
OPTICAL

SYSTEMS

DESIGN

OPERATOR MANUAL

OSD420 SERIES

VIDEO, AUDIO 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 and/or audio transmission between cameras and control center

1.1.2 FEATURES AND BENEFITS

- ▲ Fiber optic transmission of video plus audio and data signals from a CCTV camera and of audio and 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
- ▲ Full duplex 4-wire audio intercom
- ▲ Video bandwidth in excess of 6MHz
- ▲ Operating range of over 5km
- ▲ 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 OSD420 series is a fiber optic transmission system for CCTV quality or better video signals, audio signals and includes a Pan Tilt Zoom (PTZ) control signal return path, making it ideal for use in security monitoring systems. The OSD420 system is comprised of the OSD420T fiber optic video transmitter and the OSD420R fiber optic video receiver, which are designed to operate as a pair, forming the complete video + audio + data transmission system.

The OSD420T transmitter unit consists of an optical transmitter section that transmits video, audio and digital data using FM, and an optical receiver section that receives audio and data signals that are transmitted to the camera for control purposes. The audio signal can be either balanced or unbalanced at nominally 200mV level, while data can be RS232, TTL, RS422 or RS485 at DC to 64kbps data rate on the forward path (20kbps data rate reverse path). The control signal receiver section provides adjustment free operation over the full optical range of the unit.

The OSD420R receiver unit consists of a high-performance optical FM receiver for incoming video, audio and data signals and a transmitter section for sending audio and data control signals to the camera. The unit provides a constant video output level that is independent of link loss, while the audio and data section is also adjustment free over all link lengths.

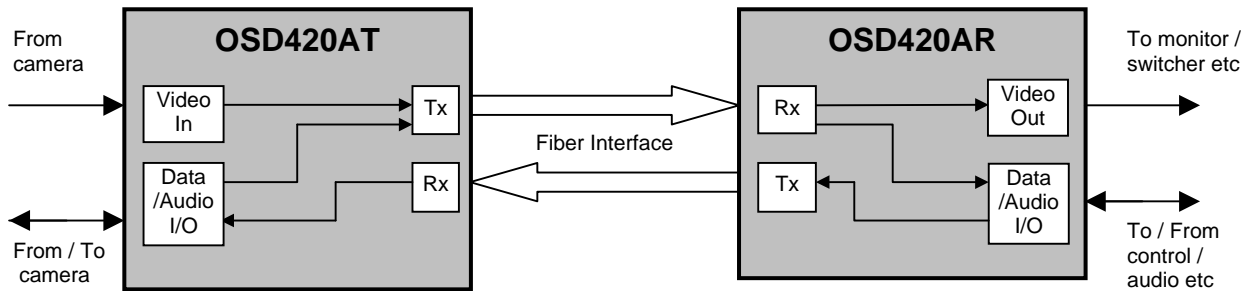
The OSD420T and OSD420R are available in two physical configurations: card and stand-alone case. The card versions are designed to fit the 3RU-high 19" OSD370 or OSD350 chassis, which allows multiple OSD card products to be conveniently powered from and located in the one chassis. The stand-alone case versions are intended for isolated use and require an external DC power source. The OSD420T is normally supplied in the standalone case configuration for mounting at each camera location, while the OSD420R is normally supplied as a card to allow multiple receiver units to be powered from and contained in the OSD370 or OSD350 chassis.

The OSD420 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.

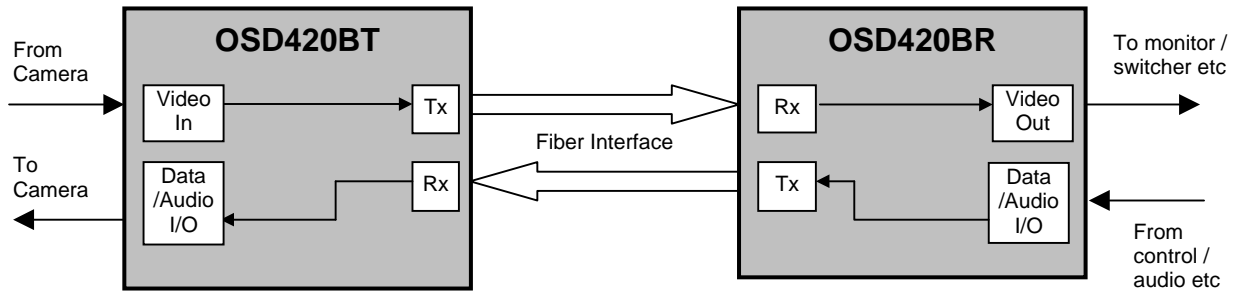
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1.2 TYPICAL CONFIGURATION

FIGURE 1 below indicates a possible set-up for an OSD420. Figure 1(a) and 1(b) illustrate the basic functional differences between the “A” and “B” versions of the OSD420 system.



(a) OSD420AT to OSD420AR



(b) OSD420BT to OSD420BR

FIGURE 1: OSD420 CONFIGURATIONS

The OSD420AT and OSD420AR pair provides full duplex audio and data transmission between camera (transmitter) and monitoring site (receiver).

The OSD420BT and OSD420BR pair provides audio and data transmission from the monitoring site (receiver) to the camera (transmitter) only.

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1.3 PRODUCTS AND OPTIONS

There are various standard configuration options available for the OSD420 system as identified in Table 1 below.

OSD420 A T R L C W (example only)

1
 2
 3
 4
 5
 6

TABLE 1: PRODUCTS AND OPTIONS

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

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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 6.5MHz (+1/-3dB)
5	Weighted Signal to Noise Ratio	>60dB at -25dBm received optical power >50dB at -30dBm received optical power
6	Audio Input/Output Impedance	>5kΩ/100Ω
7	Audio Bandwidth	20Hz – 20kHz ±3dB
8	Audio Input & Output Level	200mV nominal, balanced or unbalanced
9	Audio Signal to Noise Ratio	>50dB
10	Data Interface	TTL, RS232, RS422 and RS485 (Relay contact optional), 31kHz Manchester or Biphasic possible from ODS420R to OSD420T
11	Data Rates	DC to >64kbps OSD420R to OSD420T DC to >20kbps OSD420T to OSD420R
12	Audio and Data Connector	15Pin Female D Connector
13	Transmitter Wavelength	850 ± 30nm (1310nm for OSD420TL and OSD420R)
14	Receiver Operating Wavelength	800 to 900nm (1270 to 1580nm for OSD420TL and OSD420RL)
15	OSD420T Transmitter Coupled Power	-15 to -9dBm into multimode fiber (OSD420T) -20 to -13dBm into singlemode fiber (OSD420TL only)
16	OSD420T Sensitivity	<-37dBm for >50dB Audio SNR and 1x10 ⁻⁹ BER
17	OSD420R Transmitter Coupled Power	-20 to -10dBm into multimode fiber (OSD420R) -20 to -12dBm into singlemode fiber (OSD420RL only)
18	OSD420R Receiver Sensitivity	<-30dBm for >50dB video SNR
19	OSD420R Receiver Saturation	>-12dBm
20	Transmission Distance	>5km for multimode, >50km for singlemode
21	Optical Connectors	ST standard, others optional
22	Dimensions of Module (mm)	104W x 144D x 25H
23	Weight of Module (kg)	0.4
24	Dimensions of Card (mm)	25W x 210D x 100H
25	Weight of Card (kg)	0.2
26	Operating Temperature	-20 to +75°C
27	Relative Humidity	0 to 95% non-condensing
28	Power Requirements	+10V to +24V _{DC} @ 2.4VA
29	Chassis Current Consumption (CCC)	0.20Amp

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1.5 PIN ASSIGNMENTS

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

TABLE 3: OSD420 PIN ASSIGNMENT

PIN NUMBER	FUNCTION
1,4,10	Audio Ground
9	Audio Input +
2	Audio Input -
3	Audio Output +
11	Audio Output -
6	Relay Common
5	Data input + / RS232 data input / contact input
13	Data Input -
12	Data Input Ground
14	Data Output + / RS485 + or Relay N.O. Contact
7	Data Output - / RS485 - or Relay N.C. Contact
8	RS232 Data Output
15	Data Output Ground

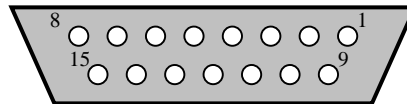


FIGURE 2: DB15 FEMALE CONNECTOR

2 INSTALLATION AND OPERATION

2.1 INTRODUCTION

This section outlines the methods required to install and operate the OSD420 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.


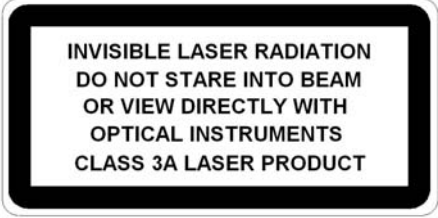
2.2 INSTALLATION

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 OSD420 is a Class 1 LED product . Wavelength of 850nm and <-8dBm power output.	The singlemode and WDM versions of the OSD420 are Class 3A laser products . 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 OSD420 DRAWINGS AND DIMENSIONS

The OSD420 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.

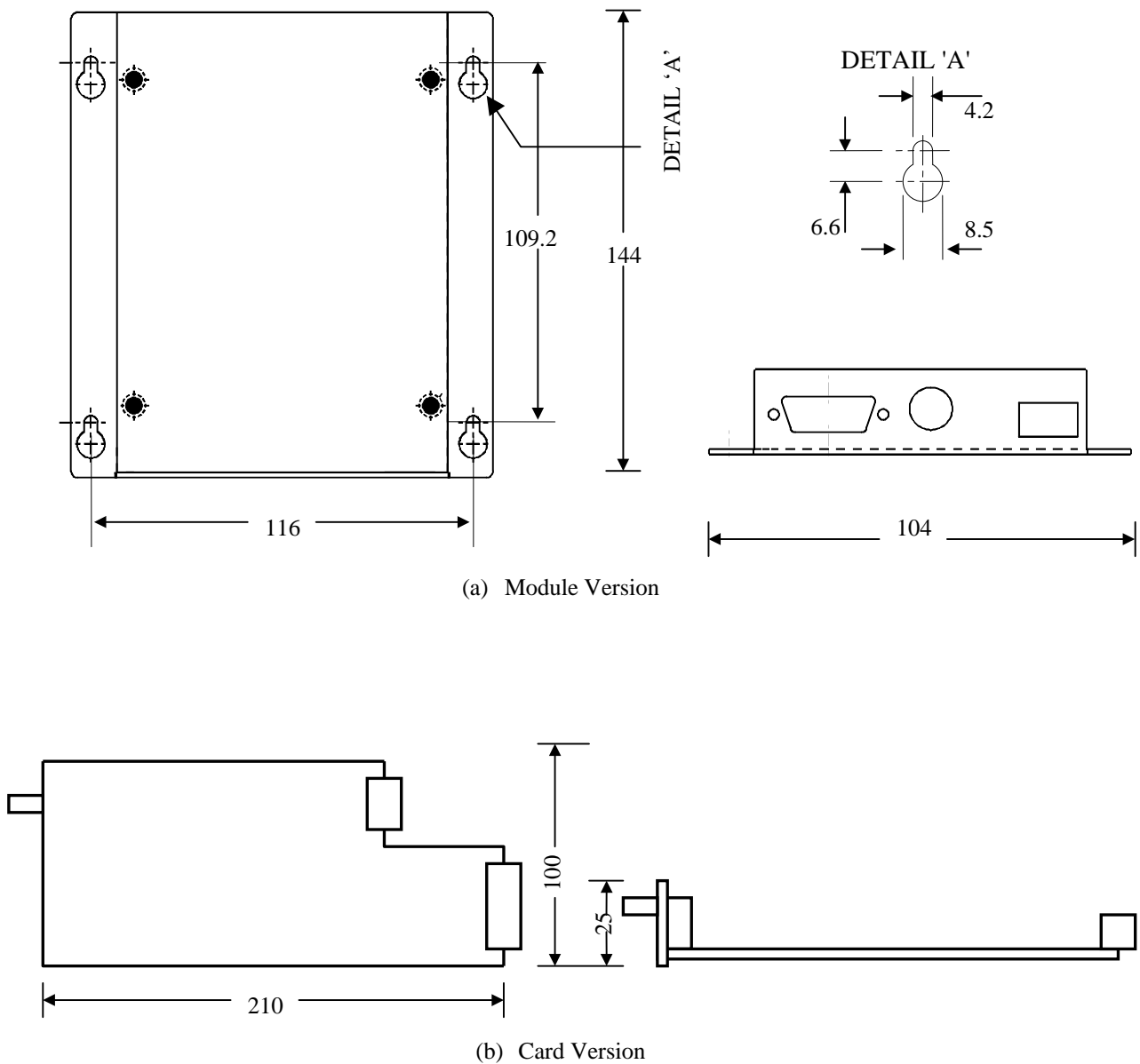


FIGURE 3: OSD420 DIMENSIONS

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2.2.3 POWER SUPPLY CONNECTIONS

The OSD420 card version is powered from the OSD370 or OSD350 chassis.

The OSD420 case version requires external DC power. The acceptable DC voltage range is +10 to +24V_{DC} @ 2.4VA.

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.

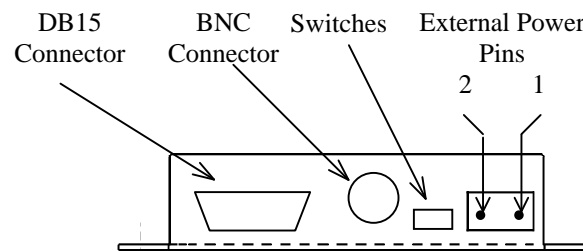


FIGURE 4: OSD420 2 PIN POWER SUPPLY CONNECTION DIAGRAM

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2.2.4 OSD420T CONNECTIONS

For the stand-alone version, connect the OSD420T to an appropriate power source. For card version, install the unit into the OSD370 or OSD350 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 OSD420T 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 OSD420T 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 OSD420T, 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 OSD420T. 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 OSD420AR is connected the "Rx Optical Signal" indicator should change from red to green.

Connect audio and/or digital 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 for pin assignments. If the OSD420T 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.

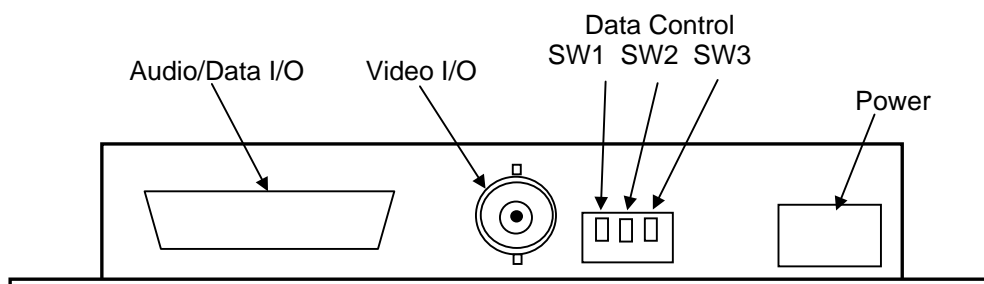


FIGURE 5: OSD420 STANDALONE REAR VIEW

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2.2.5 OSD420R CONNECTIONS

For the stand-alone version, connect the OSD420T 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 OSD420T 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 OSD420T 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 OSD420T, 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 OSD420R 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 digital signal source and/or audio signal source to the correct pins of the DB15 plug (refer to Table 3). Plug this connector into the OSD420R Audio/Data I/O socket and connect the other end(s) to your equipment as required. When data is being transmitted by the OSD420AR 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 OSD420T and OSD420R stand-alone case versions (see Figure 5). 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 ‘on’ for RS485 and ‘off’ 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: ‘on’ is the down position, ‘off’ is the up position. All switches should be ‘off’ for all data types other than RS485.

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TABLE 4: DATA CONTROL SWITCH SETTINGS FOR RS485

SW1	SW2	DELAY
Off	Off	100µs
Off	On	1ms
On	Off	10ms
On	On	11ms

2.2.7 INDICATORS

The indicator function of the OSD420 system is summarized in Table 5 and Table 6. Figure 6 shows the LED allocation and their display function.

TABLE 5: OSD420T INDICATOR FUNCTION

OSD420T	INDICATOR COLOR		
INDICATOR NAME	GREEN	RED	RED+GREEN
Laser/LED OK	Normal Laser Operation	Laser or Laser Driver Fault	-
Tx/Rx Data Present	Receiving Data Only	Transmitting Data Only	Transmitting and Receiving Data
Tx Video Present	Video Input Signal Detected	No Video Input Signal Detected	-
Rx Optical Signal	Received Optical Signal OK	Received Optical Signal Too Low or Not Present	-

TABLE 6: OSD420R INDICATOR FUNCTION

OSD420R	INDICATOR COLOR		
Indicator name	GREEN	RED	RED+GREEN
Laser/LED OK	Normal Laser Operation	Laser or Laser Driver Fault	-
Tx/Rx Data Present	Receiving Data Only	Transmitting Data Only	Transmitting and Receiving Data
Rx Video Present	Received Video Signal Detected	No Received Video Signal Detected	-
Rx Optical Signal	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 OFF), the “Tx/Rx Data Present” indicator will light red with nothing connected to the audio/data socket.

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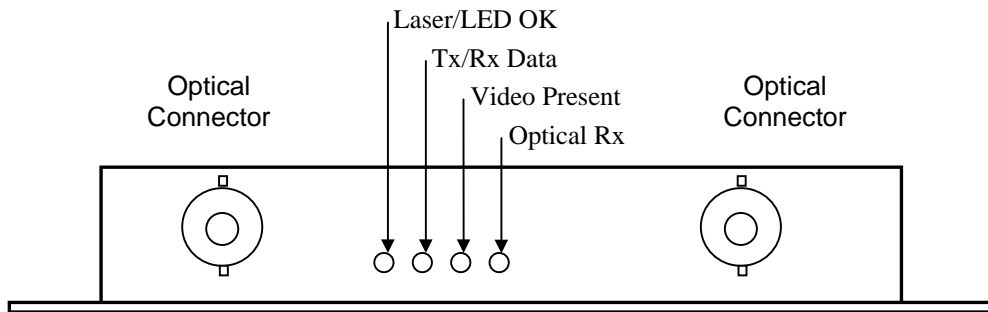


FIGURE 6: OSD420 INDICATORS

2.2.8 LINK SETTINGS

Both the OSD420T and the OSD420R have two internal user configurable links labeled as LK2 and LK4 (OSD420T) and LK1 and LK3 (OSD420R). 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: OSD420T LINK SETTINGS

LK	No. of Pins	FUNCTION	SETTING
2	2	600R termination on audio channel	ON/OFF
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: OSD420R 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	2	600R termination on audio channel	ON/OFF

3 MAINTENANCE

3.1 INTRODUCTION

The following section outlines the fault-finding procedure for the OSD420 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 OSD420.

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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