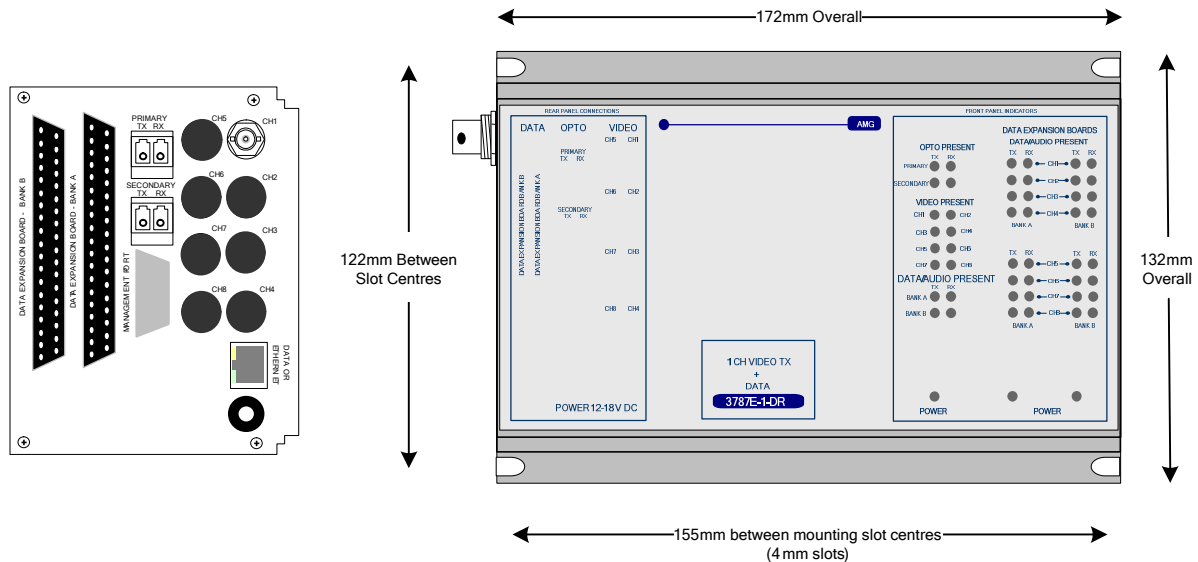




AMG3787E-1-DR-1550-HP Instruction Manual

Single Channel Video Insert Unit with Bi-directional Data and Ethernet for a Dual Redundant 1550nm wavelength fibre ring



AMG3787E-1-DR-1550-HP is a standalone single channel video insert unit designed to transmit a video signal onto a dual optical fibre ring with Dual Redundant operation. It also provides up to sixteen bi-directional data channels via a low speed data interface, plus full duplex 100BaseT Ethernet connectivity around the ring. It is designed to be powered from an **AMG2003** power supply which should be ordered as a separate item.

The **AMG3787E-1-DR-1550-HP** is designed to operate with the **AMG3788EN-DR-1550-HP**, or **AMG3788ERN-DR-1550-HP**, eight channel video and data receiver. Each receiver will 'drop off' up to eight video channels which are being transmitted around the dual fibre ring from up to eight single channel insert units.

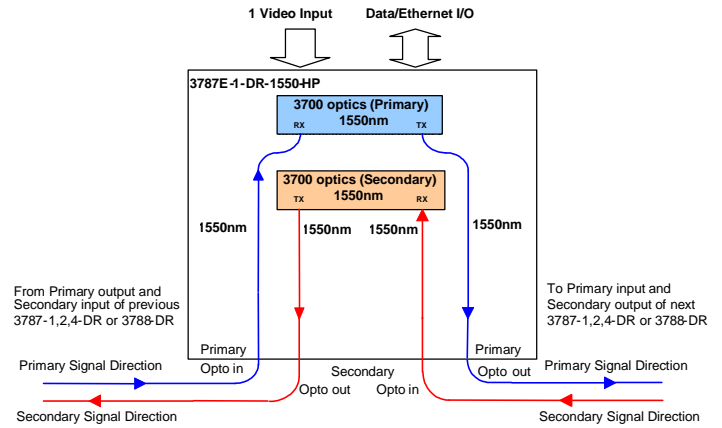
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Introduction

Unit Functional Schematic

The **AMG3787E-1-DR-1550-HP** transmits and receives optical signals from both a primary and secondary optical channel. The primary and secondary channels operate at the same wavelength (1550nm) and are transmitted on separate optical fibres.

The **AMG3787E-1-DR-1550-HP** receives and drops off data signals transmitted from an **AMG3788EN-DR-1550-HP** receiver. It then inserts video and data signals onto the outgoing optical signal.



The video signal is inserted on 1 of 8 channels available on the optical signal. The insert channel number is set by the channel selector switch on the front of the unit. If the video channel number is set to a channel that already has a video signal on it, this unit will over-write this in-coming video signal.

In normal operation where connection of both the previous unit and the subsequent unit are OK, the video and data signals are transmitted on the primary output and the data received from the primary input. The secondary optical input is independent and is regenerated on the secondary output.

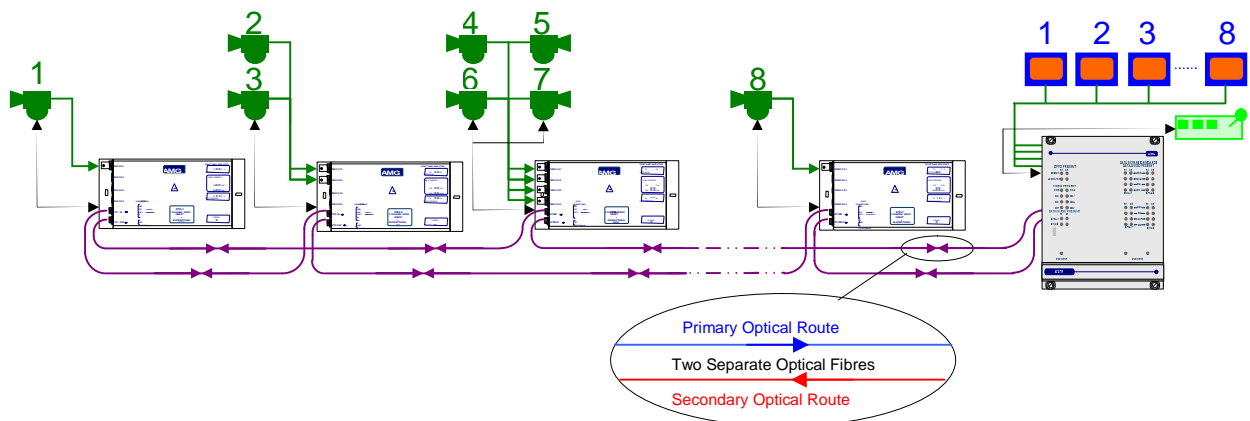
If the primary input signal is not present, the unit will shut down the secondary output to inform the previous unit that the signal route is not OK. The previous unit will then send out the video and data signals on its secondary output in the opposite direction. This signal will be repeated around the ring to get back to this **AMG3787E-1-DR-1550-HP** on the secondary route. As the primary input is not present on this unit, the data signal will now be taken from the secondary optical input, thus maintaining integrity of the data transmission.

If the secondary input signal is not present, the unit will assume that the route to the next unit is not OK and send out the video and data signal on the secondary optical output. This video and data will be transmitted to the next unit around the ring in the opposite direction on the secondary route.

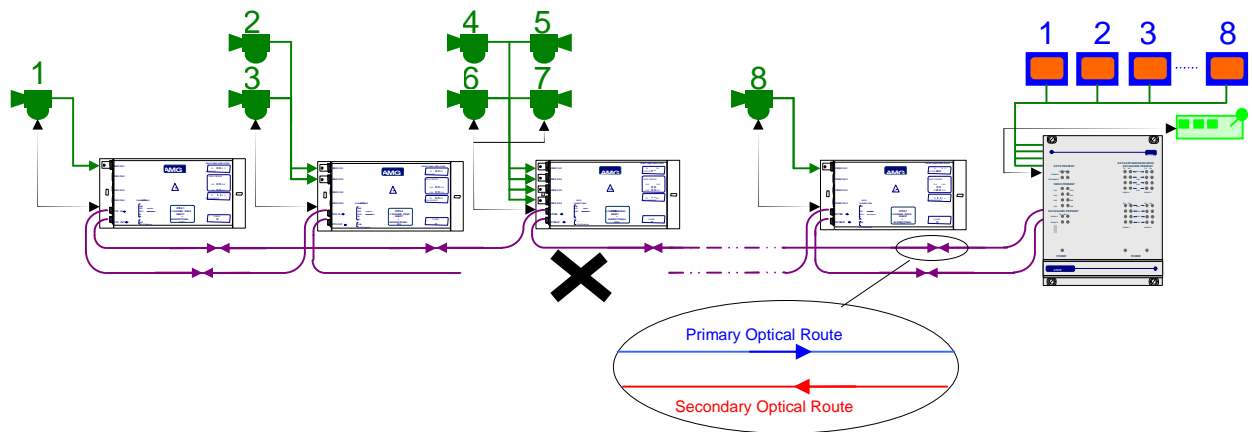
Optical System Connection

The **AMG3787E-1-DR-1550-HP** units are designed to be connected in a ring or point to point system. In a ring system **AMG3787E-1-DR-1550-HP**, **AMG3787E-2-DR-1550-HP** and **AMG3787E-4-DR-1550-HP**, single, dual and four channel insert units respectively can be combined to make up an 8 channel video transmission system as illustrated below with an **AMG3788ENR-DR-1550-HP** receiver.

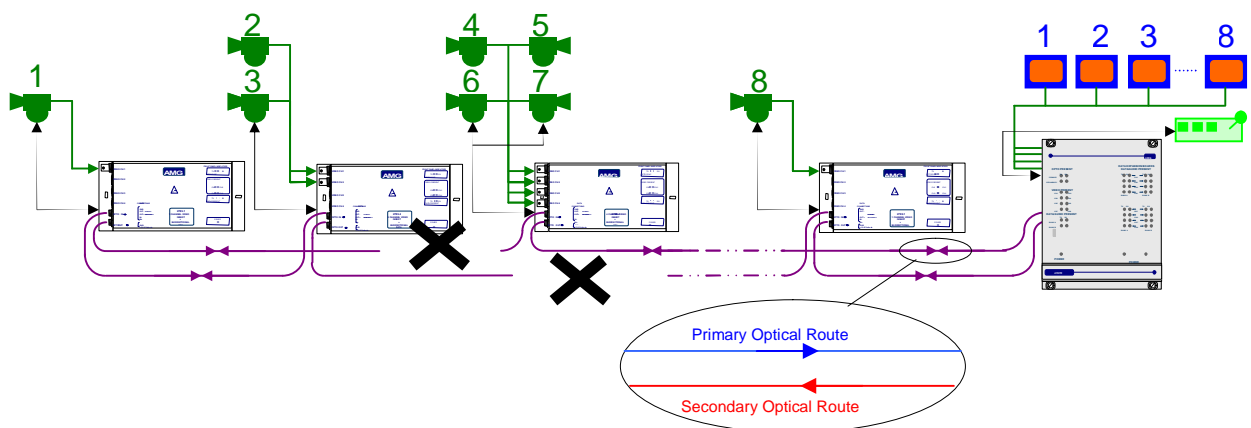
As each unit regenerates the optical signal, the optical dynamic range between each optically connected node is 22dB.



If a fibre link is broken, operation of the ring continues by making use of the secondary optical fibre route as below:



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.



Note that where necessary repeaters can be added at nodes to increase the average distance between nodes.

Connections

Video Input Connections

Connector 75 ohm BNC Socket.
Input Impedance 75 ohm terminated.
Input Level 1 volt p-p nominal
Frequency Response 10Hz to 5.75MHz min.
No of channels 1

Optical Connections

PRIMARY OPTO OUT

Connector LC/PC
Primary Optical Launch Power 0dBm to +5dBm
Wavelength 1550nm
Optical Fibre Single mode

PRIMARY OPTO IN

Connector LC/PC
Primary Optical Sensitivity -22dBm
Primary Optical Overload Level 0dBm
Wavelength 1550nm
Optical Fibre Single mode

SECONDARY OPTO OUT

Connector LC/PC
Secondary Optical Launch Power 0dBm to +5dBm
Wavelength 1550nm
Optical Fibre Single mode

SECONDARY OPTO IN

Connector LC/PC
Secondary Optical Sensitivity -22dBm
Secondary Optical Overload Level 0dBm
Wavelength 1550nm
Optical Fibre Single mode

Note: Because the maximum optical output power level (5dBm) of the **AMG3787E-1-DR-1550-HP** and **AMG3788EN-DR-1550-HP**, is higher than the maximum optical input power level (0dBm), there should always be at least +5dB of optical attenuation between two units, in order to prevent an overload of the optical inputs.

Power Connection

Connector 2.1mm screw lock long power jack – centre positive
(Switchcraft Pt. No. S761K, AMG Pt. No. G16125-00)

Power requirement 12 volt to 16 volt DC @ 1000mA max.

Ethernet Connections

No of Channels 1
Data Connector RJ45
Interface: Auto-negotiation up to 100baseT full duplex

Data Connections

Data/Audio Channels – BANK A 8 channels
Data/Audio Channels – BANK B 8 channels
Connector Two 37-way D-Type female connectors - shielded.
Configuration See next section for connection and configuration

Channel A,B Interface Defined by type of data/audio interface daughter boards fitted into Data Expansion Board.

Data and Audio Channel Configuration

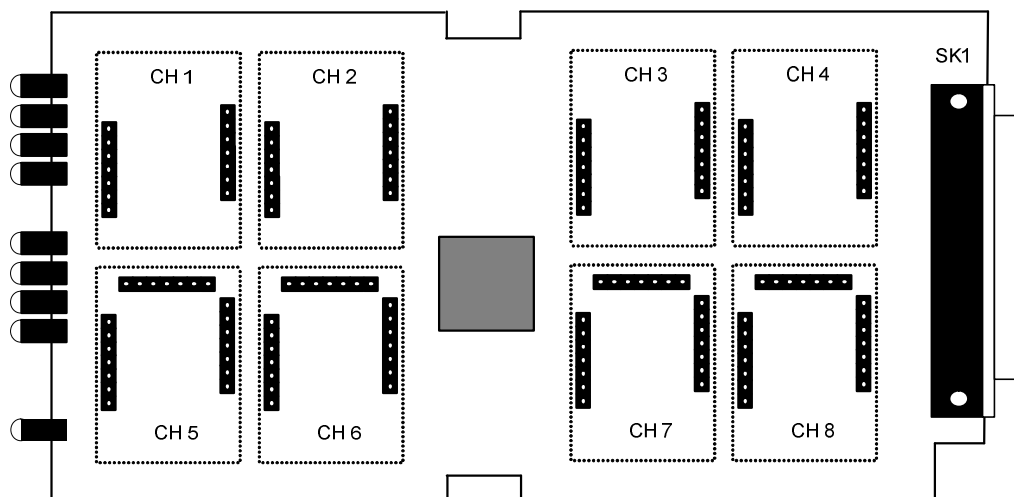
The **AMG3787E-1-DR-1550-HP** sends and receives data to/from Bank A and Bank B each of which carries up to 8 channels of data / audio, the physical interface of which is determined by fitment of AMG data or audio daughter boards onto the A/B Channel data expansion board slots.

For the Bank A/B data or audio channels to be present, appropriate data daughter boards have to be fitted onto the data expansion boards – see configuration sheet shipped with the unit for fitted daughter boards. The data expansion board slots are accessed by removing the **AMG3787E-1-DR-1550-HP** unit from the case. (See below for removal instructions).

In order to enable a data channel an appropriate daughter board should be fitted in the appropriate data channel slots on the data expansion boards. Each data interface board enables one bi-directional channel. The data interface daughter board options are as follows:

Option Code	Part No.	Description
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	X04059	TTL Data Interface Daughter Board
5	X12578	Contact Closure Data Interface Daughter Board
6	X13038	FTT10A Echelon Lonworks Data Interface Daughter Board
7	X14542	4 Wire Audio Interface Daughter Board

The channel slots are as follows:



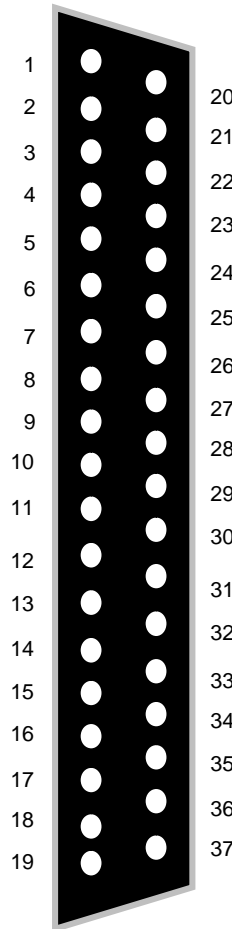
Data and Audio Daughter Board Fitting Instructions

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.

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/B
2	AUDIO/DATA CH1 IN -	A/B
3	AUDIO/DATA CH2 IN +	A/B
4	AUDIO/DATA CH2 IN -	A/B
5	AUDIO/DATA CH3 IN +	A/B
6	AUDIO/DATA CH3 IN -	A/B
7	AUDIO/DATA CH4 IN +	A/B
8	AUDIO/DATA CH4 IN -	A/B
9	GND	
10	GND	
11	GND	
12	AUDIO/DATA CH5 IN +	A/B
13	AUDIO/DATA CH5 IN -	A/B
14	AUDIO/DATA CH6 IN +	A/B
15	AUDIO/DATA CH6 IN -	A/B
16	AUDIO/DATA CH7 IN +	A/B
17	AUDIO/DATA CH7 IN -	A/B
18	AUDIO/DATA CH8 IN +	A/B
19	AUDIO/DATA CH8 IN -	A/B



Pin No.	Description	Bank
20	AUDIO/DATA CH1 OUT +	A/B
21	AUDIO/DATA CH1 OUT -	A/B
22	AUDIO/DATA CH2 OUT +	A/B
23	AUDIO/DATA CH2 OUT -	A/B
24	AUDIO/DATA CH3 OUT +	A/B
25	AUDIO/DATA CH3 OUT -	A/B
26	AUDIO/DATA CH4 OUT +	A/B
27	AUDIO/DATA CH4 OUT -	A/B
28	GND	
29	GND	
30	AUDIO/DATA CH5 OUT +	A/B
31	AUDIO/DATA CH5 OUT -	A/B
32	AUDIO/DATA CH6 OUT +	A/B
33	AUDIO/DATA CH6 OUT -	A/B
34	AUDIO/DATA CH7 OUT +	A/B
35	AUDIO/DATA CH7 OUT -	A/B
36	AUDIO/DATA CH8 OUT +	A/B
37	AUDIO/DATA CH8 OUT -	A/B

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

Front Panel Indicators

Power LED

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

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 and synchronised
	Red/Green	- optical channel receiving but not synchronised
	Off	- optical channel not receiving
Secondary Opto Sync TX.....	Green	- optical channel transmitting
	Off	- optical channel not transmitting
Primary Opto Sync RX	Green	- optical channel receiving and synchronised
	Red/Green	- optical channel receiving but not synchronised
	Off	- optical channel not receiving

Video LED's

Video Present	Green	- video signal present on video input BNC
	Off	- no video signal present on video input BNC

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/Green	- 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.

Data LED's

BANK A (When data daughter board fitted)

Data Present CH1-8 TX.....	Green	- logic one present on the data input
	Red	- logic zero present on the data input
	Off	- tri-state off or no connection on the data input

This represents the data signals being transmitted on the optical fibre

Data Present CH1-8 RX	Green	– logic one present on the corresponding data output
	Red	– logic zero present on the data output
	Off	– tri-state off on the data output

This represents the data signals being received on the optical fibre

BANK A (When audio daughter board fitted)

Audio Present TX	Green	– when an audio level between –40dBm and +0dBm is on the audio input (600ohm).
.....	Red	– when an audio level above 0dBm is on the audio input. (600ohm).
.....	Red/Green	– when an audio level peaking above 0dBm is on the audio input. (Note audio daughter board will accept up to +6dBm (600ohm).
.....	Off	– when an audio level is below –40dBm on the audio input. (600ohm).

This represents the audio signals being transmitted on the optical fibre

BANK B (When data daughter board fitted)

Data Present CH1-8 TX.....	Green	– logic one present on the data input
	Red	– logic zero present on the data input
	Off	– tri-state off or no connection on the data input

This represents the data signals being transmitted on the optical fibre

Data Present CH1-8 RX	Green	– logic one present on the corresponding data output
	Red	– logic zero present on the data output
	Off	– tri-state off on the data output

This represents the data signals being received on the optical fibre

BANK B (When audio daughter board fitted)

Audio Present RX	Green	– when an audio level between –40dBm and +0dBm is on the audio output (600ohm).
.....	Red	– when an audio level above 0dBm is on the audio output. (600ohm).
.....	Red/Green	– when an audio level peaking above 0dBm is on the audio output. (Note audio daughter board will transmit up to +6dBm (600ohm).
.....	Off	– when an audio level is below –40dBm on the audio output. (600ohm).

This represents the audio signals being received from the optical fibre

Ethernet Operation

In order for the 3700 unit to transmit Ethernet signals, the X16003 Ethernet interface should be fitted to all units in the ring. This is supplied as standard in the **AMG3785**, **AMG3786** and **AMG3787** type units.

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 bandwidth available for transmission within the ring is nominally 100Mbit/s. If one node is transmitting, all this bandwidth is available for this traffic. If multiple nodes transmit simultaneously on the ring, then the bandwidth shares 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 3700 receiver 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.

Physical Information

Dimensions

Height	132mm
Width.....	172mm (excluding connectors)
Depth	105mm
Weight.....	1200grams

Mounting Details

The unit is designed to mount on a panel using 4 off 4mm screws, see schematic on page 1.

Removal/replacement from/to the Case

Note: The 3700 series PCB's are static sensitive. Handle with proper care and use normal electrostatic discharge (ESD) procedures. Use properly grounded protection (for example, wrist stamps) when handling the PCB.

To remove units from the case to access the data expansion board and the daughter boards, remove the 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 fibres do not snag or get trapped.

Safety

The 3700 series of products uses a Class 1 laser system 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 the optical fibres systems see EN60825-2:2000 or your local safety officer.

Maintenance and Repair

There are no user serviceable parts within the AMG3700 products.

In case of problem or failure contact your local support centre or AMG Systems Ltd, Technical Support Department on tel. +44 (0) 1767 600777.

See unit data sheet for full specification.