
OPTICAL

SYSTEMS

DESIGN

PTY. LTD A.C.N. 003 020 504

OPERATOR MANUAL

OSD730

FULL DUPLEX FOUR CHANNEL

DIGITAL AUDIO/DATA SYSTEM

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INDEX 1

1. TECHNICAL SUMMARY	4
1.1 BRIEF DESCRIPTION	4
1.1.1 OVERVIEW.....	4
1.1.2 APPLICATIONS	4
1.1.3 FEATURES AND BENEFITS	4
1.2 TYPICAL CONFIGURATION	5
1.3 PRODUCTS AND OPTIONS.....	5
1.4 TECHNICAL SPECIFICATION.....	6
1.5 OSD730 PIN ASSIGNMENTS	7
1.6 PIN ASSIGNMENTS FOR THE OSD730/4A.4CC VERSION	8
2. INSTALLATION AND OPERATION.....	9
2.1 INTRODUCTION	9
2.2 INSTALLATION	9
2.2.1 WARNING AND PRECAUTION.....	9
2.2.2 PACKAGING.....	10
2.2.3 POWER SUPPLY CONNECTIONS.....	11
2.2.4 DATA CONNECTIONS	11
2.2.5 AUDIO CONNECTIONS.....	11
2.2.6 OTHER CONNECTIONS.....	12
2.2.7 LINK SETTINGS.....	12
2.3 OPERATION.....	13
2.3.1 BLOCK DIAGRAMS.....	13
2.3.2 CONTROLS	14
2.3.3 INDICATORS	15
3. MAINTENANCE.....	16
3.1 INTRODUCTION	16
3.2 EXTERNAL INSPECTION	16
3.3 ROUTINE MAINTENANCE	16
4. WARRANTY.....	17
4.1 WARRANTY PERIOD	17
4.2 ALL REPAIRS	17
4.2.1 WARRANTY REPAIRS.....	17
4.2.2 OUT-OF-WARRANTY REPAIR.....	17
4.2.3 SITE REPAIR.....	17
4.3 EXCLUSIONS	17
FIGURE 1: TYPICAL CONFIGURATION.....	5
FIGURE 2: DB44 FEMALE CONNECTOR	8
FIGURE 3: CASE DIMENSIONS	10
FIGURE 4: STANDARD CARD MOUNTING DIMENSIONS.....	10
FIGURE 5: OSD730 POWER CONNECTIONS	11
FIGURE 6: OSD730 BLOCK DIAGRAM.....	13
FIGURE 7: OSD730 SWITCH SETTINGS	14
FIGURE 8: OSD730 LED INDICATORS	15
TABLE 1: PRODUCTS AND OPTIONS.....	5
TABLE 2: TECHNICAL SPECIFICATIONS.....	6
TABLE 3: OSD730 INPUT/OUTPUT	7
TABLE 4: OSD730/4A.4CC PIN CONNECTION	8
TABLE 5: DC OR AC POWER CONNECTION.....	11
TABLE 6: LINK SETTINGS AND THEIR EFFECTS	12
TABLE 7: RS485 DELAY TIME CHART	14

1. TECHNICAL SUMMARY

1.1 BRIEF DESCRIPTION

1.1.1 OVERVIEW

The OSD730 is a modem which can provide four channels of full duplex 48KHz, 18 bit digital audio and four channels of full duplex data communications over duplex optical fiber cable.

Applications include any communications link which requires a mixture of audio and RS232, RS422 or RS485 data where distance, electrical noise or security considerations render conventional twisted pair links impractical.

The OSD730 is optionally available to operate over single mode fiber.

1.1.2 APPLICATIONS

- ▲ Studio audio distribution.
- ▲ Sound stage to console connection.
- ▲ Campus audio program distribution
- ▲ Public address systems.
- ▲ High-end intercom systems.

1.1.3 FEATURES AND BENEFITS

- ▲ Supports 4 full duplex audio and data channels
- ▲ Data can be RS232 or RS422 on all four channels with one channel also RS485 capable.
- ▲ User selectable turnaround delay on RS485 channel.
- ▲ Broadcast quality 18 bit digital audio transmission
- ▲ Available as a card or sturdy standalone module

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1.2 TYPICAL CONFIGURATION

Below, in FIGURE 1 is a typical set-up for two OSD730's that may be used together.

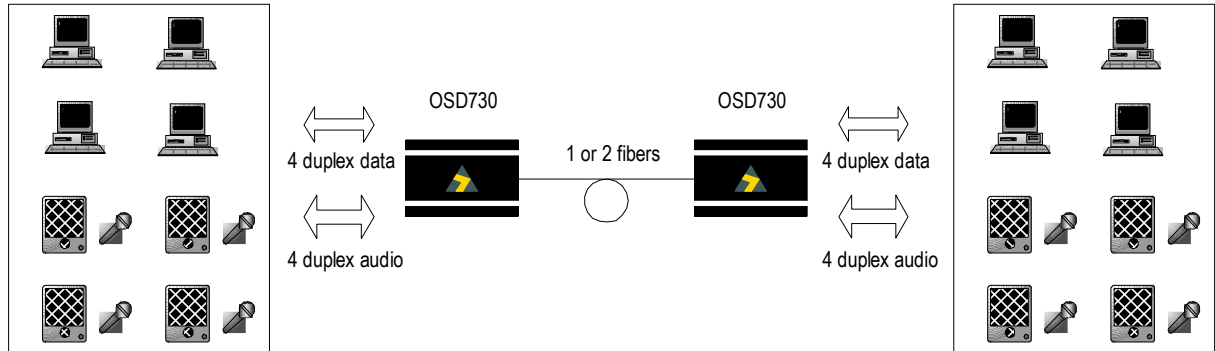


FIGURE 1: TYPICAL CONFIGURATION

Note: the OSD730 is configurable for RS422 or RS232 operation. RS232 uses two wires per channel, an input and an output, with voltage signals of these wires referenced to a common ground. The RS422 setting uses four wires per channel, an input + and - and an output + and -.

1.3 PRODUCTS AND OPTIONS

There are various options available for the OSD730.

TABLE 1: PRODUCTS AND OPTIONS

ITEM	DESCRIPTION
OSD730	FULL DUPLEX 4 CHANNEL AUDIO/DATA MODEM
OPTION L	SINGLEMODE OPTION OF THE ABOVE
OPTION C	STANDALONE CASED OPTION OF THE OSD730
OPTION W	SINGLE FIBER (WDM) OPERATION

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1.4 TECHNICAL SPECIFICATION

TABLE 2: TECHNICAL SPECIFICATIONS

SPECIFICATION	PERFORMANCE
Audio Channels	
Number of Channels	4
Nominal Level	0dBu (775mV) nominal
Headroom	18dB
Input Impedance	600Ω or 10kΩ (user selectable)
Output Impedance	200Ω
Format	Balanced input and output
Signal to Noise Ratio	>70dB at nominal level
Total harmonic distortion	<0.05% at nominal level
Bandwidth (-3dB)	10Hz to 20kHz
Indicators	Red indicator for active transmit channels Green indicator for active receive channels
Data	
Number of channels	4
Data interface	RS232 or RS422 on all 4, RS485 available on channel 1
Channel 1 Controls	RS485/Normal Turnaround delays adjustable from 43μS to 87mS (8 steps)
Indicators	Red indicator for active transmit channels Green indicator for active receive channels
Optical	
Optical wavelength	850nm (OSD730) 1300nm (OSD730L)
Transmit power	-15 to -10dBm into multimode fiber (OSD730 only) -12 to -10dBm into singlemode fiber (OSD730L only)
Receiver sensitivity	<-39dBm
Receiver saturation	>-12dBm
Link Budget and Transmission Distance	>24dB (>7km for multimode, >60km for singlemode)
Link Status Indicator	Red for no optical link Green for optical link established
Optical connectors	ST Standard
Environmental, Physical, Power	
Operating Temperature	-20 to 75°C
Relative Humidity	0 to 95% non-condensing
Power	10 to 28V _{DC} or 15 to 20V _{AC} @ 4VA
Dimensions	Module: 104W x 144D x 25H Card: 25W x 208D x 100H
Weight	Module: 400g Card: 200g
Cassis Current Consumption (CCC)	0.30 Amp

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1.5 OSD730 PIN ASSIGNMENTS

TABLE 3: OSD730 INPUT/OUTPUT

Function	Pin	Function	Pin
Digital Ground	1, 4, 7	Analog Ground	37, 38, 39, 40, 41, 42, 43, 44
Data I/P1+	16	Audio I/P1+	8
Data I/P1 -	31	Audio I/P1 -	23
Data I/P2+	32	Audio I/P2+	10
Data I/P2 -	3	Audio I/P2 -	25
Data I/P3+	19	Audio I/P3+	12
Data I/P3 -	34	Audio I/P3 -	27
Data I/P4+	35	Audio I/P4+	14
Data I/P4 -	6	Audio I/P4 -	29
Data O/P1+ or RS232 O/P1	2	Audio O/P1+	9
Data O/P1 -	17	Audio O/P1 -	24
Data O/P2 + or RS232 O/P2	18	Audio O/P2+	11
Data O/P2 -	33	Audio O/P2 -	26
Data O/P3+ or RS232 O/P3	5	Audio O/P3+	13
Data O/P3 -	20	Audio O/P3 -	28
Data O/P4+ or RS232 O/P4	21	Audio O/P4+	15
Data O/P4 -	36	Audio O/P4 -	30
LINK ALARM	22		

NOTE: O/P: Output from OSD730 to external equipment
 I/P: Input to OSD730 from external equipment

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. 2-wire RS485 is available on pins 2 and 17.

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.

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1.6 PIN ASSIGNMENTS FOR THE OSD730/4A.4CC VERSION

TABLE 4: OSD730/4A.4CC PIN CONNECTION

Function	Pin	Function	Pin
Digital Ground	1, 7	Analog Ground	37, 38, 39, 40, 41, 42, 43, 44
CC I/P1	16	Audio I/P1+ Audio I/P1 -	8 23
CC I/P2	32	Audio I/P2+ Audio I/P2 -	10 25
CC I/P3	19	Audio I/P3+ Audio I/P3 -	12 27
CC I/P4	35	Audio I/P4+ Audio I/P4 -	14 29
CC1 Common	2	Audio O/P1+ Audio O/P1 -	9 24
CC1 N/O Contact	17		
CC2 Common	18	Audio O/P2+ Audio O/P2 -	11 26
CC2 N/O Contact	33		
CC3 Common	5	Audio O/P3+ Audio O/P3 -	13 28
CC3 N/O Contact	20		
CC4 Common	21	Audio O/P4+ Audio O/P4 -	15 30
CC4 N/O Contact	36		
LINK ALARM	22		

NOTES: O/P: Output from OSD730 to external equipment
 I/P: Input to OSD730 from external equipment
 N/O: Normally Open connection
 CC: Contact Closure

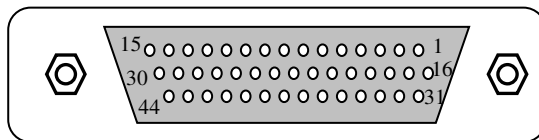


FIGURE 2: DB44 FEMALE CONNECTOR

RELAY OPERATION

The relay outputs are normally open when a the input state is open or high. The relay outputs are closed when the input state is closed or low (Ground or 0V). If the fiber link is not connected, or power is switched off from the transmitting OSD730 unit, all the relay outputs will be closed.

2. INSTALLATION AND OPERATION

2.1 INTRODUCTION

This section outlines the methods required to install and operate the OSD730 successfully. This information 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 prior to operation. If damage is detectable, return the unit and the packaging to the supplier.

2.2 INSTALLATION

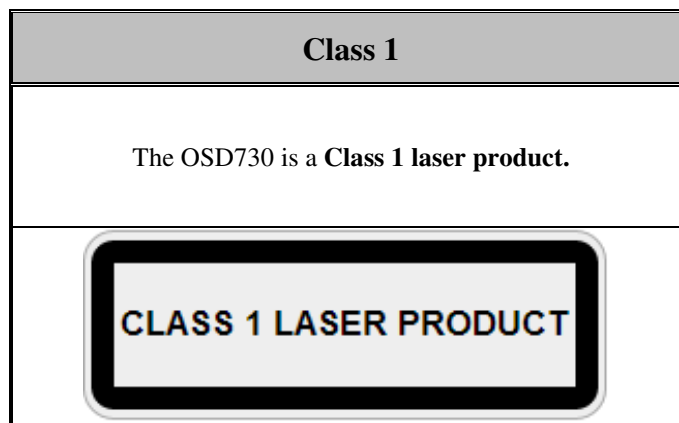
2.2.1 WARNING AND PRECAUTION

▲ 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.



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.

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2.2.2 PACKAGING

The OSD730C is designed to be mounted on an even surface and to be secured by means of M4 or smaller screws. The OSD730 card version is designed to be inserted into the OSD350N or OSD370N chassis and secured by means of captivated screws.

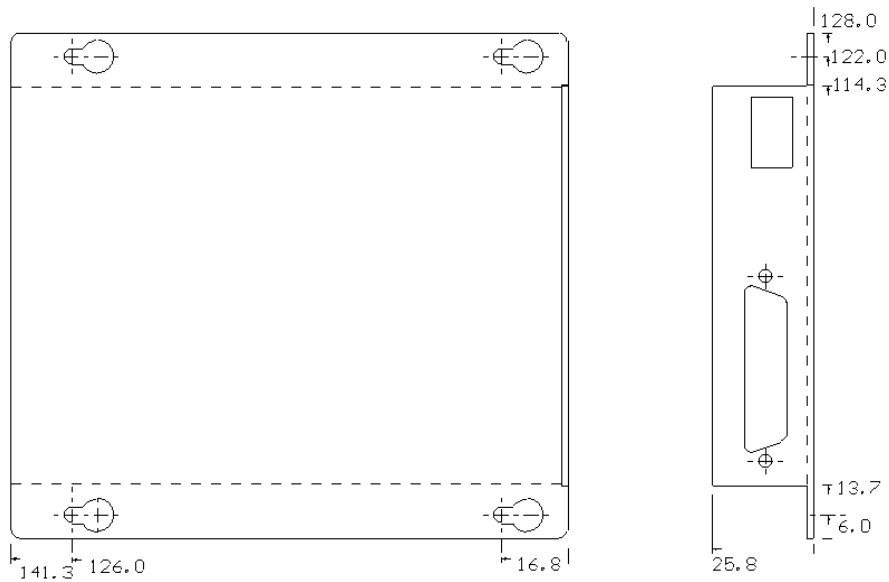


FIGURE 3: CASE DIMENSIONS

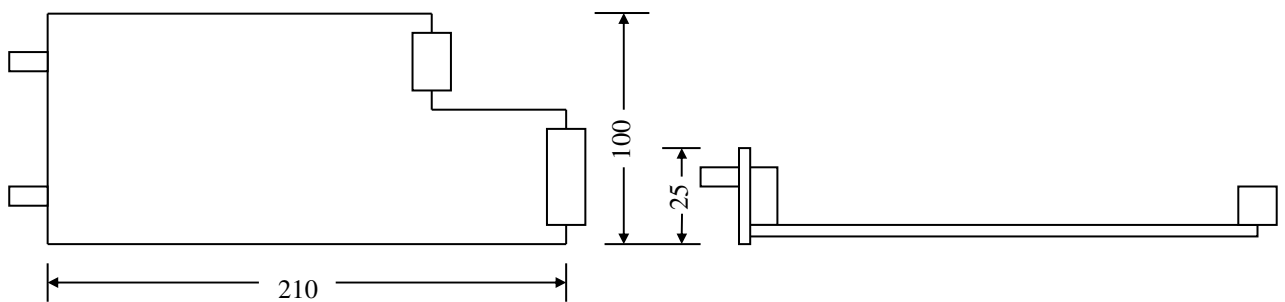


FIGURE 4: STANDARD CARD MOUNTING DIMENSIONS

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2.2.3 POWER SUPPLY CONNECTIONS

The OSD730 card version is powered from the OSD370N or OSD350N chassis. DC power on the OSD730 card version is connected via a DB9 connector. The card version of the OSD730 should be fixed into the OSD370N (or OSD350N) chassis using the captivated screws. Either card can be plugged in or out of the OSD370N (or OSD350N) chassis with power on or off.

The OSD730 module requires external +9 to 28V_{DC} or 15 to 20V_{AC} power @ 4VA. Power should be connected to the power socket located at the back of the case. DC power should be connected as indicated in Table 5.

TABLE 5: DC OR AC POWER CONNECTION

External Power Pin	Specification
Pin 1	Not Connected
Pin 2	+9V to +28V _{DC} or 15V to +20V _{AC}
Pin 3	0V

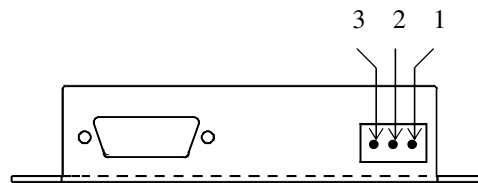


FIGURE 5: OSD730 POWER CONNECTIONS

2.2.4 DATA CONNECTIONS

The RS232, RS422 or RS485 signals are connected to or from external equipment via the high density DB44 connector as shown in TABLE 3 and FIGURE 2. RS232 signals use the positive pins and ground, while RS422 and RS485 use both the positive and negative pins. 2-wire RS485 is available on pins 2 and 17

2.2.5 AUDIO CONNECTIONS

The audio signals are connected to or from external equipment via the High density DB44 connector as shown in TABLE 3 and FIGURE 2. Please note that these are balanced outputs, and both the positive and the negative side are referenced to ground, 180 degrees out of phase to each other. Do not connect the negative output of the OSD730 audio channels to ground. If single-sided output is desired for any or all of the audio channels, then simply use the channel's positive output, and the analog ground pins on the DB44 connector (Pins 37, 38, 39, 40, 41, 42, 43, 44).

OPTICAL SYSTEMS DESIGN

2.2.6 OTHER CONNECTIONS

Pin 22 of the high density DB44 connector provides a TTL level Optical receive power status indication, for electrical monitoring of the optical link, if it is desired.

The optical fiber should be terminated by the appropriate optical connector. Before connection, inspect the end 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 make use of isopropyl alcohol and a lint-free tissue to remove contamination.

2.2.7 LINK SETTINGS

TABLE 6: LINK SETTINGS AND THEIR EFFECTS

LINK	FUNCTION	SETTING
LK6 – LK9	Non Inverted RS232 Output Data Signal, CH1 – CH4	LK: 1 to 2
LK6 – LK9	Inverted RS232 Output Data Signal, CH1 – CH4	LK: 2 to 3
LK10 – LK13	RS232 Data Output, CH1 – CH4	LK: 1 to 2
LK10 – LK13	RS422 Data Output, CH1 – CH4	LK: 2 to 3
LK1 – LK4	Audio Input Impedance 600R, CH1 – CH4	LK: In
LK1 – LK4	Audio Input Impedance 10K, CH1 – CH4	LK: Out
LK5	Factory Set	Default
LK14	Factory Set	Default

Please note that LK5 and LK14 are factory set and has no end user function. Configuring an OSD730 for different data protocols or different audio input impedances user should not alter the setting of these links.

Default settings for links 6 to 9 is set for non-inverting output data. This would be changed in the case of using MIL-STD 188 data instead of RS232, and in the case of having RS422 at one end of the fiber link and RS232 at the other end.

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2.3 OPERATION

2.3.1 BLOCK DIAGRAMS

FIGURE 6 is a simple block diagram for the OSD730.

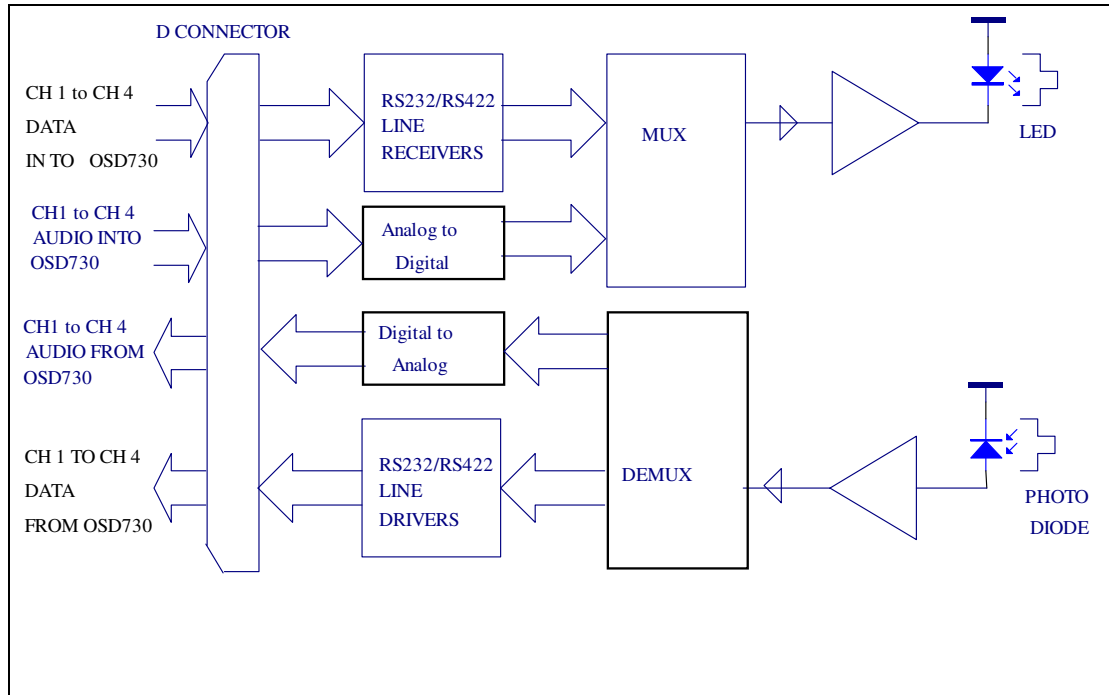


FIGURE 6: OSD730 BLOCK DIAGRAM

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2.3.2 CONTROLS

The OSD730 has one set of controls at the front between the optical connectors. This DIP switch package has 4 switches. Switch 1 selects between RS422 and RS485 mode for data channel 1, Switches 2,3,4 select the time delay between transmit enable and receive enable when in RS485 mode.

In Table 7 and Table 8 below, switches are labelled as on the front of the OSD730.

TABLE 7: RS422/RS485 SWITCH

SWITCH	STATE	FUNCTION
RS422/RS485	OFF	RS422
	ON	2-WIRE RS485

TABLE 8: RS485 DELAY TIME CHART

T1	T2	T3	Delay Time
Off	Off	Off	43us
On	Off	Off	85us
Off	On	Off	341us
On	On	Off	1.36ms
Off	Off	On	5.46ms
On	Off	On	10.9ms
Off	On	On	43.7ms
On	On	On	87ms

Note: RS-485 mode is only available when channel one is configured for RS422 operation. 2-wire RS485 is available on pins 2 and 17. Refer to Table 3 for polarity and connections.

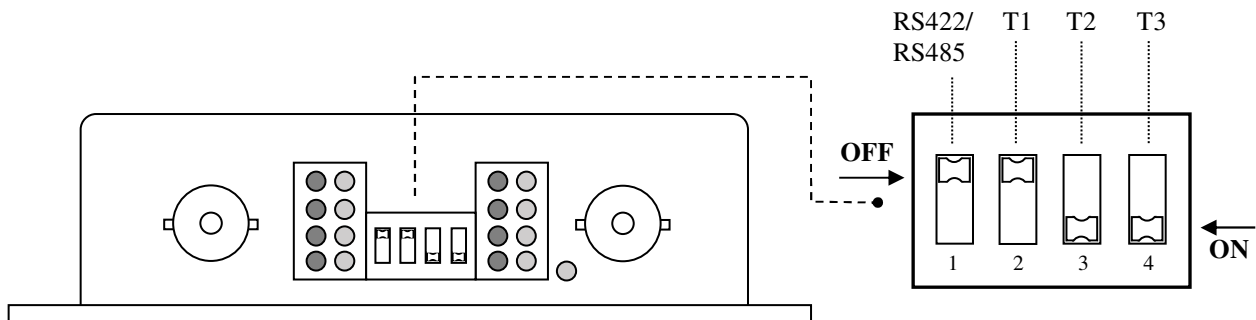


FIGURE 7: OSD730 SWITCH SETTINGS

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2.3.3 INDICATORS

The OSD730 has 2x4 sets of LEDs across its front panel and a single bicolour Link Status LED.

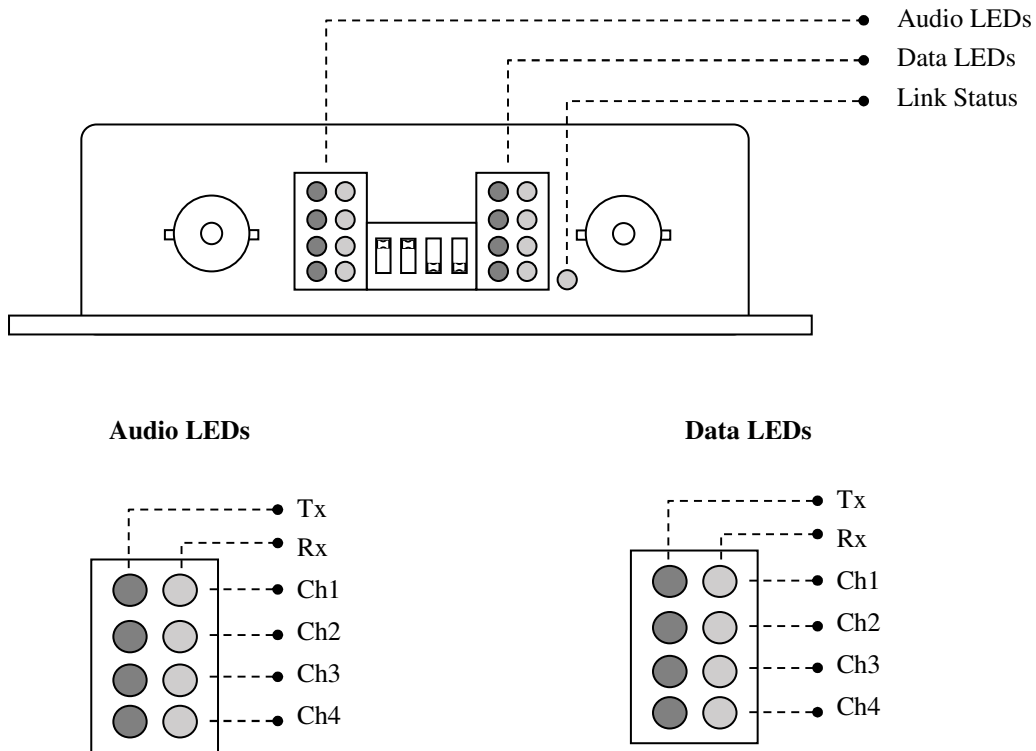


FIGURE 8: OSD730 LED INDICATORS

The Tx columns of LEDs indicate that a signal is being transmitted from the OSD730 when they illuminate red. The Rx columns of LEDs indicate that a signal is being received by the OSD730 when they illuminate green. Each row indicates the channel being transmitted/received.

The Link Status LED 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.

This link status signal is duplicated as an electrical signal, TTL level, on pin 22 of the DB44 connector on the back of the OSD730C.

3. MAINTENANCE

3.1 INTRODUCTION

The following section outlines the fault-finding procedure for the OSD730 modem. 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 ES sensitive and 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 (voltage and current) is connected to the power socket.
- ▲ Check that the data signals are connected to the modem correctly and that the distant OSD730 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 in.

3.3 ROUTINE MAINTENANCE

There is no routine maintenance required with the OSD730.

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 ALL REPAIRS

Optical Systems Design reserves the right to repair or replace faulty modules/units. Please obtain a "Return Material Authorisation" number form and number before returning goods.

Goods must be returned to Optical Systems Design, Warriewood or its nominated authorised representative, for all repairs in adequate packing material.

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 REPAIR

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 REPAIR

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

4.3 EXCLUSIONS

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

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