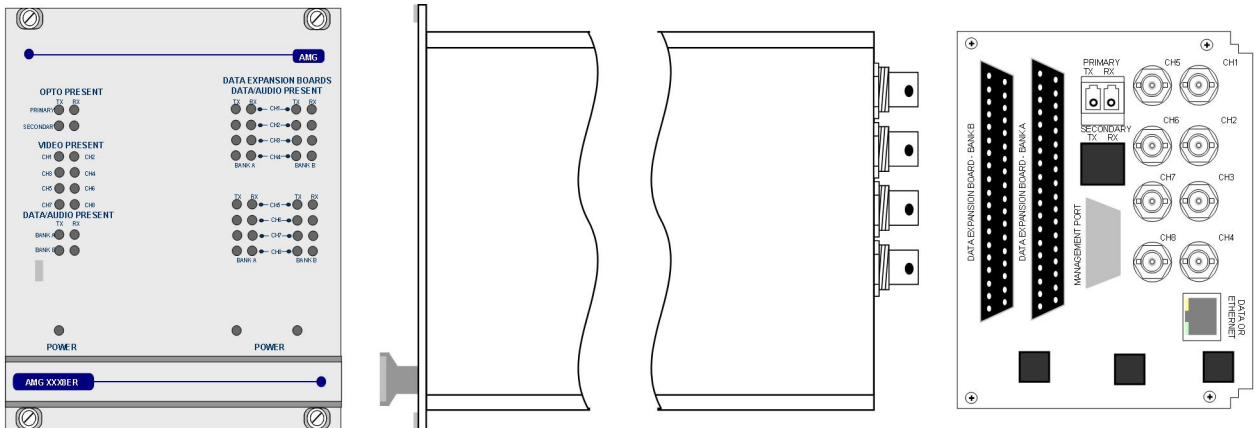# 8 Channel Video Receive Unit with up to 16 Bi-directional Data / Audio Channels plus Ethernet for a dual fibre ring.

The **AMG3788ER** is a rackmount eight channel video receive unit designed to receive up to 8 video signals from a dual fibre optical ring. It also provides 16 bi-directional data/audio channels via a low speed data interface, plus full duplex 100BaseT Ethernet connectivity around the ring. The data/audio channel interfaces, whether RS-232, RS-422, RS-485, 20mA, TTL, Contact Closure, Lonworks or Audio, are defined at manufacture by the addition of daughter boards fitted onto the Data Expansion Board A & B.

The **AMG3788ER** is designed to plug into an **AMG2005** or **AMG2009** subrack, which in turn fits into a 19" rack system.

The **AMG3788ER** is designed to operate with up to eight **AMG3717BE** single channel video insert units. Each receiver will 'drop off' up to eight video channels which are being transmitted around the fibre ring. The **AMG3788ER** may also be used with other combinations of single, dual or four channel video and data insert units.

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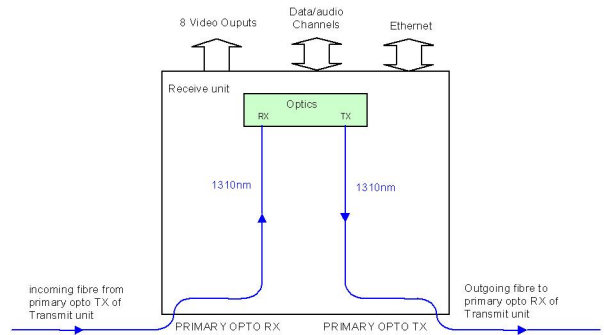AMG3788ER Instruction Sheet
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Introduction

Unit Functional Schematic

The **AMG3788ER** transmits and receives the optical signals to/from a primary optical channel.

The optical channel is transmitted on a single optical fibre around the ring in one direction and operates at a single wavelength.

The primary channel operates on 1310nm.

The **AMG3788ER** drops off up to 8 video signals and up to 16 data / audio and Ethernet signals transmitted from the **AMG3717BE** insert units. It also transmits the data and Ethernet signals back to the insert units.
As each unit regenerates the optical signal, the optical dynamic range between each optically connected node is 17dB.

Video Input Channel Configuration

At the **AMG3717BE** or rackmount **AMG3717BER** 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 **AMG3788E** or rackmount **AMG3788ER** is designed to be connected in a ring or point to point system.

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.

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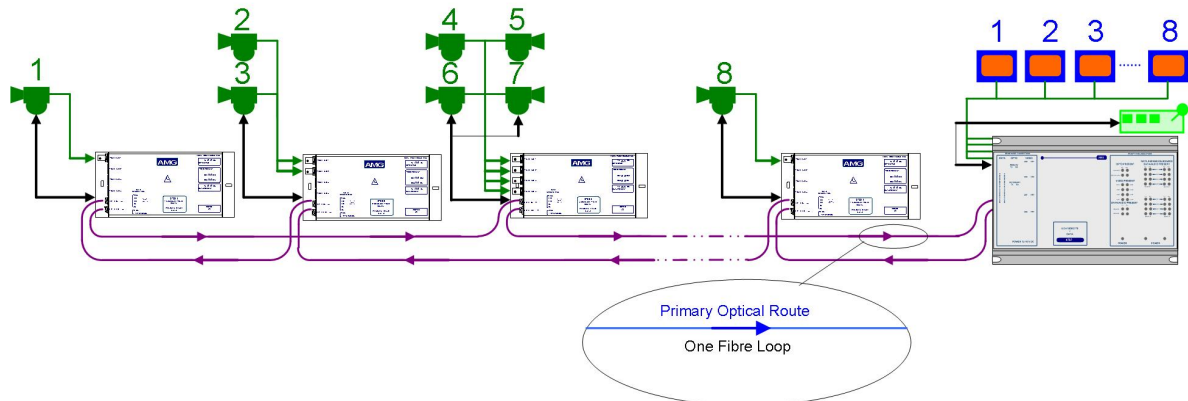
Connections

Video Output Connections

No. of channels 8
Connectors ....75 ohm BNC Socket.
Output Impedance ....75 ohm terminated.
Output 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

Power Connection

Power supply ....from plug in connection on the AMG2009 / AMG2015 subrack
Power consumption ....15 Watts max.

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

Data Channel Connections

Total No. of Data Channels ....16 channels

Data/Audio Channels – BANK A ....8 channels
Data/Audio Channels – BANK B ....8 channels
Connectors ....Two 37-way D-Type female connectors - shielded.
Connections..See below for connection and configuration

For the data or audio channels to be present, the appropriate data daughter boards have to be fitted
into the data expansion board slots.

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Data and Audio Channel Configuration

The **AMG3788E** and rackmount equivalent **AMG3788ER** sends and receives data in two banks - Bank A and Bank B each of which carries up to 8 channels of data / audio. The physical interface is determined by the fitting of AMG data or audio daughter boards onto the appropriate data expansion board slots.

Data Interface Daughter Board Options

The data interface daughter board options are as follows:

Option Code 'x'	Part No.	Description
0	X12542	4 Wire Audio Interface Daughter Board
1	X04057	RS422/485 Data Interface Daughter Board
2	X04049	RS232 Data Interface Daughter Board
3	X04058	20mA Current Loop Data Interface Daughter Board
4	X12579	TTL Data Interface Daughter Board
5	X12578	Contact Closure Data Interface Daughter Board
6	X13038	FTT10A Echelon Lonworks Data Interface Daughter Board

Bank A Data

When an **AMG3788E** or **AMG3788ER** rackmount receiver is connected in a fibre ring with multiple **AMG3717BE** insert units or alternative transmitters, the type of transmitter determines whether Channel A data from the **AMG3788E** receiver is broadcast at the same time to each insert unit or kept separate as individual data channels.

An AMG transmitter fitted with a single data Channel A interface (RJ45) will send and receive Channel A data separately to/from an **AMG3788E** receive unit. The data channel number (1-8) will be determined by the video channel number selected by the video channel selection switch on the insert unit.

Alternatively, if each insert unit is fitted with a Bank A data expansion card, for each Bank A data Channel (1-8), the **AMG3788E** receiver will combine the data received from each transmitter. The receiver logically OR's the data signals together from each transmiter to produce a single output for each A data Channel (1-8).

Similarly, Bank A data channels (1-8) transmitted from the receiver will be sent simultaneously to all insert units connected in the ring.

Bank B Data

Multiple **AMG3717BE** insert units are typically connected in a fibre ring together with an **AMG3788E** receiver or **AMG3788ER** rackmount receiver which is also fitted with a Bank B data expansion card. In this configuration, the individual Bank B data Channels (1-8) transmitted from each insert unit are combined at the receiver. For each Bank B data Channel (1-8), the receiver logically OR's the data signals together from each insert unit to produce a single data output for each B data Channel (1-8).

Similarly, Channel B (1-8) data transmitted from the receiver will be sent simultaneously to all insert units connected in the ring.

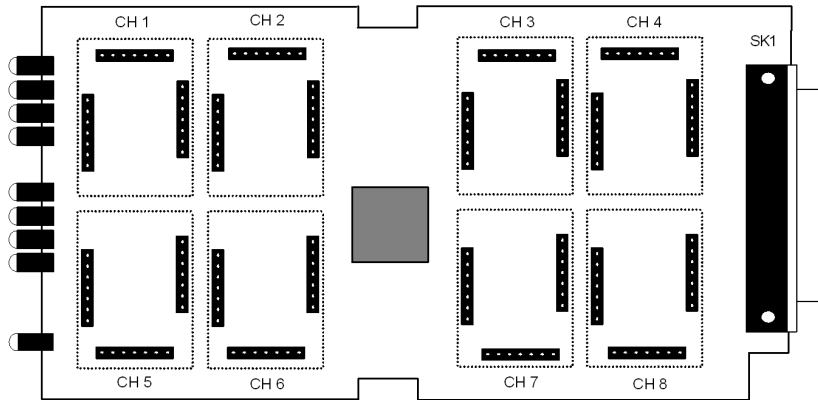**Note**: If audio daughter boards are fitted, the audio signal will only broadcast simplex from the receiver to the insert units. The audio signal will not go from the insert units to the receiver.

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Data and Audio Channel Configuration

The data expansion board slots are accessed by removing the AMG unit from its case. A data channel is active when a daughter board is installed in the required data channel slot. Each data interface board enables one bi-directional channel.
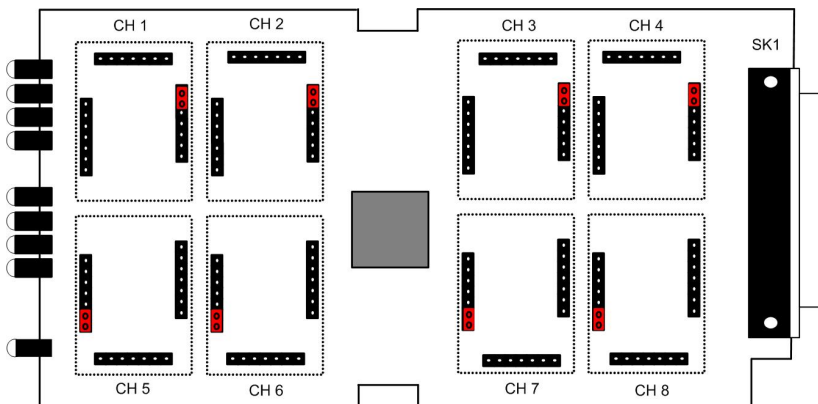
Daughter Board Layout

The channel slots are as follows:

Unpopulated Data Bank A Jumpers

Note: If data or audio daughter boards are not fitted at any location on the Bank A data expansion board, a 2-pin jumper MUST be fitted across pins 5-6 on each empty header as shown below in RED. This only applies to Bank A, not bank B and applies to PL1, PL3, PL5, PL7, PL9, PL12, PL15, PL18.

Data and Audio Daughter Board Fitting Instruction

The data and audio daughter boards pushed on to the pin headers mounted on the data expansion boards. Ensure that the connectors are lined up correctly and not offset before pushing firmly in place. Note that the data and audio channel numbers are associated with each slot. This allocates the pin numbers on the rear panel connector together with the front panel LED indicators.

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Data and Audio Connections

The BANK A/B data/audio channels pin connections on the rear panel connectors are as follows:

Pin No.	Description	Bank
1	Audio/Data CH1 IN + (A)	A/B
2	Audio/Data CH1 IN - (B)	A/B
3	Audio/Data CH2 IN + (A)	A/B
4	Audio/Data CH2 IN - (B)	A/B
5	Audio/Data CH3 IN + (A)	A/B
6	Audio/Data CH3 IN - (B)	A/B
7	Audio/Data CH4 IN + (A)	A/B
8	Audio/Data CH4 IN - (B)	A/B
9	GND	A/B
10	GND	A/B
11	GND	A/B
12	Audio/Data CH5 IN + (A)	A/B
13	Audio/Data CH5 IN - (B)	A/B
14	Audio/Data CH6 IN + (A)	A/B
15	Audio/Data CH6 IN - (B)	A/B
16	Audio/Data CH7 IN + (A)	A/B
17	Audio/Data CH7 IN - (B)	A/B
18	Audio/Data CH8 IN + (A)	A/B
19	Audio/Data CH8 IN - (B)	A/B
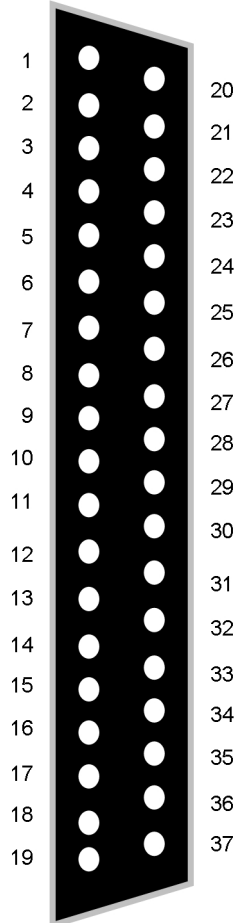
Pin No.	Description	Bank
20	Audio/Data CH1 OUT + (A)	A/B
21	Audio/Data CH1 OUT - (B)	A/B
22	Audio/Data CH2 OUT + (A)	A/B
23	Audio/Data CH2 OUT - (B)	A/B
24	Audio/Data CH3 OUT + (A)	A/B
25	Audio/Data CH3 OUT - (B)	A/B
26	Audio/Data CH4 OUT + (A)	A/B
27	Audio/Data CH4 OUT - (B)	A/B
28	GND	A/B
29	GND	A/B
30	Audio/Data CH5 OUT + (A)	A/B
31	Audio/Data CH5 OUT - (B)	A/B
32	Audio/Data CH6 OUT + (A)	A/B
33	Audio/Data CH6 OUT - (B)	A/B
34	Audio/Data CH7 OUT + (A)	A/B
35	Audio/Data CH7 OUT - (B)	A/B
36	Audio/Data CH8 OUT + (A)	A/B
37	Audio/Data CH8 OUT - (B)	A/B

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

See Data or Audio Daughter Board Instruction Sheet for meaning of Audio/Data IN+, Audio/Data IN- Audio/Data OUT+, and Audio/Data OUT- for each data type.

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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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Front Panel Indicators

Power LED

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

Video Output LED's

Video Present CH1-8 .... Green   -   video signal present on output BNC
Org   -   channel present but no video on O/P BNC
Off   -   no video channel present

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

Low Speed Data LEDs

BANK A or B (When RS232 data daughter board fitted)
Data Present CH1-16 TX .... Green   -   logic zero (+V) present on IN+
Red   -   logic transitions present on IN+
Off   -   logic one (-V) present on IN+

This represents the data signals being transmitted on the optical fibre

Data Present CH1-16 RX .... 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

BANK A or B (When RS485 / RS422 data daughter board fitted)
Data Present CH1-16 TX .... Green   -   logic zero (+V, -V) present on IN+, IN-
Red   -   logic transitions present on IN+, IN-
Off   -   logic one (-V, +V) present on IN+, IN-

This represents the data signals being transmitted on the optical fibre

Data Present CH1-16 RX .... Green   -   logic zero (+V, -V) present on OUT+, OUT-
Red   -   logic transitions present on OUT+, OUT-
Off   -   logic one (-V , +V) present on OUT+, OUT-

This represents the data signals being received on the optical fibre

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BANK A or B (When audio daughter board fitted)
Audio Present TX................................Green -   audio present > -40dBm
                                               Red -   audio present > 0dBm (overload at +6dBm)
                                               Off -   audio not present or < -40dBm

This represents the data signals being transmitted on the optical fibre

Audio Present RX ....Green -   audio present > -40dBm
                                               Red -   audio present > 0dBm (overload at +6dBm)
                                             Off -   audio not present or < -40dBm

This represents the audio signals being received from the optical fibre.

Physical Information

Dimensions

Height .... 3U Plug-in
Width 21HP
Depth .... 170mm excluding connectors
Weight 1200grams

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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