
OPTICAL

SYSTEMS

DESIGN

OPERATOR MANUAL

OSD480 SERIES

**RF/CATV/MATV TRANSMISSION
SYSTEMS**

**OSD481A/OSD483A CATV/MATV MODEM
PAIR**

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1 TECHNICAL SUMMARY

1.1 BRIEF DESCRIPTION

1.1.1 OVERVIEW

The OSD481A/483A combination provides optical transmission of a composite AM-VSB CATV spectrum of television and FM radio carriers within the 30 to 860MHz frequency range. The optical signal is transmitted over single mode optical fiber cable that may be up to 20km in length, depending on the number of channels and grade of laser used.

The OSD481A is available with three grades of laser, which permit the following levels of performance:

- ▲ G1 : 20 channels, > +2dBm optical output power
- ▲ G2 : 40 channels, > +8dBm optical output power
- ▲ G3 : 60 channels, > +10.5dBm optical output power

The system is intended for the reticulation of television signals in environments such as hotels, resorts, hospitals and other large sites.

The OSD481A optical transmitter accepts a combined RF spectrum with a level of 90dBuV per channel and outputs a linearly modulated optical signal via a single mode fiber. The unit is normally supplied for point to point links, however it can be fitted with a 1:2, 1:4 or 1:8 optical splitter which permits a point to multi-point network.

The OSD483A receiver accepts the incoming optical signal, converts it to an electrical signal and outputs this signal to an external network.

Both OSD481A and OSD483A are supplied as stand-alone 120/240VAC powered 1RU high 19" rack mountable enclosures.

1.1.2 APPLICATIONS

- ▲ CATV networking
- ▲ MATV networks for resorts, hospitals
- ▲ Secure reticulation of television and data in defense and government sites and campuses
- ▲ Distance learning
- ▲ UHF/VHF radio links
- ▲ Very wideband multiple channel data transmission

1.1.3 FEATURES AND BENEFITS

- ▲ Available to support 60 channel networks
- ▲ Operates over from 5 to at least 50km of singlemode cable depending on the laser employed in the OSD481A transmitter modem
- ▲ Can support star networks with up to 16 remote nodes
- ▲ Optionally available in a form suitable to RF over fiber signal distribution
- ▲ Very cost effective – you pay only for what you really need

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1.2 OSD480 CONFIGURATION

Note that the manual will refer to the OSD480 when referring to both the OSD481 and OSD483

1.2.1 OSD481A/483A UNIT

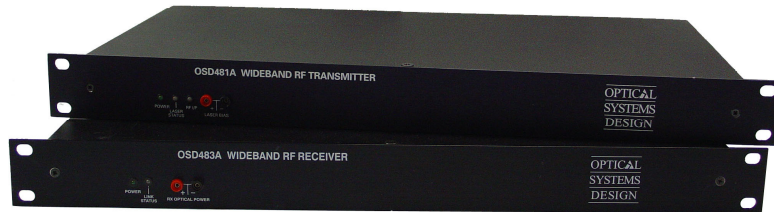


FIGURE 1: OSD481A/483A UNIT

1.2.2 TYPICAL CONFIGURATION

Figure 2 below indicates a possible set-up for an OSD480 system.

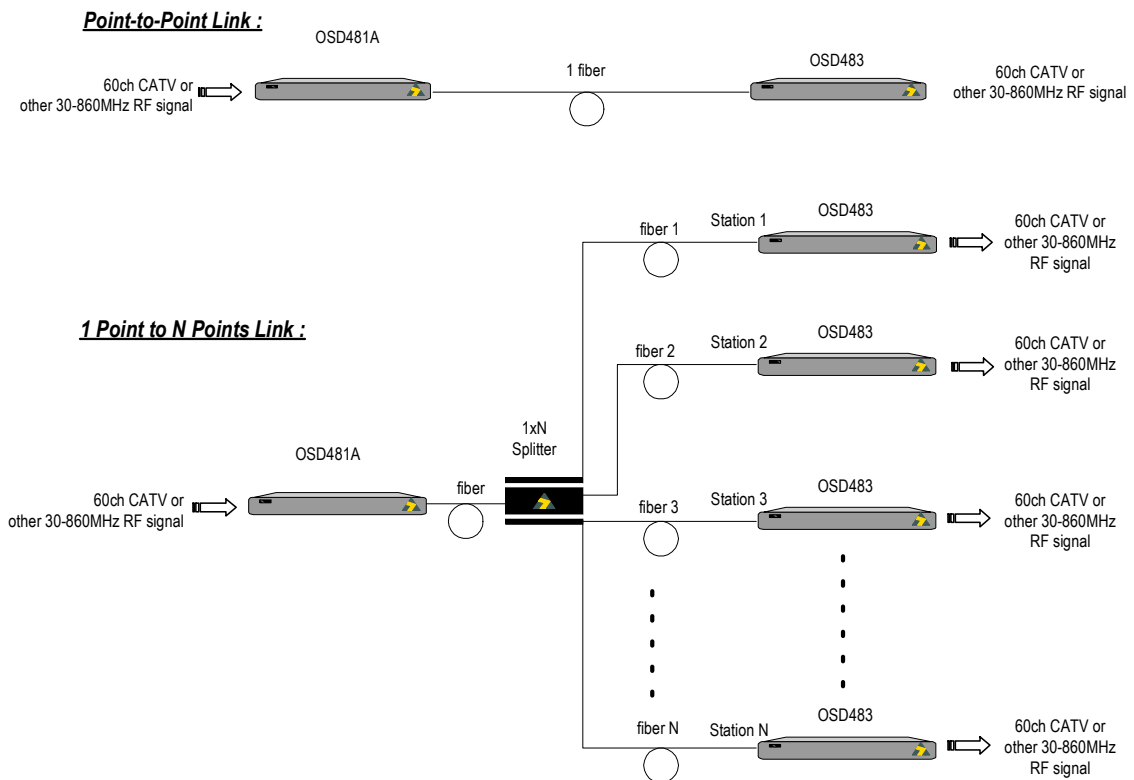


FIGURE 2: OSD480 TYPICAL CONFIGURATION

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1.3 TECHNICAL SPECIFICATIONS

TABLE 1: TECHNICAL SPECIFICATIONS

SPECIFICATION	PERFORMANCE
OSD481A Transmitter	
Electrical Interface	90dBuV/channel nominal into 75Ω, channels to be within ±1.0dB of each other
RF Input Level Control	User adjustable over 30dB range in 2dB increments
Transmission Bandwidth	30MHz – 900MHz ±1dB
Optical Wavelength	1310 ±20nm with 1550nm and CWDM wavelengths optionally available. Contact OSD for details
Optical Output Level	+4.8 to +5.4dBm with grade 1 laser +7.8 to +8.4dBm with grade 2 laser +10.8 to +11.4dBm with grade 3 laser +13.0 to +13.6dBm with grade 4 laser
Channel Loading	60 PAL-B channels (4% typical modulation index)
Indicators and Alarm Contacts	Power RF signal present Laser alarm
OSD483A Receiver	
Operating Wavelength	1250 – 1600nm
Output Level	90dBuV nominal/channel, output attenuator set to minimum, 4% modulation index, -5dBm optical input level
Receiver Bandwidth	30 – 860MHz ±2dB (in conjunction with OSD481A)
RF Output Level Control	User adjustable over 30dB range in 2dB increments
Carrier to Noise Ratio	>53dB at a receive power level of -2dBm with 60 PAL-B channels from a OSD481A/G3 transmitter
Receiver Saturation	>2dBm
Indicators and Alarm Contacts	Power Optical power present RF signal
Physical	
RF Connector	F type (N type for Option RF)
Optical Connector	SC/APC
Alarm Connector	9 pin female D
Operating Temperature	-20°C to +55°C
Relative Humidity	0 to 95% non-condensing
Power Requirements	115/230V _{AC} ± 15% 47-63Hz @ 40VA or -40 to -56V _{DC} @ 40VA
Dimensions (mm)	432W x 210D x 44H (1RU, 19 rack mounting)
Weight	3kg

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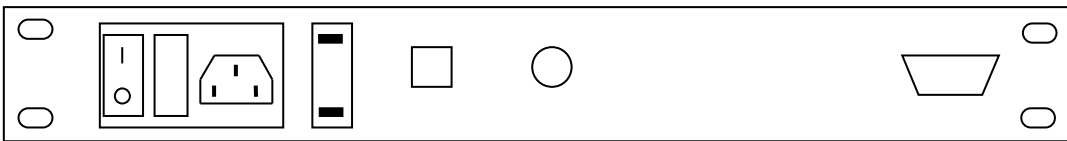
1.4 OSD480 FRONT AND REAR PANELS

OSD481A

There are three LED indicators and two Laser bias sockets on the front panel of the OSD481A

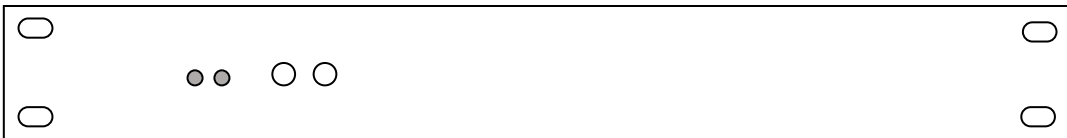


The rear panel consists of the DB9 Alarm connector, RF input connector, optical output level adjust panel and power/fuse/switch IEC inlet.



OSD483A

There are two LED indicators and two Rx Optical Power sockets.



The rear panel consists of the DB9 Alarm connector, RF output connector, optical input level adjust panel and power/fuse/switch IEC inlet.

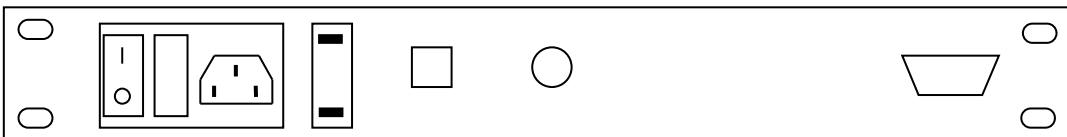


FIGURE 3: OSD480 FRONT AND REAR PANELS

2 INSTALLATION AND OPERATION

2.1 INTRODUCTION

This section outlines the methods required to install and operate the OSD480 successfully. It should be studied carefully if damage to the equipment or poor results are to be avoided.

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

2.2 INSTALLATION

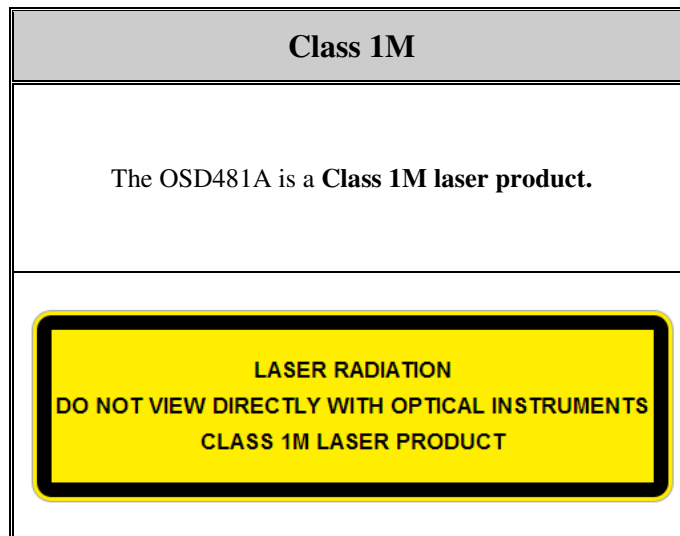
2.2.1 WARNING AND PRECAUTIONS

▲ ELECTROMAGNETIC COMPATIBILITY

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

▲ OPTICAL OUTPUT OPERATION

WARNING: Laser Safety: Class 1M 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 OSD480 DRAWINGS AND DIMENSIONS

The OSD480 standalone module is designed to be mounted on a 19" rack or an even bench surface.

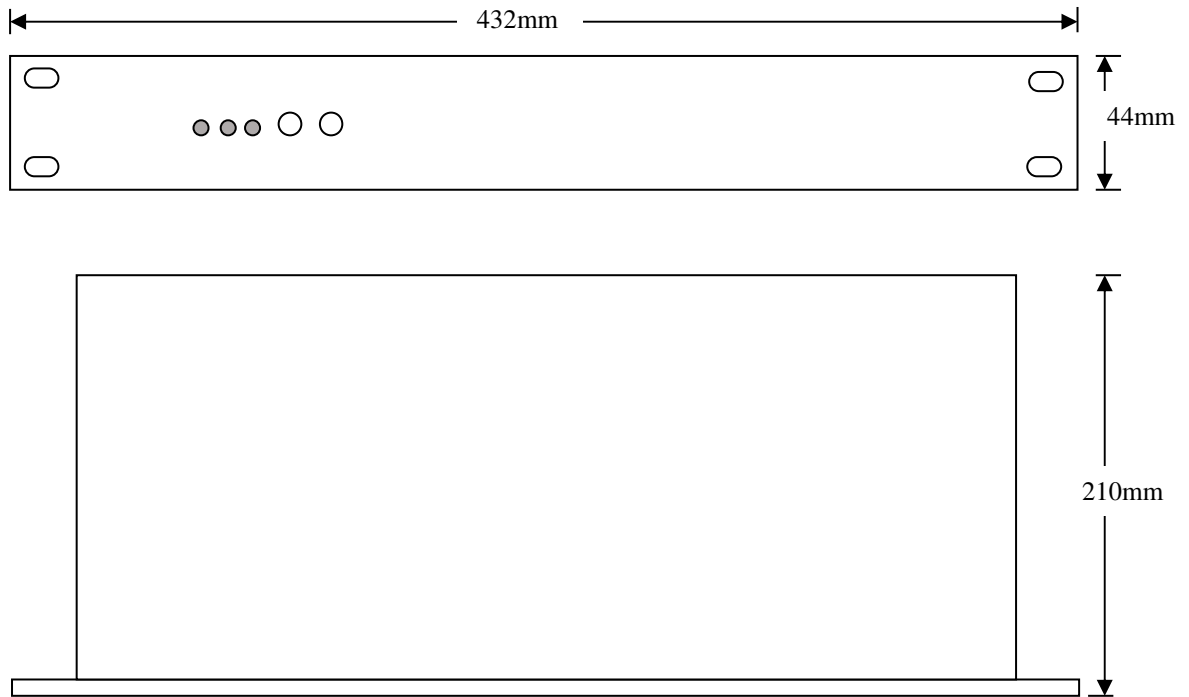


FIGURE 4: OSD480 MOUNTING DIMENSIONS

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2.2.3 POWER SUPPLY CONNECTIONS

The OSD480 requires external 115/230V_{AC} 47-63Hz @ 40VA or -40 to 56V_{DC} @ 40VA.

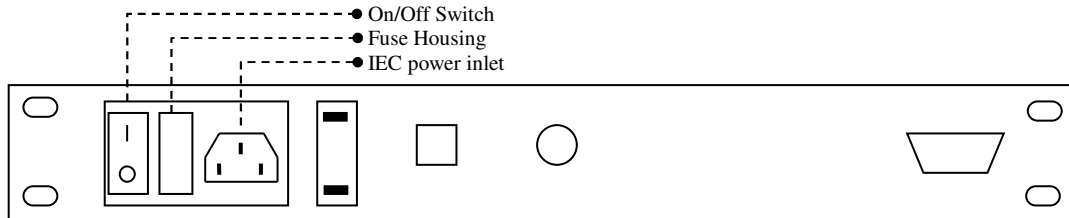


FIGURE 5: OSD480 POWER SUPPLY CONNECTIONS

2.2.4 DB9 PIN ASSIGNMENTS

O/C is an abbreviation for open circuit; S/C is an abbreviation for short circuit. Note that when Power is OFF all ALARMS go into FAIL mode.

OSD481A DB9 Alarm

TABLE 2: OSD481A DB9 PIN ASSIGNMENTS

Alarms	DB9 Pin	DB9 Pin	Continuity
Power On	9	5	S/C
	4	5	O/C
Power Fail	9	5	O/C
	4	5	S/C
Laser OK	1	2	S/C
	6	2	O/C
Laser Fail	1	2	O/C
	6	2	S/C
RF Level Nominal	3	8	S/C
	7	8	O/C
RF Level Low	3	8	O/C
	7	8	S/C

OSD483A DB9 Alarm

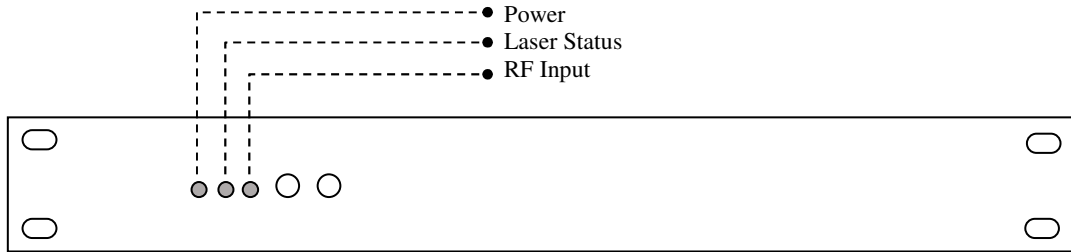
TABLE 3: OSD483A DB9 PIN ASSIGNMENTS

Alarms	DB9 Pin	DB9 Pin	Continuity
Power On	9	5	S/C
	4	5	O/C
Power Fail	9	5	O/C
	4	5	S/C
Optical Present	6	2	S/C
	1	2	O/C
Optical Loss	6	2	O/C
	1	2	S/C

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2.2.5 LED INDICATORS

OSD481A



OSD483A

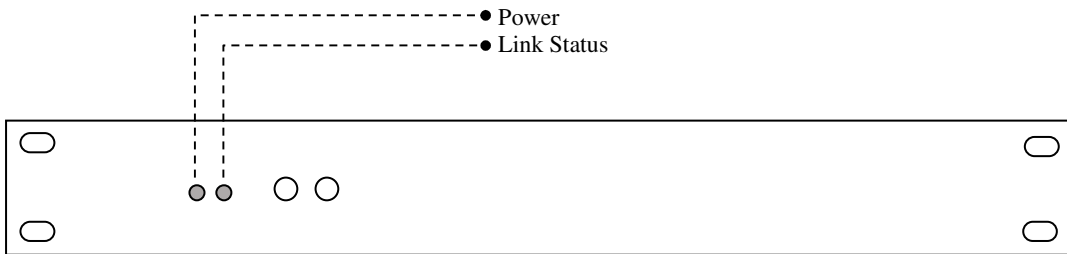


FIGURE 6: OSD480 LED INDICATORS

TABLE 4: LED FUNCTION

	OSD481			OSD483	
	Power	Laser Status	RF Input	Power	Link Status
Off	No Power	No Power	No Power	No Power	No Power
Green	Power On	Laser OK	RF input connected	Power On	Optical Link Present
Red	-	Laser not OK	No RF signal connected	-	No Optical Link

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2.2.6 CONTROLS

OSD481

The RF input level to the transmitter may be adjusted by means of an attenuation switch located on the OSD481A rear panel. There are two push buttons marked [+] and [-] to increment or decrement attenuation level located on the rear of the unit. The level is changed in 2dB increments and there are sixteen discrete attenuation levels: from 0 to F (hexadecimal).

It is important to set the attenuator so that the laser is working with optimum modulation. Recommended attenuator settings for a 4mW laser are shown in Table 5.

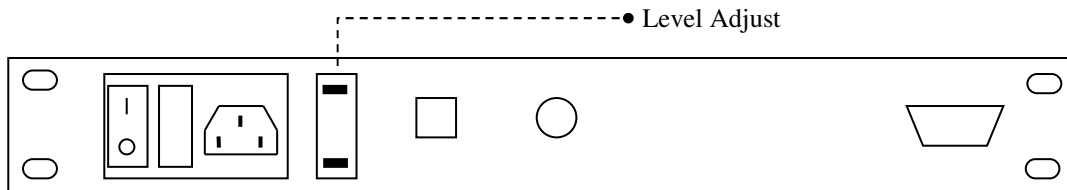


FIGURE 7: OSD481 CONTROLS

Table 5: OSD481A Transmitter Attenuator Settings

Number of Carriers	RF Level at input port (dBuV)	Attenuator control
1	95	2
79	95	C

OSD483

There is one user adjustment available on the OSD483A receiver located on the rear of the unit. It is a broadband, low distortion gain adjustment, which can be used to set the system (OSD481A/483A) gain to other than unity.

External amplifiers/attenuators may be necessary to achieve the desired levels required for each particular installation.

The key requirement is to keep optical power levels as high as possible short of causing visible distortion products.

2.2.7 RF INPUT POWER LIMIT

Precautions have to be taken not to overdrive the OSD481A RF input with excessive signal level.

Laser damage may occur as a result of excessive signal power being applied to the input.

The maximum RF power applied to the RF input port of the OSD481A must not exceed +118dBuV when the attenuator is set to 0.

For this reason it is recommended to set the OSD481A RF attenuator control to position [F] (maximum attenuation) before connecting RF signals to the OSD481A input. The attenuator control is located at the rear panel of the unit and consists of two push buttons marked [+] and [-] to increment or decrement attenuation level. The attenuation level is changed in 2dB increments and there are sixteen discrete attenuation levels: from 0 to F (hexadecimal).

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2.2.8 RECEIVER OPTICAL INPUT LIMIT

OSD483A uses a photodiode that is designed to work at optical powers of less than +2dBm. **It is necessary to ensure that optical power going into OSD483A input is less than +2dBm, or damage to the unit may occur.** The OSD481A transmitted optical power can be as high as +11dBm. In situations where optical path attenuation is not high enough, a fixed optical attenuator must be used to reduce optical power at the OSD483A receiver input to less than +2dBm.

2.3 SYSTEM SETTINGS RECOMMENDATIONS

For best results, please note the following:

ALL AM-VSB Fiber Optic Transmission Systems operate best if:

1. Input television carriers are within ± 1 dB of each other, as this maximises the effective optical power available to each carrier.
2. The combined RF input spectrum is adjusted just below the onset of visible inter-modulation distortion effects such as picture crosstalk or increased picture noise.
3. The optical link causes minimal optical reflections back to the laser transmitter. This is best ensured by using only very high quality, angle polished physical contact (SC/APC) optical connectors with return loss (RL) of better than 60dB. Similarly high quality splices (typically these are fusion splices) must be used to minimise such reflections.
4. The receiver's optical input power is just below the onset of visible inter-modulation distortion effects such as picture crosstalk or increased picture noise. Receiving PIN diode should not be fed more than +2dBm optical power, as this will cause saturation and subsequent intermodulation distortion.

Consequently, the best system performance is attained as a compromise between these four factors and the intrinsic noise of the laser.

2.4 SYSTEM ADJUSTMENTS

The setup procedure for the OSD481A/483A system is as follows:

1. Connect the source of RF signals to the OSD481A Transmitter.
2. Connect the OSD483A Receiver's output to an ordinary television set.
3. Connect the OSD481A to the OSD483A via the fiber optic link.
4. Tune the TV set to one of the channels in the high VHF band, eg channels 10 or 12. You may see a picture with a lot of crosstalk from other channels. This will almost certainly be due to overloading of the OSD481A laser.
5. In such a situation, it will be necessary to reduce the RF signal to the laser by adjusting the attenuator control on the OSD481A. **Note that it is important for the TV signals to be within 2dB of each other.**

3 MAINTENANCE

3.1 INTRODUCTION

The following section outlines the fault-finding procedure for the OSD480 modems. Please take note of the following:

- ▲ Personnel without appropriate training should not attempt any maintenance except that outlined below.
- ▲ If further maintenance is attempted you are warned that every care should be taken to ensure that internal measurements made while the equipment is operational are taken carefully as some components within the unit are expensive and may be damaged by failure of any portion of their support circuitry.
- ▲ Some components within the unit are Electrostatic (ES) sensitive and Electrostatic Discharge (ESD) precautions should be taken when performing maintenance upon the unit.

3.2 EXTERNAL INSPECTION

Visually check for the following:

- ▲ Check that the correct power source is connected to the power socket.
- ▲ Check that the RF cables are connected to the modem correctly and that the distant OSD480 modem has been connected 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.

3.3 ROUTINE MAINTENANCE

- ▲ There is no routine maintenance required with the OSD480.

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 contact 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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