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**OPTICAL**

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**SYSTEMS**

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**DESIGN**

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**OPERATOR MANUAL**

**OSD418 SERIES**

**VIDEO AND DATA**

**FIBER OPTIC TRANSMISSION SYSTEM**



# OPTICAL SYSTEMS DESIGN

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## 1 TECHNICAL SUMMARY

### 1.1 BRIEF DESCRIPTION

#### 1.1.1 APPLICATIONS

- ▲ CCTV networks requiring half or full duplex data transmission between cameras and control center

#### 1.1.2 FEATURES AND BENEFITS

- ▲ Fiber optic transmission of video and data signals from a CCTV camera and of data signals to the camera
- ▲ Remote control of Pan, Tilt and Zoom for video surveillance
- ▲ Transmission of alarm and control signals from the camera site
- ▲ Video bandwidth in excess of 6MHz
- ▲ Operating range of over 5km on multimode fiber and 50km on singlemode fiber with standard devices and greater than 100km with optional lasers.
- ▲ Immunity to electrical interference, low radiation with complete end-to-end isolation
- ▲ Safe transmission in hazardous environments
- ▲ Optional contact closure termination in lieu of data signaling

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### 1.1.3 PRODUCT DESCRIPTION

The OSD418 series is a fiber optic transmission system for CCTV quality video signals, and includes a Pan Tilt Zoom (PTZ) control signal return path, making it ideal for use in security monitoring systems. The OSD418 system is comprised of the OSD418T fiber optic video transmitter and the OSD418R fiber optic video receiver, which are designed to operate as a pair, forming the complete video and data transmission system.

The OSD418T transmitter unit consists of an optical transmitter section that transmits video and digital data using FM, and an optical receiver section that receives data signals to the camera for control purposes. The data can be RS232, TTL, RS422 or RS485 at DC to 64kbps data rate. The control signal receiver section provides adjustment free operation over the full optical range of the unit.

The OSD418R receiver unit consists of a high-performance optical FM receiver for incoming video and data signals and a transmitter section for sending data control signals to the camera. The unit provides a constant video output level that is independent of link loss, while the data section is also adjustment free over all link lengths.

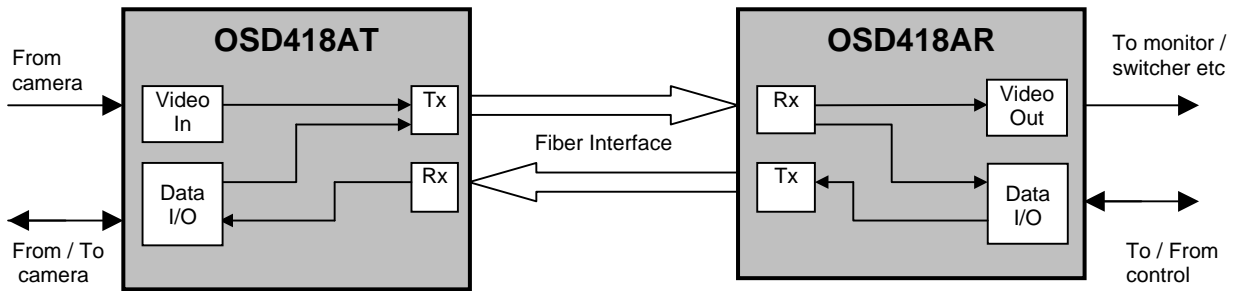
The OSD418T and OSD418R are available in two physical configurations: card and stand-alone case. The card versions are designed to fit the 3RU-high 19" OSD370 chassis, which allows multiple OSD card products to be conveniently powered from and located in the one chassis. The stand-alone case versions are intended for isolated use and require an external DC or AC power source. The OSD418T is normally supplied in the standalone case configuration for mounting at each camera location, while the OSD418R is normally supplied as a card to allow multiple receiver units to be powered from and contained in the OSD370 chassis or 1RU case.

The OSD418 system can be used with any standard multimode optical fiber, and is available optionally for singlemode fiber use. A Wavelength Division Multiplexing version is also available to allow the use of a single fiber for transmission and reception.

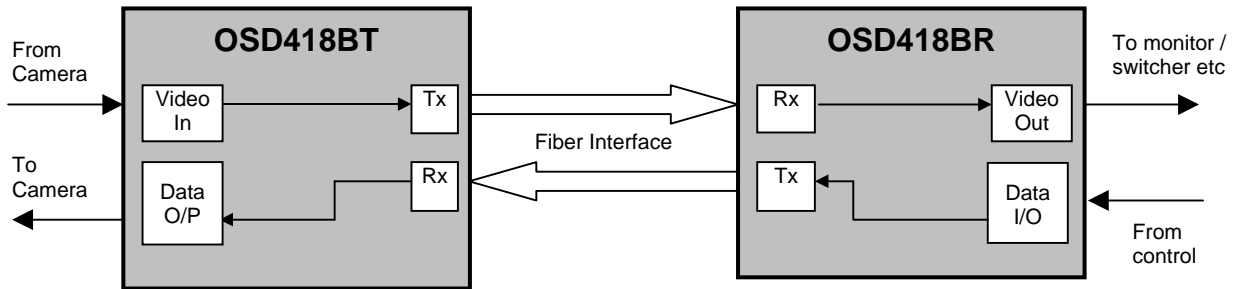
# OPTICAL SYSTEMS DESIGN

## 1.2 TYPICAL CONFIGURATION

FIGURE 1 below indicates a possible set-up for an OSD418. Figure 1(a) and 1(b) illustrate the basic functional differences between the “A” and “B” versions of the OSD418 system.



(a) OSD418AT to OSD418AR



(b) OSD418BT to OSD418BR

FIGURE 1: OSD418 CONFIGURATIONS

The OSD418AT and OSD418AR pair provide full duplex data transmission between camera (transmitter) and monitoring site (receiver).

The OSD418BT and OSD418BR pair provide data transmission from the monitoring site (receiver) to the camera (transmitter) only.

# OPTICAL SYSTEMS DESIGN

## 1.3 PRODUCTS AND OPTIONS

There are various standard configuration options available for the OSD418 system as identified in Table 1 below.

OSD418 A T R L C W (example only)

1
2
3
4
5
6

TABLE 1: PRODUCTS AND OPTIONS

|          |             |  |
|----------|-------------|--|
| <b>1</b> | <b>ITEM</b> | <b>DESCRIPTION</b>   |
|          | A           | Forward video with full duplex data transmission             |
|          | B           | Forward video with reverse path data transmission            |
| <b>2</b> | <b>ITEM</b> | <b>DESCRIPTION</b>   |
|          | T           | Transmitter  |
|          | R           | Receiver   |
| <b>3</b> | <b>ITEM</b> | <b>DESCRIPTION</b>   |
|          | -           | No relay output  |
|          | R           | Relay output option  |
| <b>4</b> | <b>ITEM</b> | <b>DESCRIPTION</b>   |
|          | -           | Multi-mode version   |
|          | L           | Single-mode version  |
|          | LD1         | -10dBm 1310nm laser version                                  |
|          | LD2         | -5dBm 1310nm laser version                                   |
| <b>5</b> | <b>ITEM</b> | <b>DESCRIPTION</b>   |
|          | -           | Card version (3RU high chassis mount for OSD370)             |
|          | C           | Stand-alone case version (clamshell case)                    |
|          |             |  |
| <b>6</b> | <b>ITEM</b> | <b>DESCRIPTION</b>   |
|          | -           | Two optical fiber operation                                  |
|          | W           | Wavelength Division Multiplexed (WDM) single fiber operation |

# OPTICAL SYSTEMS DESIGN

## 1.4 TECHNICAL SPECIFICATIONS

TABLE 2: TECHNICAL SPECIFICATIONS

| NO | SPECIFICATION                                  | PERFORMANCE   |                      |
|----|--|---|----------------------|
| 1  | Video Input/Output Impedance                   | 75Ω   |                      |
| 2  | Video Input/Output Level                       | 1Vp-p   |                      |
| 3  | Video Connector                                | BNC   |                      |
| 4  | Video Bandwidth                                | 5Hz to 10MHz (+1/-3dB)  |                      |
| 5  | Weighted Signal to Noise Ratio                 | >60dB at -25dBm received optical power<br>>50dB at -30dBm received optical power                                |                      |
| 6  | Data Interface                                 | TTL, RS232, RS422 and RS485 (Relay contact optional)<br>31kHz Manchester or Biphase possible in both directions |                      |
| 7  | Data Rates                                     | DC to >64kbps in both directions  |                      |
| 8  | Data Connector                                 | 15 pin female subminiature D connector  |                      |
| 9  | Transmitter Wavelength                         | 850 ± 30nm (1310nm for OSD418TL and OSD418RL)   |                      |
| 10 | Receiver Operating Wavelength                  | 800 to 900nm (1270 to 1580nm for OSD418TL and OSD418RL)   |                      |
| 11 | OSD418T Transmitter Coupled Power              | -15 to -10dBm into multimode fiber (OSD418T)<br>-13 to -11dBm into singlemode fiber (OSD418TL only)             |                      |
| 12 | OSD418T Sensitivity for 1x10 <sup>-9</sup> BER | <-37dBm   |                      |
| 13 | OSD418R Transmitter Coupled Power              | -20 to -10dBm into multimode fiber (OSD418R)<br>-20 to -11dBm into singlemode fiber (OSD418RL only)             |                      |
| 14 | OSD418R Receiver Sensitivity                   | <-30dBm for <50dB video SNR   |                      |
| 15 | OSD418R Receiver Saturation                    | >-12dBm   |                      |
| 16 | Transmission Distance                          | >5km for multimode, >50km for singlemode  |                      |
| 17 | Optical Connectors                             | ST standard, others optional  |                      |
| 18 | Dimensions of Module (mm)                      | 104W x 144D x 25H   |                      |
| 19 | Weight of Module (kg)                          | 0.4   |                      |
| 20 | Dimensions of card (mm)                        | 25W x 208D x 100H   |                      |
| 21 | Weight of Card (kg)                            | 0.2   |                      |
| 22 | Power Requirements                             | +10V to +35V <sub>DC</sub> or 22 to 28V <sub>AC</sub> @ 2.5VA   |                      |
| 23 | Operating Temperature                          | -20 to +75°C  |                      |
| 24 | Relative Humidity                              | 0 to 95% non-condensing   |                      |
|    |  | <b>OSD418T</b>  | <b>OSD418R</b>       |
| 25 | Indicators                                     | Laser OK  | Laser OK             |
|    |  | Tx Video Present  | RX Video Present     |
|    |  | Tx/Rx Optical Signal OK   | Tx/Rx Data Present   |
|    |  | Rx Optical Signal OK  | Rx Optical Signal OK |
| 26 | Chassis Current Consumption (CCC)              | 0.20Amp   | 0.20Amp              |

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## 1.5 PIN ASSIGNMENTS

Pin assignments for the “Data Input/Output” DB15 connector (Figure 2) are shown in Table 3 below.

TABLE 3: OSD418 PIN ASSIGNMENT

| PIN NUMBER   | FUNCTION  |
|--------------|---|
| 1,4,10,12,15 | Ground  |
| 9            | Not Used  |
| 2            | Not Used  |
| 3            | Not Used  |
| 11           | Not Used  |
| 6            | Relay common                                    |
| 5            | Data input + / RS232 data input / contact input |
| 13           | Data input -                                    |
| 14           | Data output + / RS485 + or relay N.O. contact   |
| 7            | Data output - / RS485 - or relay N.C. contact   |
| 8            | RS232 data output                               |

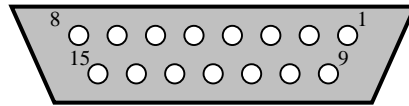


FIGURE 2: DB15 FEMALE CONNECTOR

## 2 INSTALLATION AND OPERATION

### 2.1 INTRODUCTION

This section outlines the methods required to install and operate the OSD418 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.


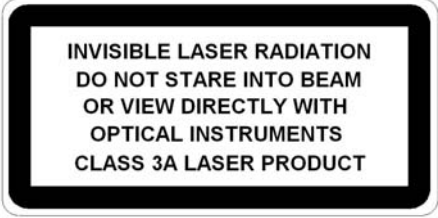
### 2.2 INSTALLATION

#### 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

| Class 1  | Class 3A   |
|--|--|
| The multimode version of the OSD418 is a <b>Class 1 LED product</b> . Wavelength of 850nm and <-8dBm power output. | The singlemode and WDM versions of the OSD418 are <b>Class 3A laser products</b> . Wavelength of 1310nm and <+5dBm power output or wavelength of 1550nm and <+7dBm power output. |
|                                 |    |

- ▲ 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.

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## 2.2.2 OSD418 DRAWINGS AND DIMENSIONS

The OSD418 stand-alone version should be mounted on an even surface and secured by means of M4 or smaller screws. Figure 3(a) is an outer case drawing showing the required mounting dimensions.

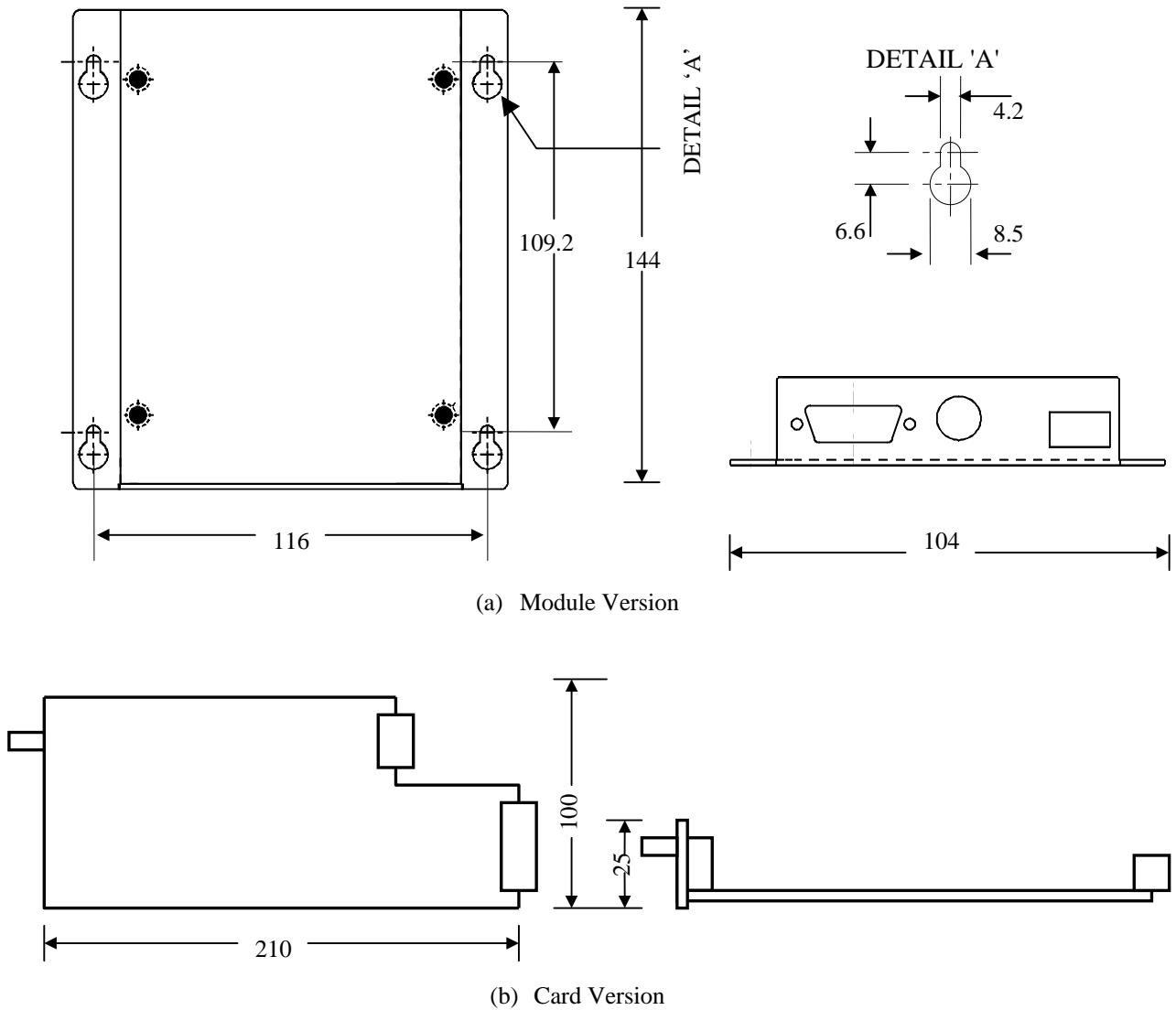


FIGURE 3: OSD418 DIMENSIONS

# OPTICAL SYSTEMS DESIGN

## 2.2.3 POWER SUPPLY CONNECTIONS

The OSD418 card version is powered from the OSD370 chassis.

It is important to read the following information for proper operation and avoid damage to the unit.

The OSD418 requires external DC or AC power. The acceptable DC voltage range is +10 to +35V<sub>DC</sub> or 22 to 28V<sub>AC</sub> @ 2.5VA. Power should be connected to the 2 way socket located at the back of the case. Take care to connect DC power with the correct polarity: Pin 2 is 0V and Pin 1 is positive for DC power.

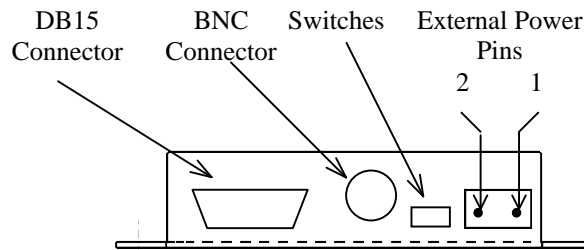


FIGURE 4: OSD418 2 PIN POWER SUPPLY CONNECTION DIAGRAM

For AC supplies the polarity is not applicable. NOTE: For AC power, Pin 2 **must not** be grounded. The OSD418 has a full bridge rectifier circuit, grounding Pin 2 will short half the bridge circuit (Figure 5) and damage the product!

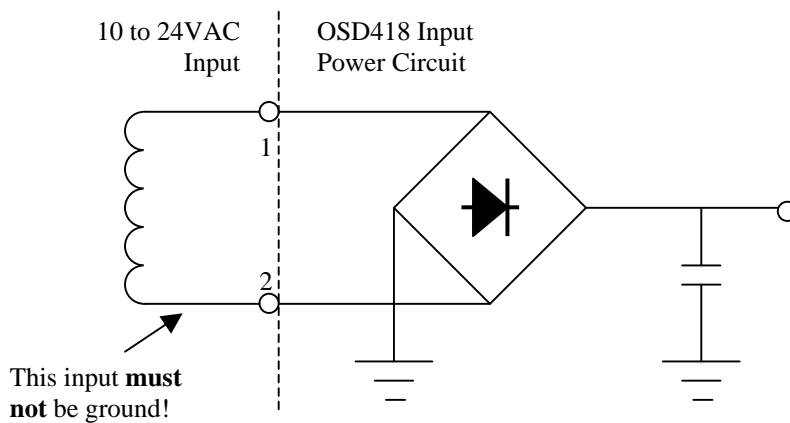


FIGURE 5: OSD418 AC INPUT VOLTAGE DIAGRAM

## OPTICAL SYSTEMS DESIGN

### 2.2.4 OSD418T CONNECTIONS

For the stand-alone version, connect the OSD418T to an appropriate power source. For card version, install the unit into the OSD370 chassis. Once the power source is switched on, check that the indicators illuminate. Check that the "Laser/LED OK" indicator is illuminated green. If it is red, there may be a problem with the unit and it should not be used.

For RS232 use, connect RS232 data to the positive data input (pin 5) and data input ground return (pin 12). The RS232 data output of the OSD418T will be of the same phase as this input. If you require inverted RS232 output, connect the RS232 input to the negative data input (pin 13). Alternatively, the RS232 output from the OSD418T may be inverted internally (see Table 7): set LK4 to pins 2 and 3 for inverted RS232 output (factory setting is for non-inverted output – pins 1 and 2). Note that accessing LK4 requires disassembly of the OSD418T, which should not be attempted unless absolutely necessary and by qualified technical staff only.

For RS485 use, refer to the 'Controls' section of this manual.

Connect a BNC terminated RG59 cable from the camera to the OSD418T. If the camera is operating properly the "Video Present" indicator should change from red to green.

Connect the optical plugs on the optical cable to the receptacles located on the side of the case or on the front panel of the card version. When the remote OSD418AR is connected the "Rx Optical Signal" indicator should change from red to green.

Connect the data signal pins of the DB15 connector to your equipment via a suitable cable. Ensure that the correct signals are connected to the correct pins – refer to Table 3 on page 7 for pin assignments. If the OSD418T is only transmitting data the Rx/Tx Data indicator shows red; if it is only receiving data the indicator shows green. If both transmit and receive data are present both colors illuminate.

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.

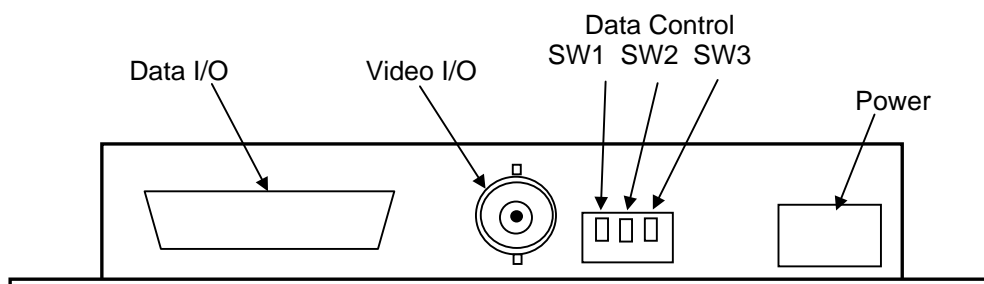


FIGURE 6: OSD418 STANDALONE REAR VIEW

## OPTICAL SYSTEMS DESIGN

### 2.2.5 OSD418R CONNECTIONS

For the stand-alone version, connect the OSD418R to an appropriate power source. For card version, install the unit into the OSD370 chassis. Once the power source is switched on, check that the indicators illuminate. Check that the "Laser/LED OK" indicator is illuminated green. If it is red, there may be a problem with the unit and it should not be used.

For RS232 use, connect RS232 data to the positive data input (pin 5) and data input ground return (pin 12). The RS232 data output of the OSD418T will be of the same phase as this input. If you require inverted RS232 output, connect the RS232 input to the negative data input (pin 13). Alternatively, the RS232 output from the OSD418T may be inverted internally (see Table 8): set LK1 to pins 2 and 3 for inverted RS232 output (factory setting is for non-inverted output – pins 1 and 2). Note that accessing LK1 requires disassembly of the OSD418T, which should not be attempted unless absolutely necessary and by qualified technical staff only.

For RS485 use, refer to the 'Controls' section of this manual.

Connect a BNC terminated RG59 cable from the OSD418R to the video monitor/switcher.

Connect the optical plugs on the optical cable to the receptacles located on the side of the case or on the front panel of the card version. If the received optical power is sufficient the "Rx Optical Signal" indicator will change from red to green. If a video signal is being received the "Video Present" indicator should be green; if no video signal is being received this indicator will be red.

Check that you have wired the data signal source to the correct pins of the DB15 plug (refer to Table 3 on page 7). Plug this connector into the OSD418R Data I/O socket and connect the other end(s) to your equipment as required. When data is being transmitted by the OSD418AR the "Tx/Rx data" indicator shows red; if only receive data is present it shows green. If both transmit and receive data are present both colors should illuminate.

### 2.2.6 CONTROLS

The data control switch is 3 pole, and is located on the right-hand side of the video BNC connector on both the OSD418T and OSD418R stand-alone case versions. On the card versions it is located on the upper right-hand side of the PCB and can be identified as a 4-pole DIP switch with side actuators. Switch 4 position is not used.

Switch SW3 is used to determine the data type. Set it 'down' for RS485 and 'up' for RS422/TTL/RS232.

All 'two wire' RS485 devices are by default in receive mode, and only change to transmit mode for data transmission. All RS485 protocols use a transmit delay to ensure successful transmissions to the ends of the network. The delay is data rate and protocol dependent.

Switches SW1 and SW2 are used to select the delay time for RS485 operation. Table 4 shows the switch settings for the four possible delay times. The lowest delay value for reliable operation should be chosen.

Note: All switches should be 'up' for all data types other than RS485. In case of the card version assembled in the chase 'up' position is 'right' and 'down' is 'left'.

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TABLE 4: DATA CONTROL SWITCH SETTINGS FOR RS485

| SW1  | SW2  | DELAY |
|------|------|-------|
| up   | up   | 100µs |
| up   | down | 1ms   |
| down | up   | 10ms  |
| down | down | 11ms  |

## 2.2.7 INDICATORS

The indicator function of the OSD418 system is summarized in Table 5 and Table 6. Figure 7 shows the LED allocation and their display function.

TABLE 5: OSD418T INDICATORS

| OSD418T                   | INDICATOR COLOR             |  |                                 |
|---------------------------|-----------------------------|--|---------------------------------|
|                           | GREEN                       | RED  | RED+GREEN                       |
| <b>Laser/LED OK</b>       | Normal Laser Operation      | Laser or Laser Driver Fault                    | -                               |
| <b>Tx/Rx Data Present</b> | Receiving Data Only         | Transmitting Data Only                         | Transmitting and Receiving Data |
| <b>Tx Video Present</b>   | Video Input Signal Detected | No Video Input Signal Detected                 | -                               |
| <b>Rx Optical Signal</b>  | Received Optical Signal OK  | Received Optical Signal Too Low or Not Present | -                               |

TABLE 6: OSD418R INDICATOR FUNCTION

| OSD418R                   | INDICATOR COLOR                |  |                                 |
|---------------------------|--------------------------------|--|---------------------------------|
|                           | GREEN                          | RED  | RED+GREEN                       |
| <b>Indicator name</b>     |                                |  |                                 |
| <b>Laser/LED OK</b>       | Normal Laser Operation         | Laser or Laser Driver Fault                    | -                               |
| <b>Tx/Rx Data Present</b> | Receiving Data Only            | Transmitting Data Only                         | Transmitting and Receiving Data |
| <b>Rx Video Present</b>   | Received Video Signal Detected | No Received Video Signal Detected              | -                               |
| <b>Rx Optical Signal</b>  | Received Optical Signal OK     | Received Optical Signal Too Low or Not Present | -                               |

\*Note: when using modes other than RS485 (i.e. all switches of the Data Control switch 'up'), the "Tx/Rx Data Present" indicator will light red with nothing connected to the data socket.

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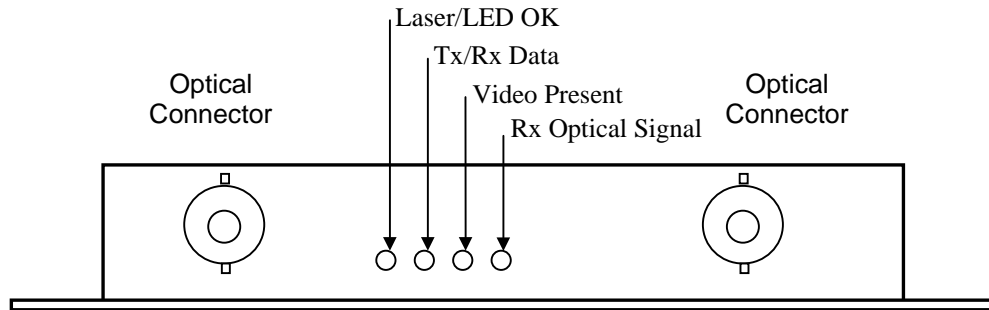


FIGURE 7: OSD418 INDICATORS

## 2.2.8 LINK SETTINGS

Both the OSD418T and the OSD418R has one internal user configurable link labeled as LK4 (OSD418T) and LK1 (OSD418R). Table 7 and Table 8 below lists the links and settings. All other Links are factory set and must not be touched. Permanent damage may occur and/or void warranty.

TABLE 7: OSD418T LINK SETTINGS

| LK | No. of Pins | FUNCTION  | SETTING |
|----|-------------|---|---------|
| 4  | 3           | Sets RS232 at output1 to normal phasing (default) | 1,2     |
| 4  | 3           | Sets RS232 at output1 to reversed phasing         | 2,3     |

TABLE 8: OSD418R LINK SETTINGS

| LK | No. of Pins | FUNCTION  | SETTING |
|----|-------------|---|---------|
| 1  | 3           | Sets RS232 at output1 to normal phasing (default) | 1,2     |
| 1  | 3           | Sets RS232 at output1 to reversed phasing         | 2,3     |



## 3 MAINTENANCE

### 3.1 INTRODUCTION

The following section outlines the fault-finding procedure for the OSD418 modems. Please take note of the following:

- ▲ Personnel without appropriate training should not attempt any maintenance except that outlined in Section 3.2.
- ▲ 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 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 OSD418.

## 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 repair labels is evident.

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