OPTIC▲L
SYSTEMS
DESIGN

OPERATOR MANUAL

OSD732T AND OSD732R

FIBER OPTIC TELEPHONE TRANSMISSION SYSTEM

OPTICAL SYSTEMS DESIGN

INDEX 1

1 TECHNICAL SUMMARY

1.1 BRIEF DESCRIPTION

1.1.1 OVERVIEW

The OSD732 is a high performance fully digital fiber optic interface for links between a PABX and any touchtone telephone. It is designed for applications such as PABX/Line extension between buildings or to a remote location (e.g. from a central control room to a security guard post) where only one or a few telephones are required. A typical application example could be the emergency telephone systems of highways or other ITS (Intelligent Transportation System) applications. The OSD732 can also be used to connect any two touchtone telephones to form a dedicated intercom system.

The OSD732 is available with common optical fibers operating at wavelengths of 850nm, 1300nm or 1550nm. Both multimode or singlemode versions are available to suit different application requirements. The longest transmission distance supported by the OSD732 is 5km on multimode fiber or 50km over singlemode fiber. The unit can be supplied with 1 or 4 telephone interfaces.

The OSD732 is available in two types of package: a standalone module or a card which can be installed into a standard OSD370 19" rack-mount chassis.

1.1.2 APPLICATIONS

▲ Line/PABX–Telephone Links

▲ Telephone-Telephone Intercom Links

▲ ITS Emergency Telephone system

▲ PABX Extension for Remote Locations

▲ Secure networks

1.1.3 FEATURES AND BENEFITS

▲ Interfaces with any touchtone or decadic dialling telephone and PABX systems.

▲ Available with 1or 4 telephone interfaces.

▲ Duplex communication on one or two optical fibers.

▲ A-Tick Compliant

▲ Operates with both singlemode and multimode fibers over up to 50km.

▲ Available in both standalone module or rack-mount card.

▲ Fully digital transmission.

1.2   TYPICAL CONFIGURATION

Figure 1 shows a typical set-up for an OSD732 pair.
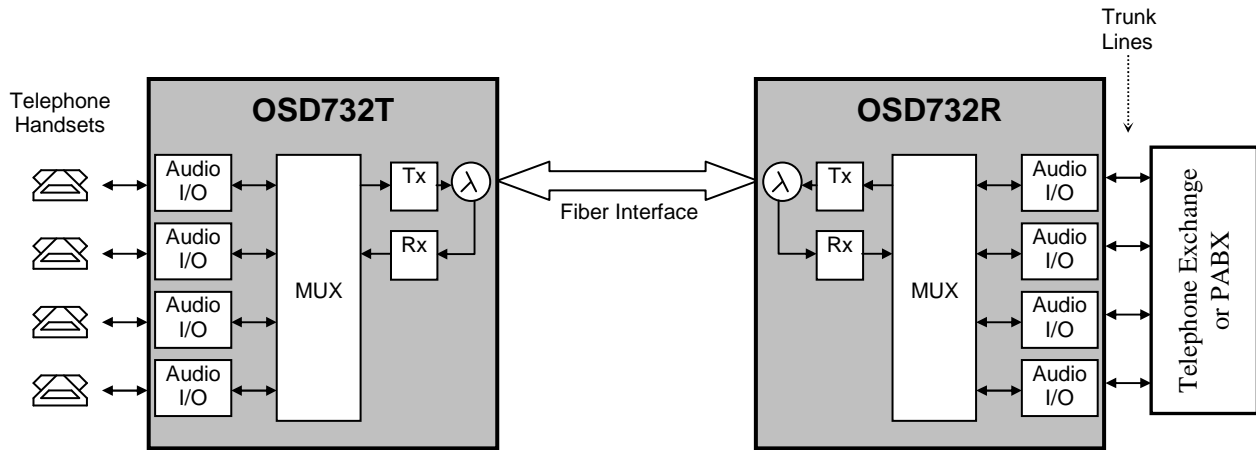
FIGURE 1: TYPICAL CONFIGURATION

1.3   PRODUCTS AND OPTIONS

There are various options available for the OSD732 as identified in Table 1 below:

TABLE 1: PRODUCTS AND OPTIONS

ITEM	DESCRIPTION
OSD732T	Telephone interface module for telephone end of link
OSD732R	Telephone interface module for exchange end of link
ITEM	**DESCRIPTION**
OPTION C	Module Version
OPTION L	1310nm and/or 1510nm singlemode option
OPTION W	Single fiber operation
OPTION 2A	Two channel version
OPTION 4A	Four channel version

1.4 TECHNICAL SPECIFICATIONS

TABLE 2: TECHNICAL SPECIFICATIONS

SPECIFICATION	PERFORMANCE
Audio Bandwidth	150Hz to 6kHz
Signal to Noise Ratio (SNR)	> 70dB
Input/Output Impedance	600Ω
Optical Signal Wavelength	850nm (OSD732) or 1310nm (OSD732L)
Coupled Transmit Power	-13 to –10dBm into 62.5/125 multimode fiber (OSD732) -13 to –10dBm into 9/125 singlemode fiber (OSD732L)
Receiver Sensitivity for 1×10^{-9} BER	< -40dBm
Receiver Saturation	> -10dBm
Optical Link Budget and Transmission Distance	>27dB: >8km on multimode fiber >70km on singlemode fiber
Ring Voltage	70VAC on –24VDC bias
Telephone Connector	RJ11
Optical Connector	ST standard, others are optional
Operating Temperature	-20°C to +75°C
Relative Humidity	0 to 95% non-condensing
Power Requirements	+9V to 24V_{DC} @ 6VA
Indicators	Rx optical Signal OK Laser OK
Dimensions (mm)	104W x 157D x 53H (module) 25W x 208D x 100H (card)
Weight	0.4kg (Module) 0.2kg (card)
Chassis Current Consumption (CCC)	0.3 Amp (1Channel) 0.5 Amp (4 Channel)

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2   INSTALLATION AND OPERATION

2.1   INTRODUCTION

This section outlines the methods required to install and operate the OSD732T and OSD732R 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 1 Laser Product per IEC/EN 60825-1:20011 standard.

Class 1
The OSD732 is a **Class 1 laser product.**
CLASS 1 LASER PRODUCT
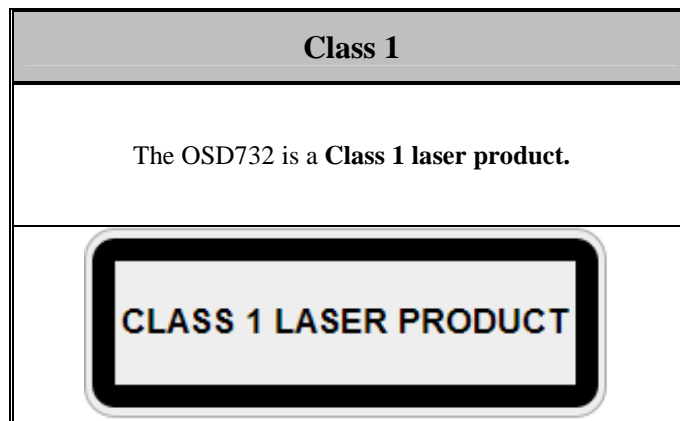
PRECAUTIONS

▲ 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.

CAUTION: When installing in the OSD370 chassis ensure that it is connected to a socket outlet with a protective earth connection. This equipment will be inoperable when mains power fails.

2.2.2 PACKAGING

The OSD732TC and OSD732RC are designed to be mounted on an even surface and to be secured by means of M4 or smaller screws.

The OSD732T and OSD732R card versions are designed to be inserted into a chassis and secured by means of captivated screws.
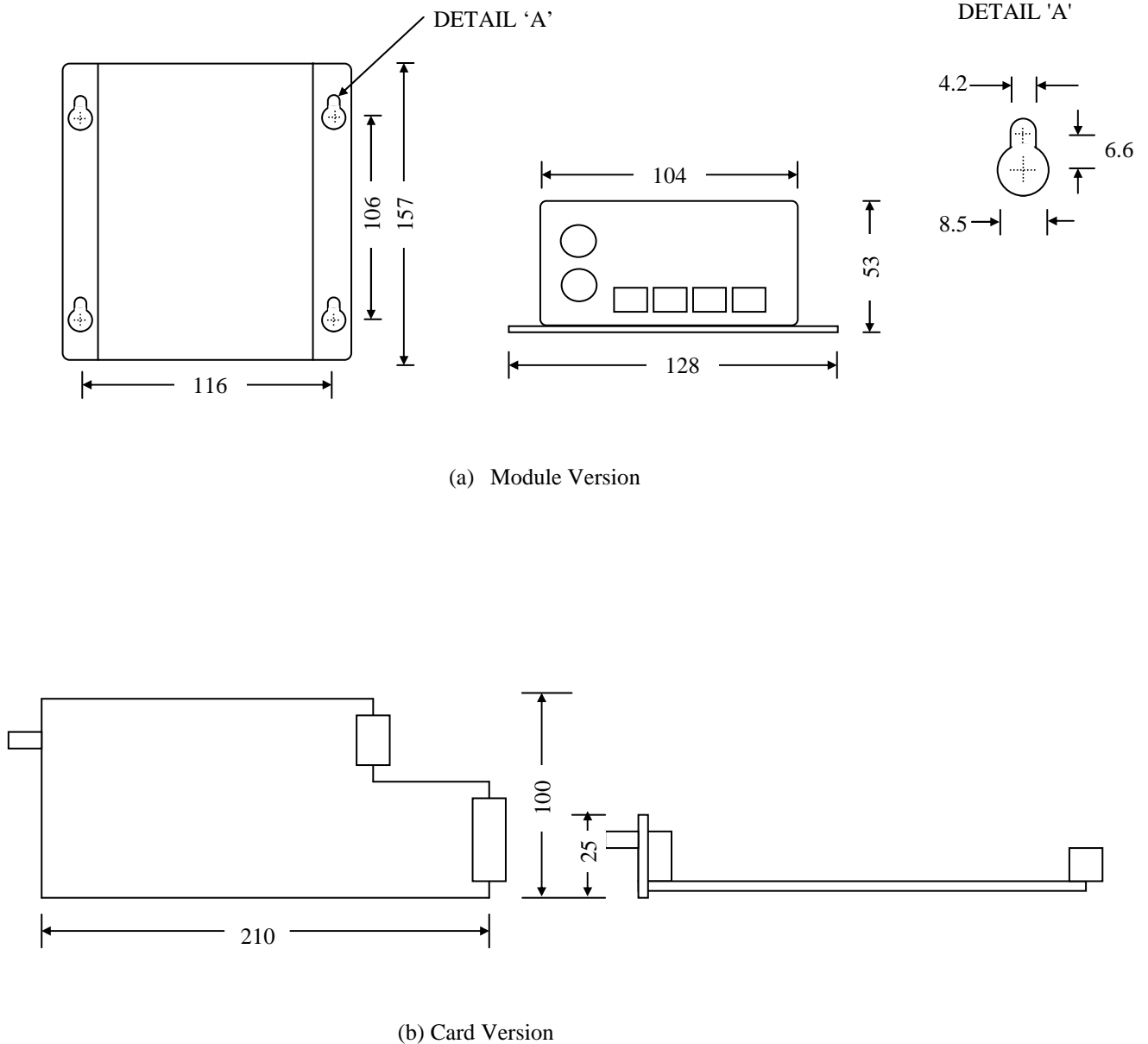
DETAIL 'A'

DETAIL 'A'

(a) Module Version

(b) Card Version

FIGURE 2: OSD732 DIMENSIONS

2.2.3   POWER SUPPLY CONNECTIONS

The OSD732 requires external DC power. The voltage range of the OSD732 is +9V to +24V @ 6VA. Power is connected to the socket located at the back of the case. DC power should be connected as indicated in Table 3.

DC power in the OSD732 card version is connected via a DB9 connector. Power is supplied by the OSD370 or OSD350 chassis which can be plugged in or out of the chassis with power on or off.

TABLE 3: DC POWER CONNECTION

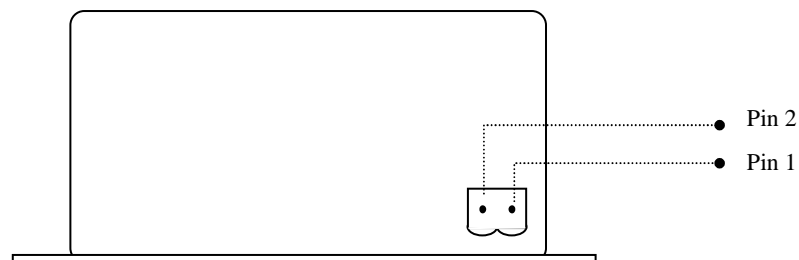| External Power Pin	Specification
Pin 1	+9Vto +24 DC
Pin 2	Ground

FIGURE 3: OSD732 POWER SUPPLY CONNECTION

2.2.4   OTHER CONNECTIONS

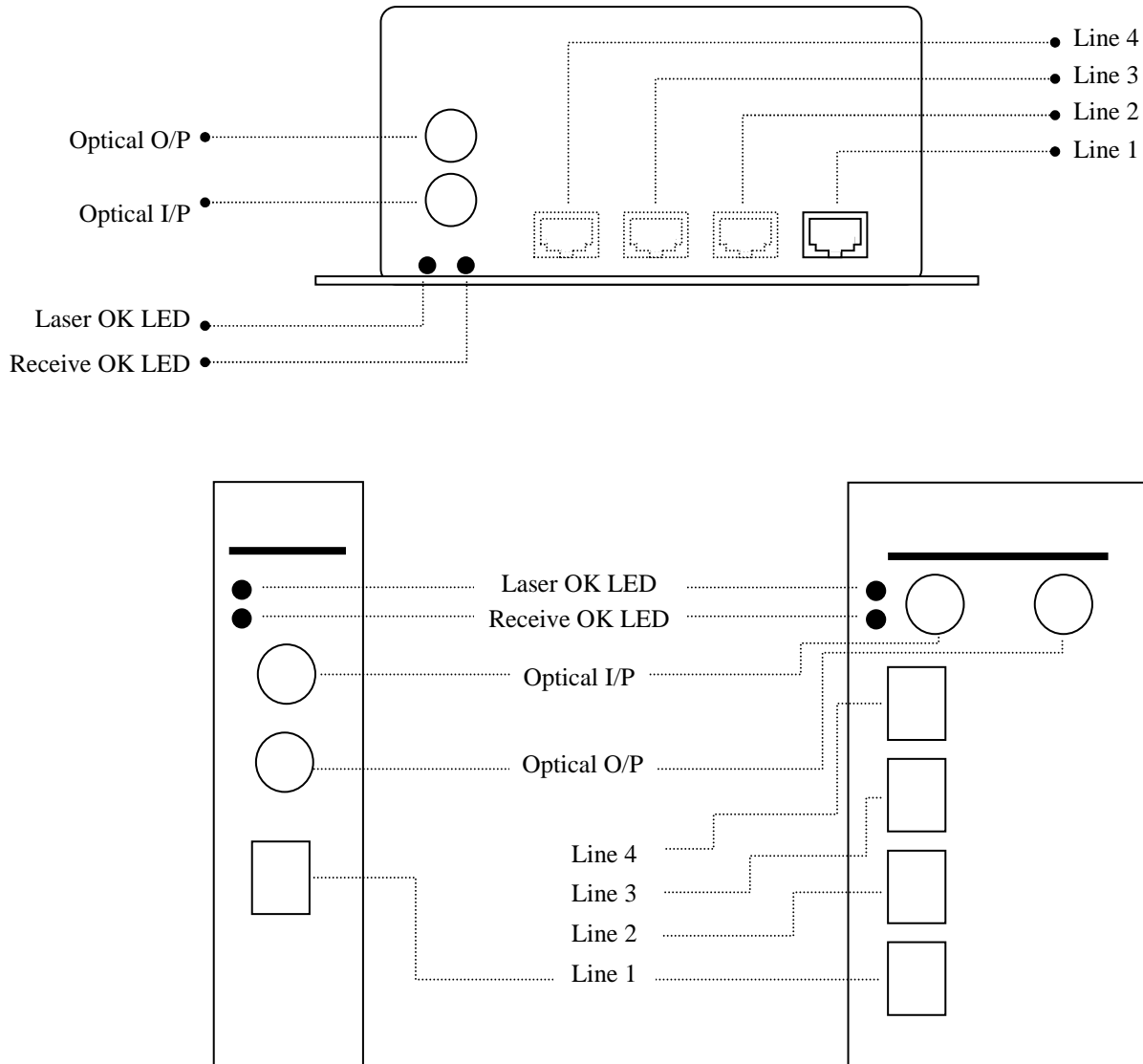FIGURE 4: OSD732 OTHER CONNECTIONS

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.

2.3 OSD732 OPERATION

2.3.1 OSD732 TELEPHONE CALL OPERATION

This section applies to both the OSD732T and OSD732R.

When a handset is connected to the OSD732T and an exchange or PABX line is connected to the OSD732R, a conventional telephone circuit is established.

If the handset connected to the OSD732T is in the "OFF HOOK" state, the trunk line at the OSD732R end is switched into its active state, thus informing the exchange that the handset is "OFF HOOK". The exchange feeds a dial tone via the fiber modems to the handset so that the user can then dial the required number. Either tone or decadic loop disconnect signalling can be used.

The exchange network or PABX connects the two handsets once the distant handset is picked up and breaks down the connection when either party hangs up following standard telecommunications practice.

An incoming call to the handset is first detected by the OSD732R as a ringing signal. The frequency and cadence of this signal is transferred to the OSD732T which generates a similar ring signal and feeds this to the handset. The OSD732T detects when the user picks up the handset and transfers this information to the remote OSD732R which sets the attached trunk line to the active state. This causes the initiating exchange or PABX to stop the ring signal and a two-way conversation can then start.

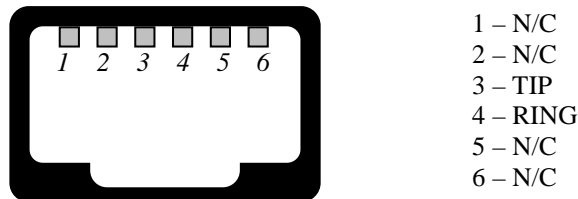Figure 5 below illustrates the RJ11 connection


```
1 – N/C
2 – N/C
3 – TIP
4 – RING
5 – N/C
6 – N/C
```

FIGURE 5: RJ11 PINOUT CONFIGURATION

2.3.2   TELEPHONE TO TELEPHONE INTERCOM OPERATION*

Figure 6 indicates how to connect the OSD732 as Telephone to Telephone Intercom connection. Intercom mode is activated automatically when two OSD732T's are connected back-to-back. Intercom mode operates as follows:

1. Handset A or B goes off-hook, a ringtone should start on handset B or A respectively.
2. Handset B or A goes off-hook, the ringtone should stop and audio communication between handset A and B is possible.
3. Handset A and/or B go back on-hook, the communication is stopped and the system resets.

Note: For 4 channel OSD732 versions, the handsets will communicate through the corresponding channels (ie Ch1 to Ch1, Ch2 to Ch2, etc)
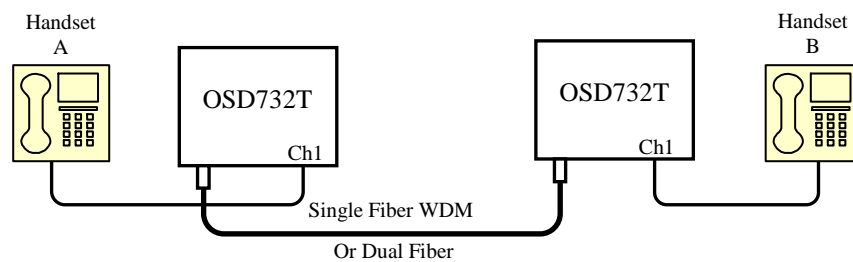

FIGURE 6: TELEPHONE TO TELEPHONE INTERCOM

2.3.3   TIP & RING POLARITY REVERSAL*

The standard method to transport voice between two telephone sets is to use tip and ring lines. Tip and ring lines are the twisted pair of wires that connect to your phone by way of an RJ–11 connector (see Figure 5 for pin configuration). The tip and ring lines are also used for polarity reversal which is used in a number of examples;

1. A ringing tone is a 20-25Hz toggled signal which produces the ring tone
2. Some countries require Caller Line ID signalling where polarity reversal precedes the transmission of data before the ringing signal.
3. Some systems require reversal of polarity to indicate far end answer eg coin operated phones.

In the case where Tip and Ring reversal is encountered at one end (eg OSD732R), the distant OSD732 (eg OSD732T) will transfer the polarity reversal over the fiber link providing system integrity.

*Note: This feature is only available on units with serial numbers 10004506 and higher.

2.3.4   OSD732T

Figure 7 is a block diagram of the OSD732T.

When using the OSD732T 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 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 "Off". If it is red there may be a problem with the laser. Disconnect power and have the Laser checked as soon as possible.

Finally, plug in the optical connectors of the optical cable. If the remote OSD732R is connected, the "Receive OK" LED will change from Red to Green.

Ensure that the correct signals are connected to the correct pins of the RJ11 connector as specified in Figure 5.
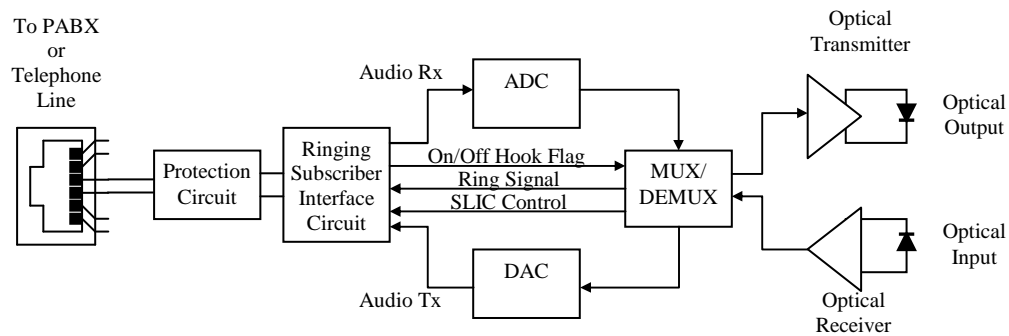

FIGURE 7: OSD732T BLOCK DIAGRAM

2.3.5   OSD732R

Figure 8 is block diagram of the OSD732R.

When using an OSD732R for the first time check that the unit is in good condition with no visible damage.

If a card version (OSD732R) is used, insert it in an appropriate slot on the OSD chassis and check that the indicators illuminate accordingly. If a module version (OSD732RC) is used, connect the unit to an appropriate power source and check that the indicators illuminate accordingly.

The "Laser OK" indicator LED should be "Off" in both Card and Case Versions, if the LED is red there may be a problem with the laser. Disconnect power and have the Laser checked as soon as possible.

Connect the optical cable: if adequate optical power is received and signal is locked the "Receive OK" indicator will change from 'red' to 'green'.
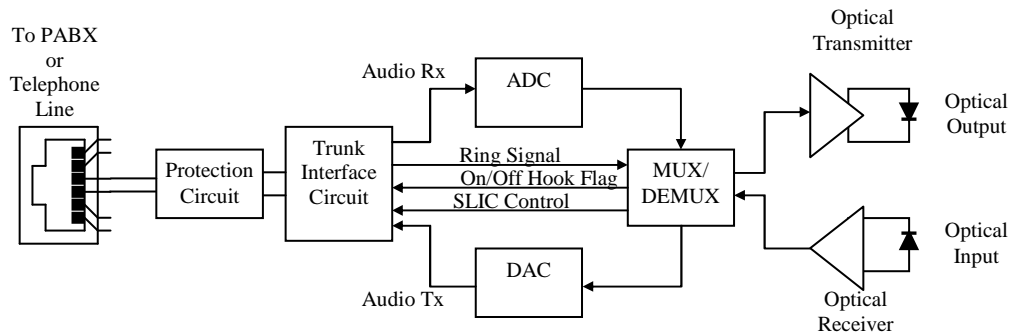

FIGURE 8: OSD732R BLOCK DIAGRAM

2.3.6   INDICATORS

TABLE 4: OSD732 INDICATORS

INDICATOR	COLOUR	FUNCTION
LD - Laser OK	Off Red	OK Fail
RCV - Receive Signal OK	Green Red	OK Fail

3   MAINTENANCE

3.1   INTRODUCTION

The following section outlines the fault-finding procedure for the OSD732T and OSD732R 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 OSD732T or OSD732R 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 OSD732T and OSD732R.

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. DATA INPUT IN 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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SYSTEMS

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