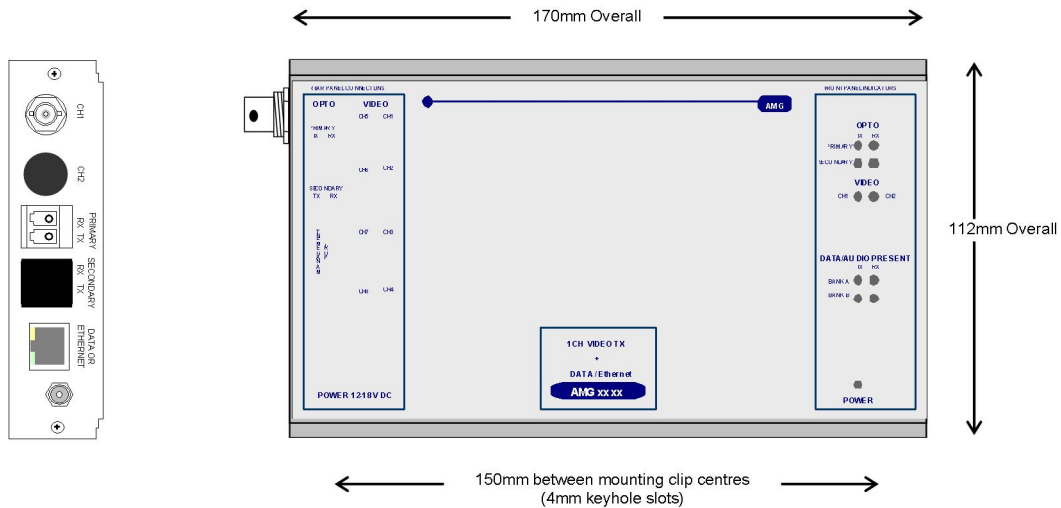


Single Channel Video Insert Unit with Bi-Directional Data Channel for a Dual Redundant Fibre Ring



The **AMG6113-DR-SF** is a standalone single channel video insert unit designed to transmit one video signal onto a singlemode optical fibre ring with Dual Redundant operation. It also provides one bi-directional data channel via a low speed data interface.

In addition, LED diagnostics is inherent within each unit to enable easy identification of fault location from any position in the loop.

The **AMG6113-DR-SF** is designed to be powered using an **AMG2003** standalone power supply.

The **AMG6113-DR-SF** is designed to operate with an **AMG6184-DR-SF** or rackmount equivalent **AMG6184R-DR-SF** eight channel video, and data 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 insert units.

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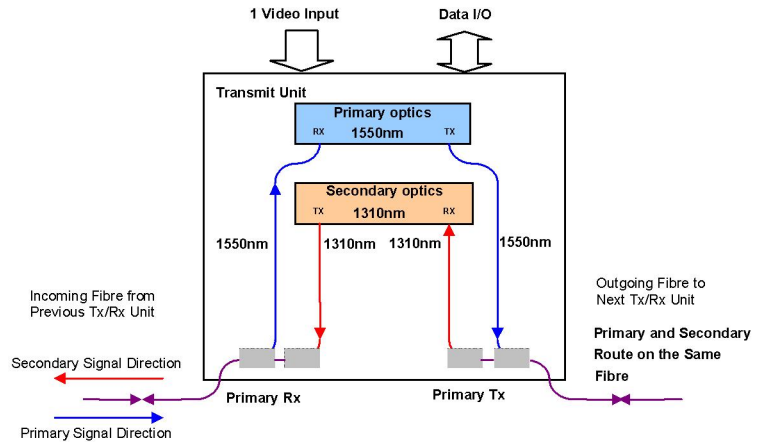
Introduction

Unit Functional Schematic

The **AMG6113-DR-SF** transmits and receives the optical signals from both a primary and secondary optical channel.

These optical channels are transmitted on the same optical fibre in opposite directions, operating at different wavelengths.

The primary channel operates on 1550nm and the secondary channel on 1310nm.



The **AMG6113-DR-SF** receives and drops off data signals transmitted from an **AMG6184-DR-SF** receiver. It then inserts video and data 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 **AMG6113-DR-SF** or rackmount **AMG6113R-DR-SF** 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.

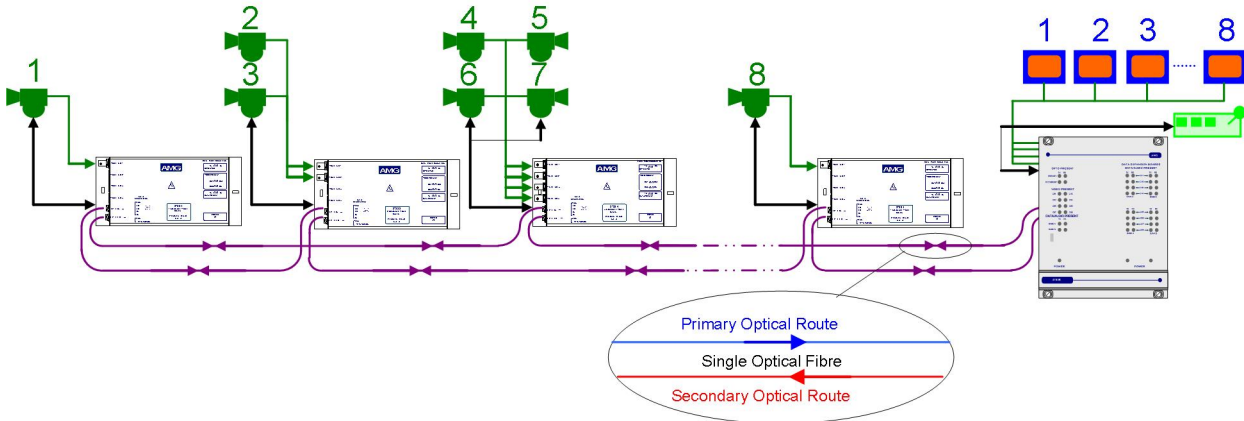
Dual Redundant Operation

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

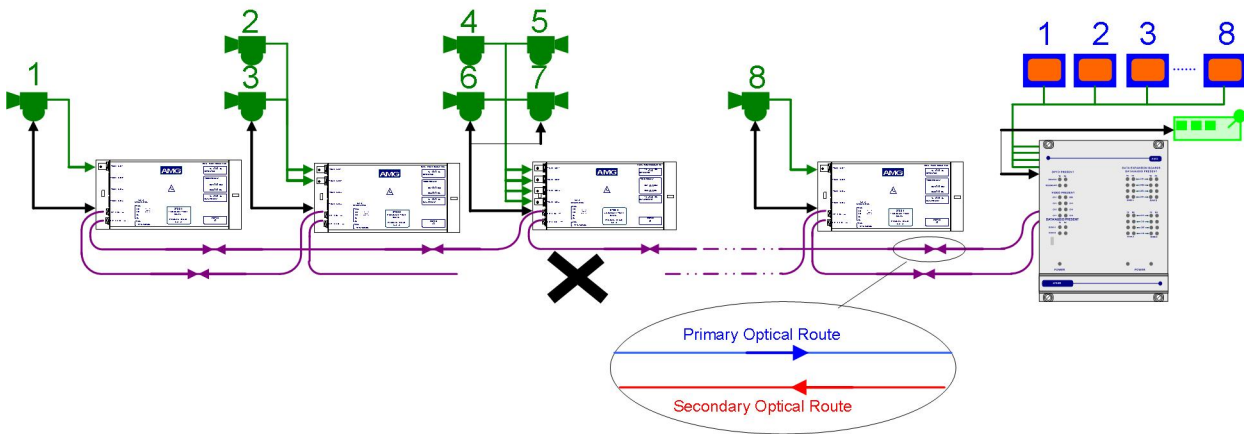
If the primary input signal is not present, a unit will shut down the secondary output to inform the previous unit that the signal route is not OK. The previous unit will then send out the video and data signals on its secondary output in the opposite direction. This signal will be repeated around the ring to get back to this unit 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, an insert 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.

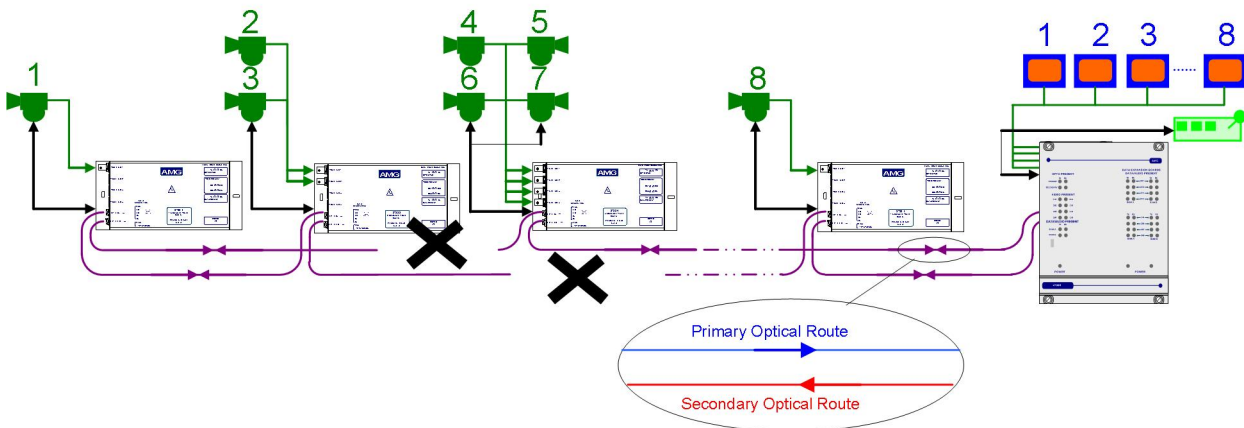
The **AMG6113-DR-SF** or rackmount **AMG6113R-DR-SF** is designed to be connected in a ring or point to point system. In a ring system, single, dual and four channel insert units respectively can be combined to make up an 8 channel video transmission system as illustrated below.



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.



Connections

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 RJ45 connector.

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

DATA CHANNEL B

Data Channel B Not Present

Video Input Connections

No. of channels..... 1
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..... 1550nm
Secondary Optical Sensitivity..... -22dBm
Wavelength..... 1310nm

PRIMARY OPTO IN

Connector LC/PC
Primary Optical Sensitivity..... -22dBm
Wavelength..... 1550nm
Secondary Optical Launch Power -5dBm
Wavelength..... 1310nm

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 5 Watts

Data and Audio Channel Configuration

Data and Audio Channel Configuration

The **AMG6113-DR-SF** and rackmount equivalent **AMG6113R-DR-SF** 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 high]	RS422 [switch mid]	RS232 [switch low]	
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.

Front Panel Indicators

Power LED

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

Video Input LED's

Video Present CH1	Green	-	video signal present on input BNC
	Org	-	channel present but no video on I/P BNC

Fibre Optic LED's

Primary Opto Sync TX.....	Green	-	optical channel transmitting
	Off	-	not transmitting
Primary Opto Sync RX	Green	-	optical channel receiving
	Org	-	receiving but not synchronised.
	Red	-	receiving, but fault on a previous unit**
	Off	-	not receiving
Secondary Opto Sync TX.....	Green	-	optical channel transmitting
	Off	-	not transmitting
Secondary Opto Sync RX	Green	-	optical channel receiving
	Org	-	receiving but not synchronised.
	Red	-	receiving, but fault on a previous unit**
	Off	-	not receiving

**See appropriate section on Self Diagnostic LEDs for full description.

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

Self Diagnostic LED indicators

In normal operation, data is transmitted continuously on both a Primary and a Secondary optical channel in different directions around the fibre loop. The system is Dual Redundant and if one or more optical faults develop, the ring will automatically adapt to maintain the best optical path.

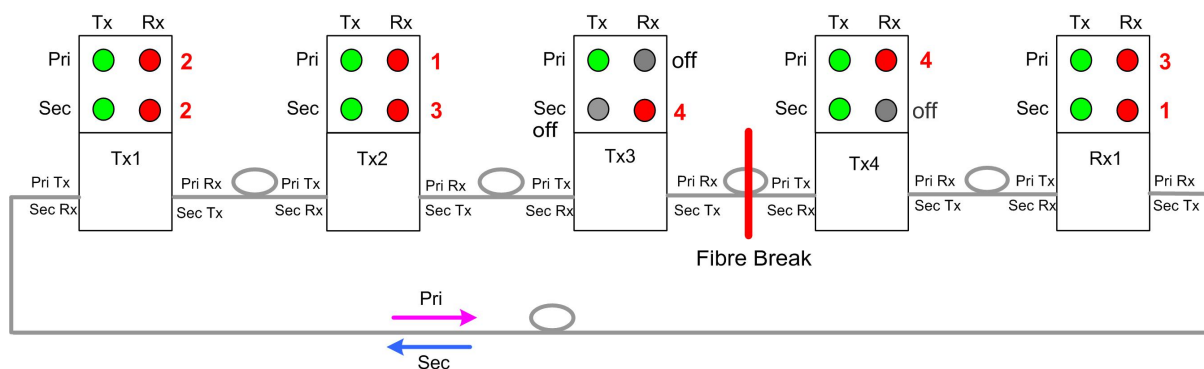
An **AMG6184-DR-SF** or rackmount **AMG6184R-DR-SF** receive unit continuously monitors the optical status of each **AMG6113-DR-SF** or **AMG6113R-DR-SF** insert unit and sends this status information around the fibre loop to every insert unit. Each insert unit displays the status of both the Primary and Secondary optical channels using the fibre optic status LEDs. This information is in addition to the standard status indication.

An optical fault condition can either be as a result of a failed insert unit or a fibre break. If an optical fault is present at a preceding insert unit, the relative location of the optical fault is indicated by flashing (red) the appropriate Primary Rx or Secondary Rx LED a number of times. The location of the failed unit is viewed relative to itself and in the direction of the received optical signal. The number of red LED flashes is a "count" which indicates the number of working units between itself and the optical fault.

In the case of a complete failure of the Receive Unit or all connected optical fibres, this would render the system unusable and the Diagnostic LED indicators invalid.

Self Diagnostic LED Example 1: Single Fibre Break

In the following example, a system is comprised of four insert units Tx1-Tx4 and one receive unit Rx1 and there is a fibre break present between two adjacent insert units Tx3 and Tx4. The break affects both the the Primary and Secondary Optical channels.



a) At insert unit Tx1, the Pri-Rx LED flashes twice: indicating a Primary Rx. fault in the direction of Tx2, 2 units away. The Sec. Rx LED flashes twice: indicating a Secondary Rx. fault in the direction of Rx1, 2 units away.

b) At insert unit Tx2, the Pri-Rx LED flashes once: indicating a Primary Rx. fault in the direction of Tx3, 1 unit away. The Sec. Rx. LED flashes 3 times: indicating a Secondary Rx. fault in the direction of Tx1, 3 units away.

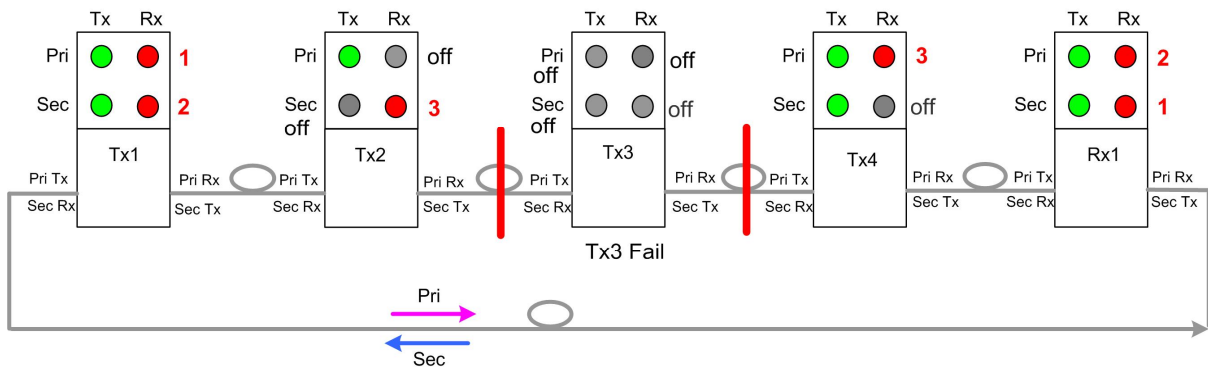
c) At insert unit Tx3, the Pri-Rx LED is off: indicating that this unit is not receiving a Primary signal from Tx4. The Sec. Rx LED flashes 4 times: indicating a Secondary Rx. fault in the direction of Tx2, 4 units away. The Sec-Tx LED is off: indicating that the Secondary Tx. (output) has been turned off.

d) At insert unit Tx4, the Pri Rx LED flashes 4 times: indicating a Primary Rx. fault in the direction of Rx1, 4 units away. The Sec. Rx LED is off : indicating that this unit is not receiving a Secondary signal from Tx3.

e) At receive unit Rx1, the Pri-Rx LED flashes 3 times: indicating a Primary Rx. fault in the direction of Tx1, 3 units away. The Sec. Rx LED flashes once: indicating a Secondary Rx. fault in the direction of Tx4, 1 unit away.

Self Diagnostic LED Example 2: Tx. Unit Failure

In the following example, a system is comprised of four insert units Tx1-Tx4 and one receive unit Rx1 and there is a complete failure or power loss at Tx unit Tx2. This effectively creates two fibre breaks between adjacent insert units Tx2 and Tx3, and between Tx3 and Tx4. The break affects both the the Primary and Secondary Optical channels.



a) At insert unit Tx1, the Pri-Rx LED flashes once: indicating a Primary Rx. fault in the direction of Tx2, 1 unit away. The Sec. Rx LED flashes twice: indicating a Secondary Rx. fault in the direction of Rx1, 2 units away.

b) At insert unit Tx2, the Pri-Rx LED is off: indicating that this unit is not receiving a Primary signal from Tx3. The Sec Rx. LED flashes 3 times: indicating a Secondary Rx. fault in the direction of Tx1, 3 units away. The Sec. Tx LED is off: indicating that the Secondary Tx. (output) has been turned off.

c) At insert unit Tx3, the unit has failed or lost its supply power, so all LEDs are off.

d) At insert unit Tx4, the Pri-Rx LED flashes 3 times: indicating a Primary Rx. fault in the direction of Rx1, 3 units away. The Sec. Rx LED is off: indicating that this unit is not receiving a Secondary signal from Tx3.

e) At receive unit Rx1, the Pri-Rx LED flashes twice: indicating a Primary Rx. fault in the direction of Tx1, 2 units away. The Sec. Rx LED flashes once: indicating a Secondary Rx. fault in the direction of Tx4, 1 unit away.

Physical Information

Dimensions

Height..... 112mm
Width..... 170mm (excluding connectors)
Depth 35mm
Weight..... 500grams

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. 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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