OPTIC▲L
SYSTEMS
DESIGN

OPERATOR MANUAL

OSD8816B SERIES

DIGITAL VIDEO AND DATA

FIBER OPTIC TRANSMISSION SYSTEM

INDEX 1

1 TECHNICAL SUMMARY

1.1 BRIEF DESCRIPTION

1.1.1 OVERVIEW

The OSD8816B series is a high-quality fiber optic digital video and data transmission system. The system consists of the OSD8816BT and the OSD8816BR, which are designed to be used as a pair, and provide one-way transmission of PAL, NTSC or SECAM video, plus full-duplex transmission of one data channel.

The OSD8816BT accepts one analog composite video input signal along with one digital data input signal. The video signal is converted to digital with 10-bit[*1] resolution so as to preserve the quality of the input signals. The resulting digital signal is multiplexed and transmitted as a digital bit-stream through the fiber. The OSD8816BT also includes an optical receiver section that decodes the digital signal transmitted by the OSD8816BR, to provide data output signals. Data can be TTL, RS232, RS485 or RS422 31kHz Manchester or Bi-phase. The OSD8816BT receiver provides adjustment free operation over the full optical range of the unit.

The OSD8816BR incorporates a high performance optical digital receiver for incoming video and data signals, and a transmitter that outputs a digital optical signal consisting of one data channel. The unit provides a constant video output level which is independent of link loss, and data section of the OSD8816BR is also adjustment free over all link lengths. Data signal interface levels are the same as those of the OSD8816BT.

The OSD8816BT and OSD8816BR are available in two physical configurations: card or module. The card versions are designed to fit the 3RU-high 19" OSD370N or OSD350N chassis, which allows multiple OSD card products to be conveniently powered from and located in the one chassis. The module case versions are intended for isolated use and require an external power source.

The OSD8816B system can be used with any standard singlemode or multimode optical fiber over a single fiber for transmission and reception.

[*1] Video resolution can be either 10-bit with reverse data only, or 9-bit with duplex data (i.e. forward and reverse data). See section 1.6 for further details

1.1.2 APPLICATIONS

▲ High quality CCTV networks requiring full duplex or reverse data transmission between cameras and their control center

▲ Transportation communication systems

1.1.3 FEATURES AND BENEFITS

▲ One way optic transmission of PAL, NTSC or SECAM video plus either both way or reverse transmission on one data channel

▲ Broadcast quality 10 bit video maintained over all link lengths.

▲ Video bandwidth of 10MHz

▲ Remote control of Pan, Tilt and Zoom for video surveillance

▲ Transmission of alarm and control signals from the camera site

▲ Operates over singlemode or multimode fiber

▲ Operating range of at least 3km on multimode fiber and 100km on singlemode fiber, depending on optical devices

▲ Single fiber operation

1.2   TYPICAL CONFIGURATION

Figure 1 below indicates the typical set-up for an OSD8816B system.
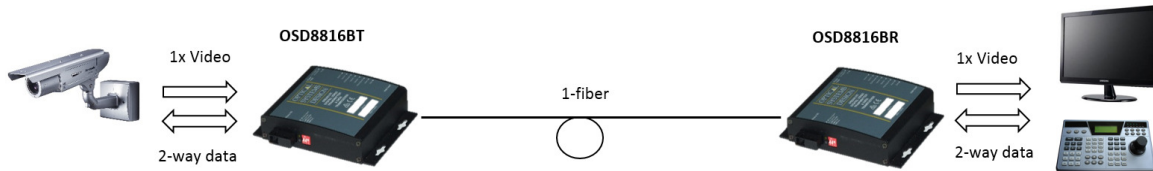

FIGURE 1: TYPICAL CONFIGURATIONS

The OSD8816BT and OSD8816BR pair can provide one forward video transmission and full duplex data transmission between camera (transmitter) and monitoring site (receiver) or one way data transmission from the monitoring site (receiver) to the camera (transmitter) only.

1.3   PRODUCTS AND OPTIONS

There are various options available for the OSD8816B as identified in Table 1 below:

OSD8816B   T   C   R   (example only)
            ❶   ❷   ❸

TABLE 1: PRODUCTS AND OPTIONS

❶

ITEM	DESCRIPTION
T	Transmitter

❷

ITEM	DESCRIPTION
-	Card version (3RU high chassis mount for OSD370 or OSD350)
C	Stand-alone module version

❸

ITEM	DESCRIPTION
-	Standard
R	Contact transmission from OSD8816BT to OSD8816BR

1.4 TECHNICAL SPECIFICATIONS

TABLE 2: TECHNICAL SPECIFICATIONS

SPECIFICATION	PERFORMANCE
Video Input/Output Impedance	75Ω composite
Video Input/Output Levels	1Vpp nominal
Video Connectors	BNC
Video Bandwidth	5Hz to 10MHz
Signal to Noise Ratio (Weighted)	> 67dB for 10-bit operation > 64dB for 9-bit operation
Linearity	<0.7% Differential Phase (DP) <0.7° Differential Gain (DG)
Data Interface	TTL, RS232, RS422 and RS485. 31kHz Manchester or Biphase possible in either direction
Optional Contact Transmission (from OSD8816BT to OSD8816BR only)	Optoisolated MOSFET output at OSD8816BR
Data Rates	DC to > 1.0Mbps
Data Connectors	8 Way terminal block with screw clamps
Number of Fibers Required	One only
OSD8816BT Transmitter Wavelength	1310nm
OSD8818T Transmitter Coupled Power	-14 to -5dBm into singlemode fiber -17 to -8dBm into multimode fiber
OSD8816BR Transmitter Wavelength	1550nm
OSD8816BR Transmitter Coupled Power	-15 to -5dBm into singlemode -22 to -10dBm into multimode fiber
OSD8816BR Receiver Sensitivity	<-27dBm (singlemode fiber) <-24dBm (multimode fiber)
OSD8816BR Receiver Saturation	>-3dBm
OSD8816BT Receiver Sensitivity	<-36dBm (singlemode fiber) <-28dBm (multimode fiber)
OSD8816BT Receiver Saturation	>-3dBm
Optical Connectors	ST standard, others optional
Optical Link Budget and distances	>7dB: >3km on multimode fiber @ 1310nm (fiber bandwidth limited) >13dB: >30km on singlemode fiber @ 1310nm (fiber loss limited) >30dB: >80km on singlemode fiber @1310nm with high power devices*
Dimensions (mm)	114W x 105D x 31H (module – excluding flanges and connectors) 25W x 208D x 100H (card)
Weight	0.35kg (module), 0.2kg (card)
Power Requirements	+9V to +35V$_{DC}$ or 22V to 28V$_{AC}$ @ 3VA
Operating Temperature	-20°C to +75°C
Relative Humidity	0 to 95% non-condensing
Chassis Current Consumption (CCC)	0.25 Amp

102881615

NOTES:

*Other combinations of laser types and optical levels, receiver types and sensitivity levels are possible. Contact OSD for details.

1.5   PIN ASSIGNMENTS

Pin assignments for the "Data Input/Output" 8 way terminal block connector (Figure 2) is shown in Table 3 below.

TABLE 3: PIN ASSIGNMENT

PIN	FUNCTION	PIN	FUNCTION
1	Data Input +	**5**	Data Output $-$ / *4
2	Data Input $-$	**6**	RS232 Data Output /*4
3	RS232 Data Input	**7**	Data Ground
4	Data Output + / *4	**8**	Mode: N/O*2 – 10-bit video, reverse data only N/C *3 – 9-bit video, duplex data

NOTES:

*2   10-bit video resolution and reverse data only when pin 8 is left Normally Open (N/O) and SW3 (T3) left OFF (UP) (see Table 4 and Figure 3)

*3   9-bit video resolution and full duplex (or forward) data, only when pin 8 is connected to ground pin.

RS422 / 4W RS485

Pin	Connection
1	Rx +
2	Rx –
4	Tx +
5	Tx –
7	Ground

2W RS485

Pin	Connection
4	I/O +
5	I/O –
7	Ground

*4**Optional Relay Output (8816BR only)**
OSD8816BT

Pin	Connection
2	Contact Input
7	Ground

OSD8816BR

Pin	Connection
4	Normally open (NO)
6	Common (COM)

RS485 2-Wire half duplex is used to connect several devices to the same bus when only one unit transmits data at a time. All units are normally in high impedance receive mode waiting for data. When transmission of data is requested, the device waits for a protocol specific turn-around time delay before transmitting after which it returns to receive mode.

RS485 4-Wire full duplex is used for master/slave arrangement. Devices are polled and respond faster with no turn-around time delay required between request/response. The receiver is always enabled allowing the devices to receive data even while responding to a request.

Note: If a link doesn't seem to be working correctly, try swapping the polarity of the data lines on both ends.   Some devices are marked opposite the RS485 standard.
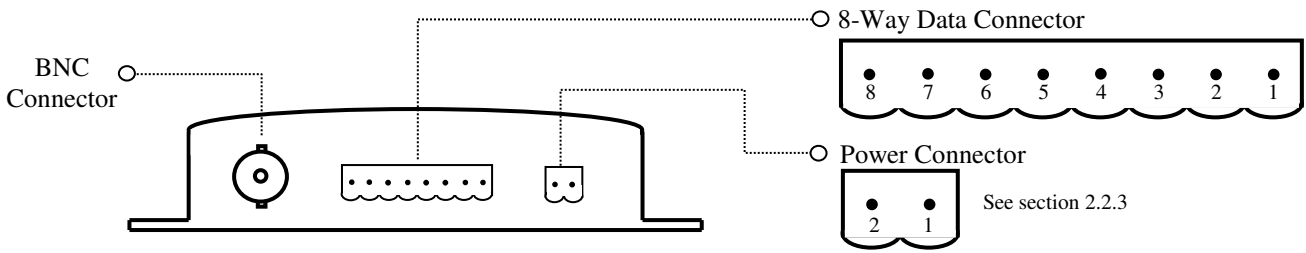
FIGURE 2: REAR PANEL CONNECTORS

1.6 DATA MODE SWITCH SETTINGS

The 3-way data control switch is located at the front of OSD8816B modem. Switches SW1, SW2 and SW3 are used for setting the Data Mode Options.

Note: For correct operation, ensure that both OSD8816BT and OSD8816BR have the switch settings in the same modes.

TABLE 4: DATA MODE SWITCH SETTINGS

SWITCH	STATE	POSITION	FUNCTION
SW1	OFF	DOWN	RS422
	ON	UP	RS485
SW2	OFF	DOWN	4-Wire Operation
	ON	UP	2-Wire Operation
SW3	OFF	DOWN	10-Bit Video Mode
	ON	UP	9-Bit Video + Data Mode

Note: For optional relay version, the switch settings must be set to RS422, 4-Wire, 9-Bit settings (ie. SW1-Off, SW2-Off, SW3-On.
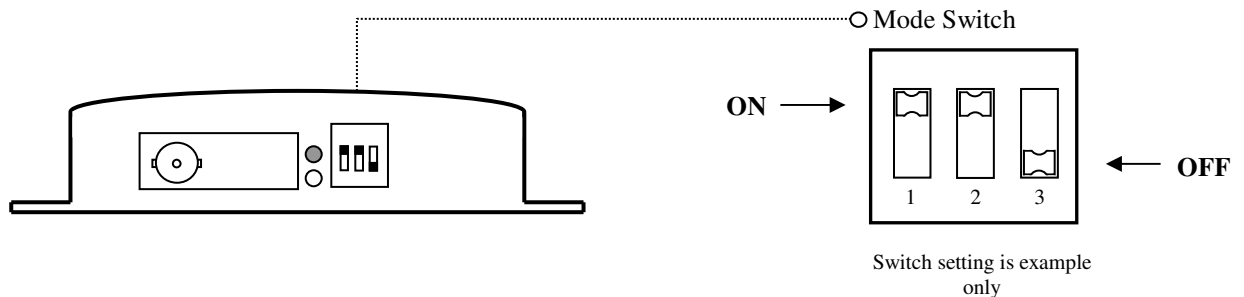

FIGURE 3: DATA SWITCH DIAGRAMS

2 INSTALLATION AND OPERATION

2.1 INTRODUCTION

This section outlines the methods required to install and operate the OSD8816BT and OSD8816BR successfully. It should be studied carefully if damage to the equipment or poor results are to be avoided.

This equipment has been fully tested prior to dispatch and is ready for immediate operation. However it is advisable to check for external transportation damage before operation. If damage is evident, return the unit with the packaging to your supplier immediately.

2.2 INSTALLATION

2.2.1 WARNING AND PRECAUTIONS

▲ **ELECTROMAGNETIC COMPATIBILITY**

WARNING: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

▲ **OPTICAL OUTPUT OPERATION**

WARNING: **Laser Safety:** Class 1 Laser Product per IEC/EN 60825-1:20011 standard.

| Class 1 |
|---|
| The OSD8816B is a **Class 1 laser product.** |
| CLASS 1 LASER PRODUCT |
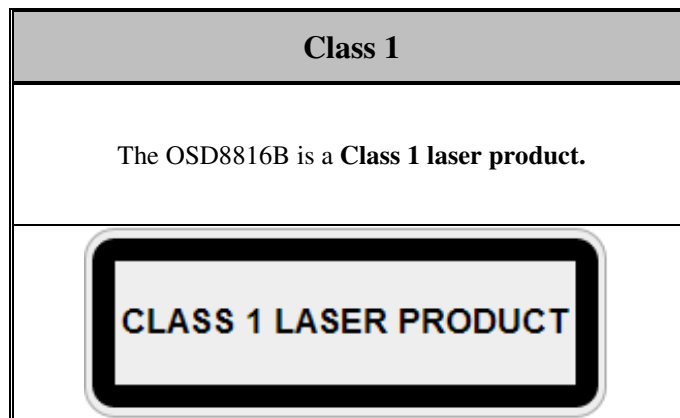
PRECAUTIONS

▲ All service personnel should be provided training as to the hazards of direct viewing of laser radiation and of the precautionary measures during servicing of equipment

▲ Areas where laser products are installed should be restricted in access to trained service personnel only and appropriate warning signs posted in the work area.

▲ All laser apertures should be covered by protective covers when not connected to optical fibers. Never leave outputs uncovered.

▲ Laser equipment should be positioned above or below eye level where possible. Apertures should be positioned away from personnel.

▲ Protective eyewear should be worn in the vicinity of laser equipment.

2.2.2   DRAWINGS AND DIMENSIONS

The OSD8816BTC and OSD8816BRC are designed to be mounted on an even surface and to be secured by means of M4 or smaller screws. The OSD8816BT and OSD8816BR card versions are designed to be inserted into a chassis and secured by means of captivated screws.
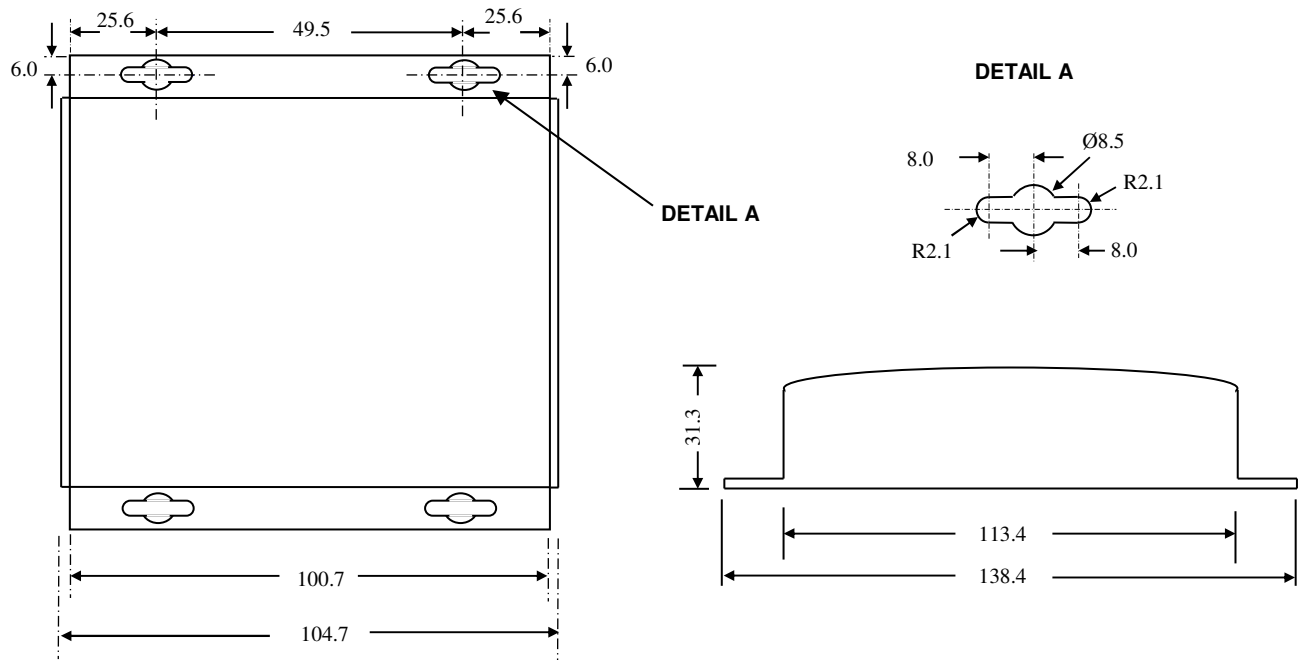
(a) Module Version
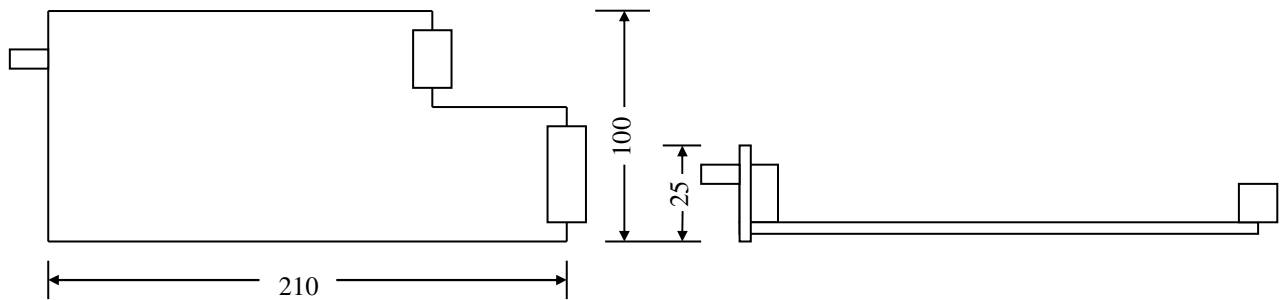
(b) Card Version

FIGURE 4: MOUNTING DIMENSIONS

2.2.3   POWER SUPPLY CONNECTIONS

The OSD8816B card version is powered from the OSD370N or OSD350N chassis. DC power in the OSD881B6 card version is connected via a DB9 connector. The card version of the OSD8816BT and OSD8816BR should be fixed into the chassis using the captivated screws. Either card can be plugged in or out of the chassis with power on or off.

TABLE 5: CARD POWER SUPPLY PINOUT

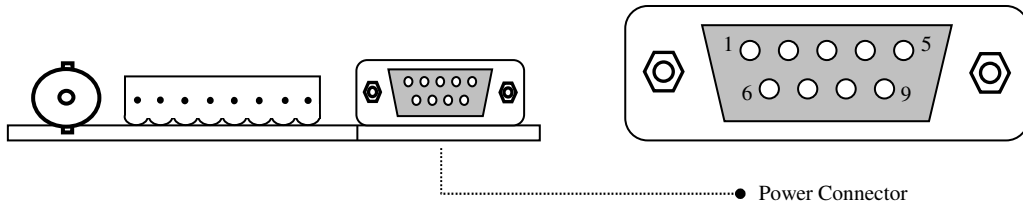| OSD370N or OSD350N Power Pin	Specification
Pin 3	$+12V_{DC}$ ($\pm1V$) – supplied by OSD921
Pin 6,7	0V

FIGURE 5: CARD POWER SUPPLY PINOUT

The OSD8816B module requires external +9 to $35V_{DC}$ or 22 to $28V_{AC}$ power @ 3VA. Power should be connected to the power socket located at the back of the case. DC power should be connected as indicated in Table 6.

TABLE 6: DC OR AC POWER CONNECTION

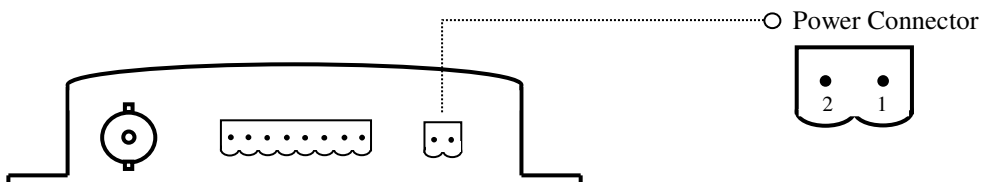| External Power Pin	Specification
Pin 1	+9V to $+35V_{DC\ or}$ 22V to $+28V_{AC}$
Pin 2	0V

FIGURE 6: MODULE POWER SUPPLY CONNECTIONS

2.2.4   OTHER CONNECTIONS

The video-input signal (eg. from camera) is connected to the video input BNC connector on the OSD8816BT. The video output signal (eg. to monitor) is connected from the video output BNC connector on the OSD8816BR.

Data signals are connected to the 8 way terminal block connector as set out in Table 3.

The optical fiber cable must be terminated with the appropriate optical connector. Before connection, inspect the ends of the connectors to ensure that no dust or dirt is present as it could contaminate the modem connector and result in poor performance.

If it is necessary to clean the cable connectors, use isopropyl alcohol and lint free tissue to remove contamination.

2.3   OSD8816B OPERATION

2.3.1   OSD8816BT AND OSD8816BR OPERATION

When using the OSD8816B for the first time, check that the unit is in good condition with no visible damage.

If a card version is used, insert it in an appropriate slot on the OSD370 or OSD350 chassis and check that the indicators illuminate accordingly on power up (see Table 5). If a module version (OSD8816BC) is used, connect the unit to an appropriate power source and check that the indicators illuminate accordingly on power up (see Table 7).

To connect a video signal, connect a BNC terminated coaxial cable from the camera to the OSD8816BT. If the camera is operational, the "Video Present" indicator should illuminate 'Amber'.

Connect a BNC terminated coaxial cable between the BNC socket on the rear of the OSD8816BR and the video monitor or switcher.

Plug in the optical connectors of the optical cable. If the set-up is connected correctly, the OSD8816BR "Link OK" LED will change from 'Red' to 'Green'. If a video signal is being received the "Video Present" indicator on the OSD8816BR should be 'Amber'; if no video signal is being received this indicator will not be illuminated.

Plug the digital signal source (data) into 8 way terminal block connector on the rear of the module.

Ensure that the correct signals are connected to the correct pins of Data Input/Output connector as specified in Table 3.

Ensure that both OSD8816BT and OSD8816BR switch settings are in the same modes (see Table 4).
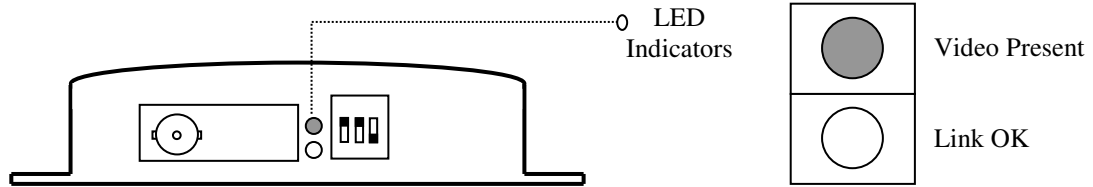
2.3.2   OSD8816BT AND OSD8816BR INDICATORS

FIGURE 7: LED INDICATORS

TABLE 7: INDICATOR FUNCTION

INDICATOR	PARAMETER	COLOUR	FUNCTION
VIDEO PRESENT	Video Input Status	Off	No video signal present
		Amber	Video signal present
LINK OK	Link Status	Red	No optical signal received
		Green	Optical Signal received

NOTE:

"Link OK" Indicator refers to the received data stream. LED is 'green' after the optical link is established and the receiver is locked onto the incoming data stream and detects a low Bit Error Rate. LED will indicate 'red' after the Bit Error Rate reaches an unacceptable level or when there is no optical link established.

3 MAINTENANCE

3.1 INTRODUCTION

The following section outlines the fault-finding procedure for the OSD8816BT and OSD8816BR modems. Please take note of the following:

▲ Personnel without appropriate training should not attempt any maintenance except that outlined below.

▲ If further maintenance is attempted you are warned that every care should be taken to ensure that internal measurements made while the equipment is operational are taken carefully as some components within the unit are expensive and may be damaged by failure of any portion of their support circuitry.

▲ Some components within the unit are Electrostatic (ES) sensitive and Electrostatic Discharge (ESD) precautions should be taken when performing maintenance upon the unit.

3.2 EXTERNAL INSPECTION

Visually check for the following:

▲ Check that the correct power source is connected to the power socket.

▲ Check that the data signals are connected to the modem correctly and that the distant OSD8816BT or OSD8816BR modem has been terminated correctly to any external equipment.

▲ Inspect the optical connectors for any contamination and clean using isopropyl alcohol and a lint free tissue if any contamination is detected.

▲ Check that any external termination resistors are connected if the system configuration requires them.

3.3 ROUTINE MAINTENANCE

▲ There is no routine maintenance required with the OSD8816BT and OSD8816BR.

4   WARRANTY

Thank you for purchasing equipment designed, manufactured and serviced by Optical Systems Design (OSD). OSD warrants that at the time of shipment, its products are free from defects in material and workmanship and conforms to specifications. Our Warranty conditions are outlined below:

4.1   WARRANTY PERIOD

For warranty period, please call your local OSD distributor.

4.2   REPAIRS

Optical Systems Design reserves the right to repair or replace faulty modules/units. Please obtain a "Return Material Authorisation" (RMA) form and number before returning goods.
Goods must be returned in adequate packing material to Optical Systems Design, Warriewood or its nominated authorised representative, for all repairs.

4.2.1   WARRANTY REPAIRS

Return shipments to OSD shall be at customer's expense and freight back to the customer will be at OSD expense.

4.2.2   OUT-OF-WARRANTY REPAIRS

OSD reserves the right to repair or replace any faulty goods. Freight costs and insurance for both journeys are met by the user. All equipment repaired by OSD will have a 3-Month Warranty from the date of dispatch.

4.2.3   SITE REPAIRS

By agreement site repairs may be undertaken for which out of pocket, hotel and travel expenses will be charged.

4.2.4   EXCLUSIONS

This warranty does not apply to defects caused by unauthorized modifications, misuse, abuse or transport damage to the equipment. All modifications to OSD's standard product will need written authorization and will be charged at normal repair rates. All modifications are to be carried out by OSD Technicians. Warranty is void if unauthorized removal and/or tampering with serial number and/or labels is evident.

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