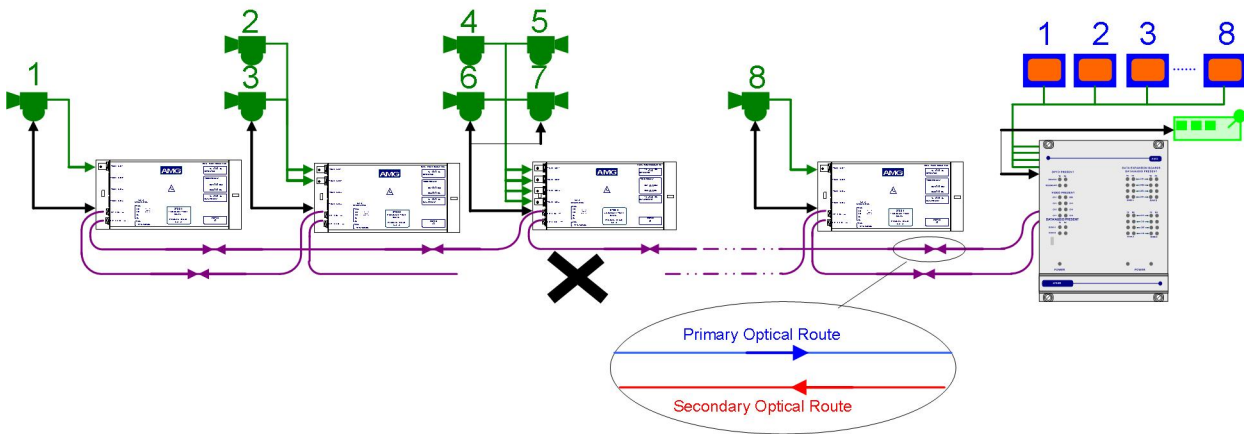
Primary Optical Route
Two Separate Optical Fibres
Secondary Optical Route
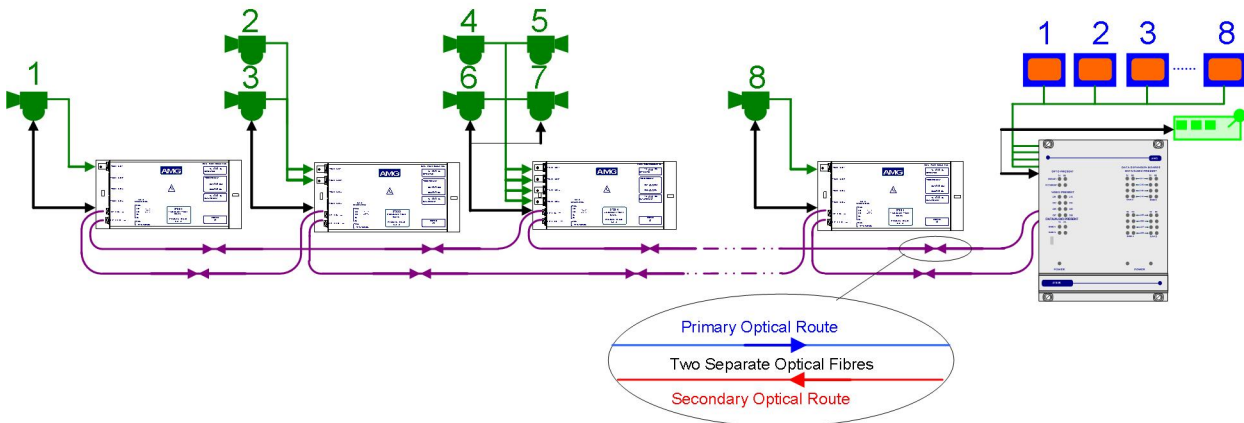
If a fibre link is broken, operation of the ring continues by making use of the secondary optical fibre route as below:

Primary Optical Route
Secondary Optical Route

If multiple breaks occur, operation is maintained with all the units still physically connected to the receiver. For the scenario shown below camera signals and control would now be lost from cameras 1, 2 and 3 as there is now no physical connection between the transceivers and the receiver. However operation of cameras 4,5,6,7 and 8 remains fully functional.

Primary Optical Route
Secondary Optical Route

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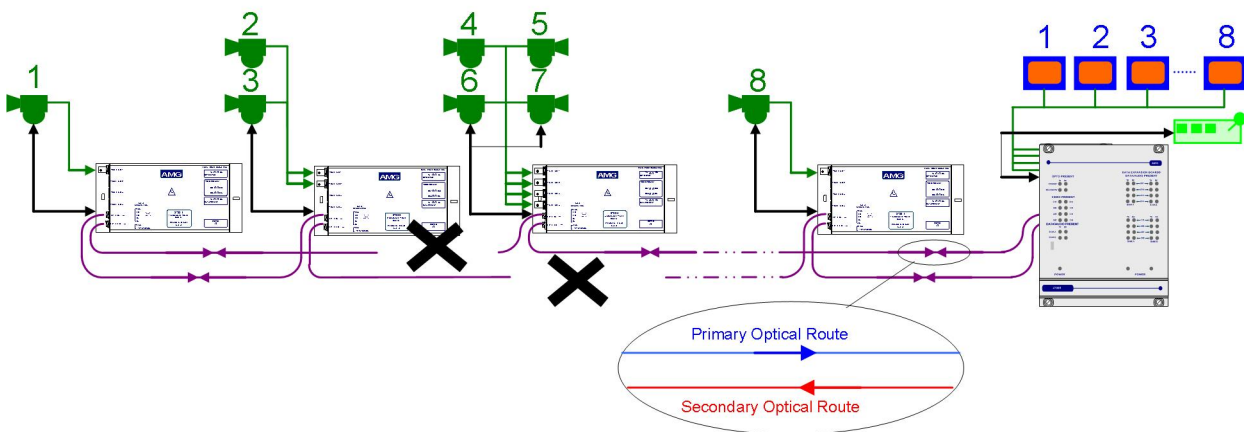
Connections

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 ....Singlemode

PRIMARY OPTO IN

Connector ....LC/PC
Primary Optical Sensitivity...................-22dBm
Wavelength..1310nm
Optical Fibre ....Singlemode

SECONDARY OPTO OUT

Connector ....LC/PC
Secondary Optical Launch Power.......-5dBm
Wavelength..1310nm
Optical Fibre ....Singlemode

SECONDARY OPTO IN

Connector ....LC/PC
Secondary Optical Sensitivity..............-22dBm
Wavelength..1310nm
Optical Fibre ....Singlemode

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

Ethernet Connection

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

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

Ethernet Data LED's

BANK A

Data Present TX (Ethernet)	Green	-	data present on the Ethernet input
	Off	-	no data present on the Ethernet input

This represents the Ethernet signals being transmitted onto the optical fibre

Data Present RX (Ethernet)	Green	-	data present on the Ethernet input
	Off	-	no data present on the Ethernet input

This represents the Ethernet signals being received from the optical fibre

BANK B

Data Present TX	Green	-	RJ45 Ethernet port operating at 100Mbit/s
	Red	-	RJ45 Ethernet port operating at 10Mbit/s
Data Present RX	Green	-	RJ45 Ethernet port operating full duplex
	Off	-	RJ45 Ethernet port operating half duplex

Note: the RJ45 Ethernet auto-negotiates up to 100Mbit/s full duplex.

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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 all units in the ring.

The Ethernet interface can operate at either 10Mbits/s half duplex, or 100Mbit/s full duplex. When all the Ethernet interfaces around the ring are operating at 100Mbit/s full duplex the system behaves as a multi-port repeater. Data transmitted on any one port is transmitted out on all other ports with the minimum of delay or buffering. The nominal bandwidth available for Ethernet transmission within the ring is 100Mbit/s when Ethernet only, or 50MBit/s when the low speed data option is also used. If one node is transmitting, the entire bandwidth is available for this traffic. If multiple nodes transmit simultaneously on the ring, then the bandwidth is shared between each node as required. With similar traffic at each node the sharing would be nominally equal.

Although the limit for the number of video channels which can be transmitted around the ring is eight, up to 64 nodes can be attached for distributing Ethernet signals with the bandwidth sharing implemented. The units use Flow Control (Pause Frames) to limit the access to the ring to share the bandwidth and to ensure that no data is lost. When an Ethernet port is operating at 10Mbits/s half duplex, this port will now only receive data from a receive unit rather than all ports as when operating at 100Mbits/s full duplex.

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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Physical Information

Dimensions

Height...3U Plug-in
Width..14HP
Depth ....170mm excluding connectors
Weight...1000grams

Mounting Details

The unit is designed to be mounted within an AMG2009 or AMG2015 Subrack on standard card guides.

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.

Phone	+44 (0) 1767 600 777
Technical Support	+44 (0) 1767 604 491
Email	techsupport@amgsystems.com

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