
OPTICAL

SYSTEMS

DESIGN

OPERATOR MANUAL

OSD890 SERIES

DIGITAL 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 OVERVIEW

The OSD890 series is a high-quality digital video, audio and data optical fiber transmission system. The system consists of the OSD891 and the OSD893 transceiver units, which are designed to be used as a pair, and provide forward transmission of up to four channels of PAL, NTSC or SECAM video, plus full-duplex transmission of four audio and four data channels. An optional reverse path transmission section can be configured to provide any combination of one video channel, four audio channels and/or four data channels. In addition to this, one of the forward path video channels may be optionally configured as a reverse path instead, providing a system with 3 forward video channels and two reverse video channels. A further six low-speed data channels are also available with some configuration options.

The OSD891 accepts up to four analog composite video input signals and up to four analog audio input signals, along with up to four digital data input signals. The video signals are converted to digital with 10-bit resolution, while the audio signals are converted using 24-bit resolution so as to preserve the quality of the input signals. The resulting digital signals are multiplexed and transmitted as a digital bitstream through the fiber. The OSD891 also includes an optical receiver section that decodes the digital signal transmitted by the OSD893, to provide audio and data output signals. The audio channels can be balanced or unbalanced at 0dBu nominal, 20dBu maximum level and operate over a 21kHz bandwidth. The data channels can be RS232, TTL or RS422, with RS485 available on one channel, and operate from DC to 400kbps. User adjustable turnaround times are provided for RS485. The optional six low-speed data channels (available only in the stand-alone case and 1RU chassis versions) operate at DC to 20kbps.

The OSD891 is configured as a motherboard, the OSD8911, and a series of daughter-cards which plug into the motherboard to allow a great deal of flexibility with configuration options. The daughter cards available are as follows:

- OSD8912 – Video encoder card
- OSD8914 – Four-channel data interface card
- OSD8925 – Four-channel digital audio transceiver card
- OSD8932 – Video decoder card

By choosing the appropriate combination of daughter cards, the OSD891 can also be configured to provide 8 audio channels with 0 data channels or eight data channels with 0 audio channels.

The OSD893 incorporates a high performance optical receiver for the incoming digital bitstream. The received digital signal is then decoded into video, audio and data signals, which are available at the unit's outputs. The OSD893 also includes a transmitter that outputs a digital optical signal consisting of the return path channels of video, audio and/or data. The unit provides a constant analogue composite video output level which is independent of link loss, and the audio and data sections of the OSD893 are also adjustment free over all link lengths.

The OSD891 and OSD893 are available in three physical configurations: card, stand-alone modem case and 1RU rack mounting chassis. 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 1RU rack mounting chassis is a fully independent mains powered unit.

The OSD890 system can be used with any standard multi-mode optical fiber, and is available optionally for single-mode 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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1.1.2 APPLICATIONS

- ▲ CCTV networks requiring full duplex data and /or transmission between cameras and either control centre
- ▲ Video conferencing
- ▲ Distance learning
- ▲ Transportation networks
- ▲ Industrial monitoring systems

1.1.3 FEATURES AND BENEFITS

- ▲ Uncompressed 10 bit video, 24 bit audio encoding, giving studio quality transmission.
- ▲ Fiber optic transmission of one to four video signals on one fiber.
- ▲ Optional transmission of four audio and/or four high speed data channels which may be one way or full duplex. Alternatively, the user may transmit eight audio or eight data signals, again either one way or full duplex.
- ▲ Optional reverse video channel for camera synchronisation or for video conferencing.
- ▲ Range of up to 200km is possible with optional 1550nm operation.
- ▲ Optional duplex operation over one fiber.
- ▲ Operates on either singlemode or multimode fiber.
- ▲ Video bandwidth of 10MHz, SNR >67dB
- ▲ Audio bandwidth of 21kHz, SNR >100dB
- ▲ Video inputs have 3dB overload capability and can be equalised for up to 300m of coaxial cable.

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1.2 TYPICAL CONFIGURATION

FIGURE 1 below indicates a typical set-up for an OSD890 pair.

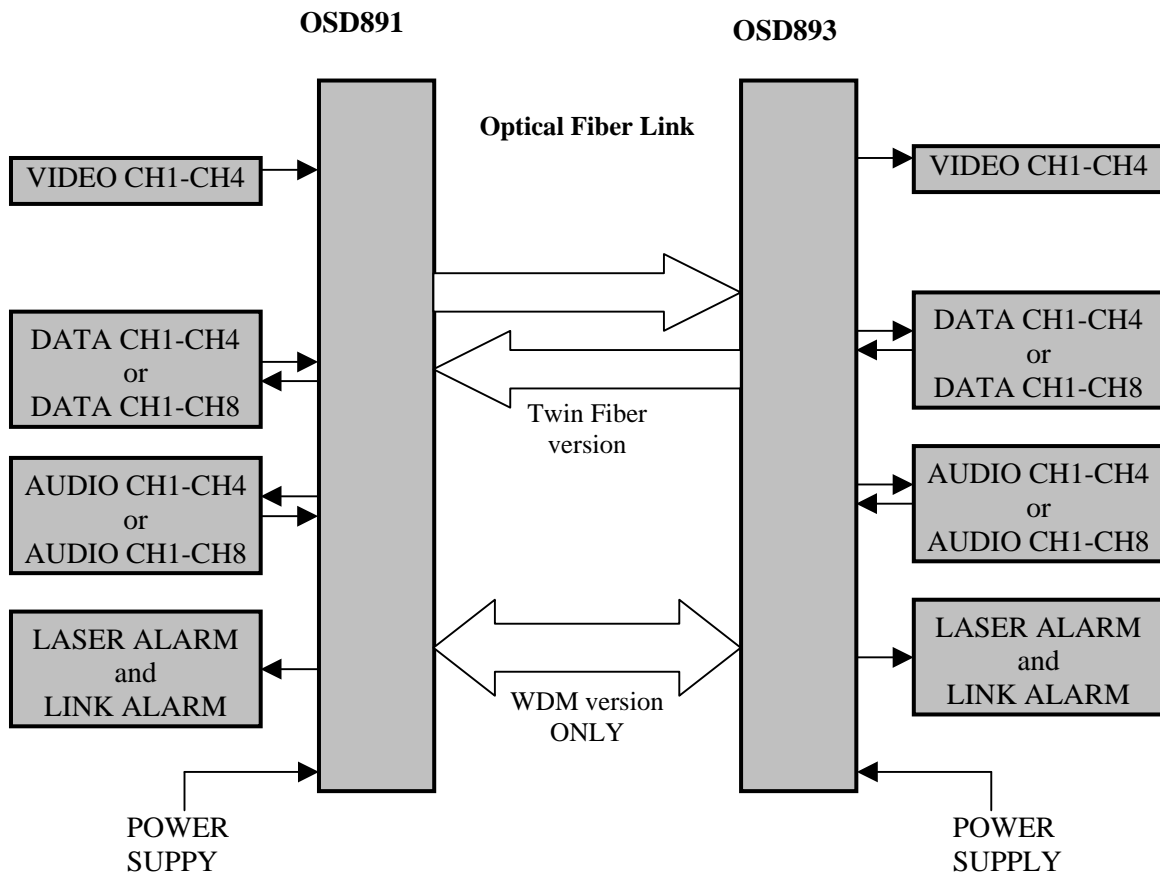


FIGURE 1: TYPICAL CONFIGURATION

OPTICAL SYSTEMS DESIGN

1.3 PRODUCTS AND OPTIONS

There are various options available for the OSD890 as identified in Table 1 below:

TABLE 1: PRODUCTS AND OPTIONS

ITEM	DESCRIPTION
NV	N video channels (where N = 1,2,3 or 4) One way transmission only
A	Forward path audio
a	Reverse path audio
v	Reverse path video
D	Forward path data
d	Reverse path data
W	Single fiber operation (WDM)
	8 Channel Audio distribution board (1RU) ^{*1}
	16 Channel Audio distribution board (1RU) ^{*1}

Notes:

*1 - As an option, an 8 or 16 channel audio distribution board is available for both the OSD891 and OSD893. The audio distribution board contains either 8 or 16 XLR type audio connectors. XLR-3F (female type) connector is used in conjunction with the OSD891 and the XLR-3M (male type) connector is used in conjunction with the OSD893.

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1.4 TECHNICAL SPECIFICATIONS

Table 2 below provides Technical Specifications for the OSD890.

TABLE 2: TECHNICAL SPECIFICATIONS

SPECIFICATION	PERFORMANCE
Video Input/Output Impedance	75Ω composite
Video Input/Output Levels	1.0 Vpp nominal
Video Connectors	BNC
Video Bandwidth	10Hz to 10MHz (±1dB)
Signal to Noise Ratio	> 67dB (weighted)
Linearity	<0.5% Differential Phase (DP) <0.5° Differential Gain (DG)
Audio Input/Output Impedance	10kΩ/200Ω Balanced/Unbalanced
Audio Bandwidth	10Hz - 21kHz (±0.5dB)
Audio Input & Output Level	0dBu nominal, 20dBu maximum
Audio Signal to Noise Ratio	>100dB (A weighted at max level)
Audio Distortion	< 0.02% Total Harmonic Distortion (THD)
Data Interface	RS232 or RS422 with RS485 available on Ch1 only
Data Rates	DC to 400kbps
Data Bit Error Rate	< 1x10 ⁻⁹
Audio and Data Connectors	Female DB-44 high density connector
Transmitter Wavelength	1310nm or 1550nm (including CWDM devices from 1470nm to 1610nm)
Transmitter Coupled Power	Several options are available from -7dBm to +6dBm
Receiver Sensitivity (either direction)	<-24dBm (PIN) <-34dBm (APD)
Link Budget	From 17dB to 38dB at 1310nm or 1550nm
Optical Connectors	ST standard, FC and SC are optional
Dimensions (mm)	100W x 208D x 25H card, powered from OSD370 chassis 215W x 210D x 56H modem case 483W x 210D x 44H 1RU case
Weight	0.2kg (card), 1.6kg (modem case), 2.9kg (1RU case)
Power Requirements	9 to 20V _{DC} @ 15VA 90 to 265 V _{AC} @ 20VA
Operating Temperature	-20 to +75°C
Relative Humidity	0 to 95% non-condensing
Chassis Current Consumption	0.9 Amp for 4-channel video system. Add 0.30 Amp for additional audio and/or data channels

10289004

NOTES:

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

It is also possible to configure the unit as 8 audio and 0 data, 0 audio and 8 data.

2 INSTALLATION AND OPERATION

2.1 INTRODUCTION

This section outlines the methods required to install and operate the OSD890 system 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

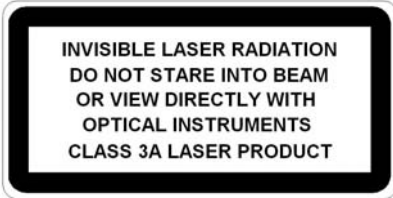
ELECTROMAGNETIC COMPATIBILITY

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.

LASER OPERATION

Class 3A

The singlemode and WDM versions of the OSD890 are **Class 3A laser products**. Wavelength of 1310nm and $<+5\text{dBm}$ power output or wavelength of 1550nm and $<+7\text{dBm}$ power output.



INVISIBLE LASER RADIATION
DO NOT STARE INTO BEAM
OR VIEW DIRECTLY WITH
OPTICAL INSTRUMENTS
CLASS 3A LASER PRODUCT

- ▲ 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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2.3 OSD890 DRAWINGS AND DIMENSIONS

There are three types of packaging of the OSD890, the “CARD” version, “MODEM CARD” version and “1RU MODEM CARD” version as shown below.

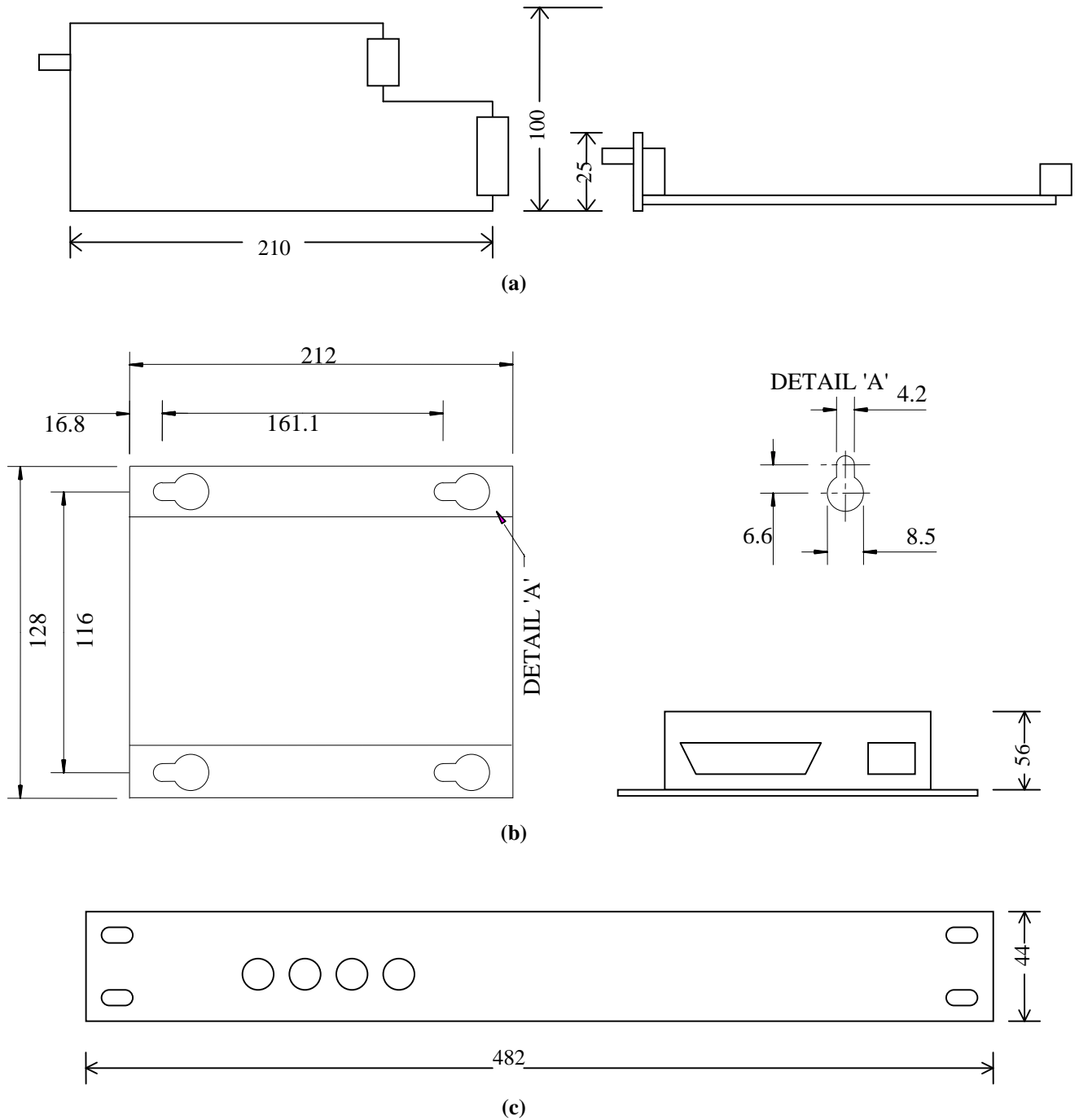


FIGURE 2: OSD890 DIMENSIONS
(a) Card Version (b) Modem Card Version (c) 1RU Version

OPTICAL SYSTEMS DESIGN

2.4 OSD890 CONNECTIONS

2.4.1 AUDIO/DATA I/O CONNECTOR PIN ASSIGNMENTS

DB44 HD PIN-OUT	FUNCTION 4A4D	FUNCTION 8A	FUNCTION 8D
1,8,15,30,38,41	Ground	Ground	Ground
16	Link Alarm	Link Alarm	Link Alarm
31	Laser Alarm	Laser Alarm	Laser Alarm
19	CH1 Data Input +	CH5 Audio Input +	CH1 Data Input +
20	CH1 Data Input -	CH5 Audio Input -	CH1 Data Input -
32	CH2 Data Input +	CH6 Audio Input +	CH2 Data Input +
33	CH2 Data Input -	CH6 Audio Input -	CH2 Data Input -
2	CH3 Data Input +	CH7 Audio Input +	CH3 Data Input +
3	CH3 Data Input -	CH7 Audio Input -	CH3 Data Input -
17	CH4 Data Input +	CH8 Audio Input +	CH4 Data Input +
18	CH4 Data Input -	CH8 Audio Input -	CH4 Data Input -
5	CH1 RS232 Output		CH1 RS232 Output
35	CH2 RS232 Output		CH2 RS232 Output
4	CH3 RS232 Output		CH3 RS232 Output
34	CH4 RS232 Output		CH4 RS232 Output
23	CH1 RS422 Output +	CH5 Audio Output +	CH1 RS422 Output +
24	CH1 RS422 Output -	CH5 Audio Output -	CH1 RS422 Output -
36	CH2 RS422 Output +	CH6 Audio Output +	CH2 RS422 Output +
37	CH2 RS422 Output -	CH6 Audio Output -	CH2 RS422 Output -
6	CH3 RS422 Output +	CH7 Audio Output +	CH3 RS422 Output +
7	CH3 RS422 Output -	CH7 Audio Output -	CH3 RS422 Output -
21	CH4 RS422 Output +	CH8 Audio Output +	CH4 RS422 Output +
22	CH4 RS422 Output -	CH8 Audio Output -	CH4 RS422 Output -
27	CH1 Audio Input +	CH1 Audio Input +	CH5 Data Input +
28	CH1 Audio Input -	CH1 Audio Input -	CH5 Data Input -
42	CH2 Audio Input +	CH2 Audio Input +	CH6 Data Input +
43	CH2 Audio Input -	CH2 Audio Input -	CH6 Data Input -
13	CH3 Audio Input +	CH3 Audio Input +	CH7 Data Input +
14	CH3 Audio Input -	CH3 Audio Input -	CH7 Data Input -
29	CH4 Audio Input +	CH4 Audio Input +	CH8 Data Input +
44	CH4 Audio Input -	CH4 Audio Input -	CH8 Data Input -
39	CH1 Audio Output +	CH1 Audio Output +	CH5 RS422 Output +
40	CH1 Audio Output -	CH1 Audio Output -	CH5 RS422 Output -
9	CH2 Audio Output +	CH2 Audio Output +	CH6 RS422 Output +
10	CH2 Audio Output -	CH2 Audio Output -	CH6 RS422 Output -
11	CH3 Audio Output +	CH3 Audio Output +	CH7 RS422 Output +
12	CH3 Audio Output -	CH3 Audio Output -	CH7 RS422 Output -
25	CH4 Audio Output +	CH4 Audio Output +	CH8 RS422 Output +
26	CH4 Audio Output -	CH4 Audio Output -	CH8 RS422 Output -

TABLE 3: J9 CONNECTOR PIN ASSIGNMENTS

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Notes:

For RS232 operation use pins 20, 33, 3, 18 (channels 1-4) as data inputs when data option fitted
 Single channel RS485 is available on pin 23 (+) and pin 24 (-) when data option fitted
 Use column Function 4A4D for 4-Audio and 4-Data channel option
 Use column Function 8A for 8-Audio channel option
 Use column Function 8D for 8-Data channel option

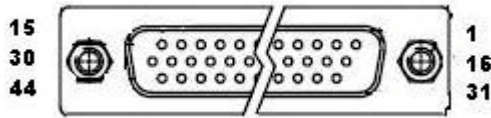


FIGURE 3: DB44 - FEMALE CONNECTOR PIN OUT

2.4.2 POWER SUPPLY CONNECTIONS

The OSD890 requires external power and should be connected as indicated in Table 4. Power for the OSD890 module card version is connected via a DB9 connector on the OSD370 or OSD350 chassis. The OSD890 card version should be fixed into the OSD370 chassis using the captivated screws. The cards can be plugged in or out of the OSD370 chassis with power on or off.

TABLE 4: POWER CONNECTION

OSD890 Version	Specification		Connection
Card	12V _{DC}	Supplied by OSD370 Chassis	DB9
Module Card	+9V to 20V _{DC}	Externally Supplied	2-Pin TermBlock Pin 1 (+), Pin 2 (Gnd)
1RU	90V _{AC} to 265V _{AC} @ 20VA	Mains Power	IEC mains plug

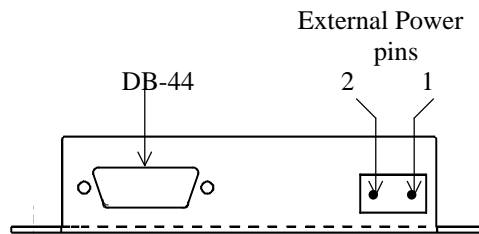


FIGURE 4: OSD890 MODULE CARD VERSION POWER SUPPLY CONNECTION

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2.4.3 OTHER CONNECTIONS

The video-input signal (eg. from camera) is connected to the video input BNC connectors on the OSD891. The video output signal (eg. to monitor) is connected from the video output BNC connectors on the OSD893.

All Data, Audio and Alarm signals are connected to the DB-44 connector as set out in Table 2.

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.

2.4.4 LINK SETTINGS

The OSD890 does not have any user configurable links on the PCB. All the links are factory set and should not be touched as permanent damage may occur and/or void warranty.

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2.5 OSD890 OPERATION

When using the OSD890 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 OSD chassis and check that the indicators illuminate accordingly on power up. If a module version or 1RU version is used, connect the unit to an appropriate power source and check that the indicators illuminate accordingly on power up.

In either case take special note of the "Laser OK" indicator, it should be green. If it is red there may be a problem with the laser. Disconnect power and have the Laser checked as soon as possible.

To connect video signals, connect BNC terminated coaxial cables (RG59) from the camera to the unit. If the camera is operational, the "Video Present" indicator should illuminate directly under the corresponding BNC connector.

Finally, plug in the optical connectors of the optical cable. If the remote OSD893 is connected, the "Data Link" LED will change from Red to Green.

Plug the digital signal source and/or audio signal into the 44-pin DB44 connector (J9) on the rear of the module. Ensure that the correct signals are connected to the correct pins of Audio/Data Input/Output connector as specified in Table 3.

2.5.1 CONTROLS

If RS485 data is required set the RS422/485 Mode switch to the "On" position, ie down (which is the 1st switch of the 4way DIPswitch). The data control switch is located on the OSD8914 Data Interface Daughter board. Switch's 2, 3 and 4 sets the RS485 Turnaround Delay to the value appropriate to your system. If you are not sure of the correct value, leave all Turnaround Delay switches "Off", ie up. Refer to Table 5 for delay selection.

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.

If RS485 is not required, keep all four switches in the "Off" position, ie up.

TABLE 5: OSD890 RS-485 TIMING DELAYS

SWITCH COMBINATIONS				FUNCTION	DELAY (μ s) (\pm 1%)
1	2	3	4		
OFF	OFF	OFF	OFF	RS-422	N/A
ON	OFF	OFF	OFF	RS-485	30
ON	ON	OFF	OFF	RS-485	100
ON	OFF	ON	OFF	RS-485	300
ON	ON	ON	OFF	RS-485	1000
ON	OFF	OFF	ON	RS-485	3000
ON	ON	OFF	ON	RS-485	10000
ON	OFF	ON	ON	RS-485	30000
ON	ON	ON	ON	RS-485	100000

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2.5.2 INDICATORS

TABLE 6: OSD890 INDICATORS

INDICATOR	COLOUR	FUNCTION
Laser OK	Green Red	OK Fail
Data Link OK	Green Red	OK Fail
Video Present (x4)	Orange Off	OK No video signal

NOTE: “Data Link OK” Indicator refers to the received data stream. It is ‘green’ after the optical link is established and the receiver is locked onto the incoming data stream and detected a low Bit Error Rate. It will indicate ‘red’ after the Bit Error Rate reaches an unacceptable level and before the number of bit errors has reduced to a low rate.

2.5.3 OPTIONAL AUDIO DISTRIBUTION BOARD

The audio distribution board is an 8 channel or 16 channel 1RU rack mount that is used in conjunction with the OSD890 system. There are two versions, one for the OSD891 which has the XLR-3F female type connectors for audio input, and the other for the OSD893 which has the XLR-3M male type connectors for audio output. Either system is designed to be mounted on a rack mount directly above or below the corresponding OSD890 unit. A ribbon cable connects the audio distribution board to the OSD890 units DB-44 connector.

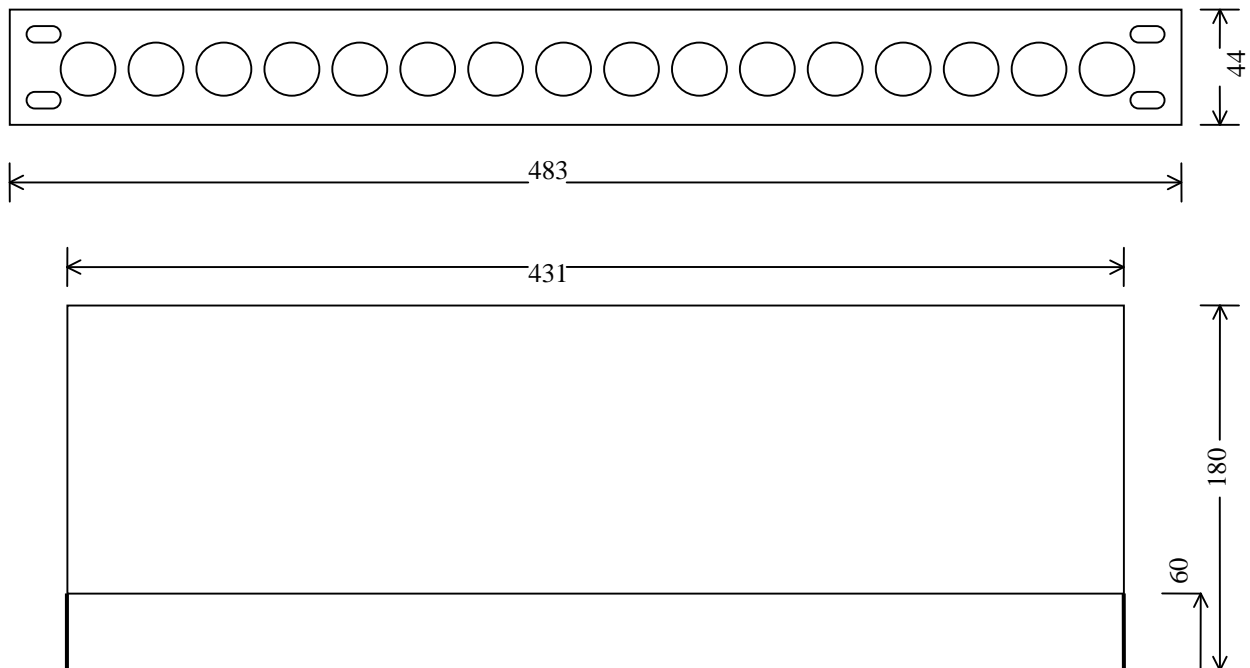


FIGURE 5: AUDIO DISTRIBUTION BOARD DIMENSIONS

3 MAINTENANCE

3.1 INTRODUCTION

The following section outlines the fault-finding procedure for the OSD890 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 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 is connected to the power socket.
- ▲ Check that the data signals are connected to the modem correctly and that the distant OSD890 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 OSD890.

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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