OPTICAL
SYSTEMS
DESIGN

OPERATOR MANUAL

OSD157

FIBER OPTIC

RS422/RS232 MODEM/MULTIPLEXER

OPTICAL SYSTEMS DESIGN

DOC ID: 10100007

OSD157 OPERATOR MANUAL

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1. TECHNICAL SUMMARY

1.1 BRIEF DESCRIPTION

1.1.1 OVERVIEW

The OSD157 is a small, self-contained modem, which can provide full duplex synchronous or asynchronous data communications over duplex optical fiber cable. The OSD157 incorporates a single chip multiplexer which handles eight independent signals all operating at up to 150kbps. In synchronous mode it operates with an external clock.

The unit may be configured as an asynchronous modem for data rates between DC and 150kbps. It operates with all commonly available multimode fibers over at least 3km.

Applications include any RS232 or RS422 communications link which requires synchronous operation and/or handshake signals where distance, electrical noise or security considerations render conventional twisted pair RS232 or RS422 links impractical.

While normally used as a modem the OSD157 may also be employed as an eight channel multiplexer, with all channels operating from DC to 150kbps.

The OSD157 is optionally available to operate over singlemode fiber. This model is designated as the OSD157L.

1.1.2 APPLICATIONS

▲ Military communications.

▲ Secure networks.

▲ Very high speed RS232 links.

▲ MIL-STD-188 links.

▲ Computer or terminal cluster communications.

1.1.3 FEATURES AND BENEFITS

▲ Factory configurable for either eight unbalanced signals or six balanced signals.

▲ Up to 12 modems plug into the OSD380 19″ rack mounting chassis.

▲ All signals are totally independent of each other.

▲ Signals may operate at any speed from DC to 150kbps.

▲ Small EMI/RFI resistant metal enclosure.

▲ Unbalanced signals may be RS232 or MIL-STD 188.

▲ More secure than copper cables.

▲ Safe transmission in hazardous environments.

▲ Complete end to end isolation.

1.2 TYPICAL CONFIGURATIONS

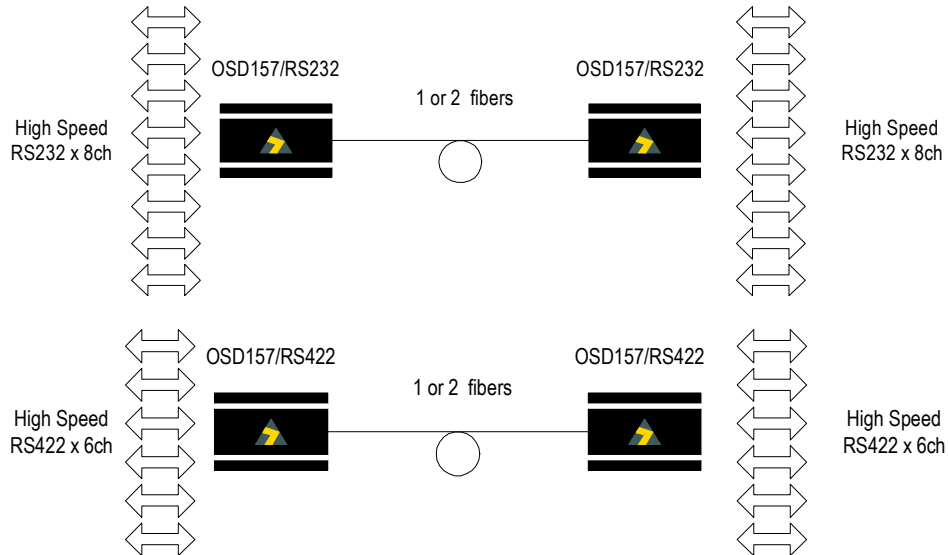Figure 1 shows a typical set-up for a link composed of two OSD157 modems.

FIGURE 1: TYPICAL CONFIGURATION

Note that the RS232 product has eight channels and that the RS422 product only has six channels. The pin assignments on the D connector are different between the two units.

The RS232 product has two wires per channel, an input, an output and a ground connection.
The RS422 product has four wires per channel, an input + and - and an output + and -.

1.3 PRODUCTS AND OPTIONS

There are various options available for the OSD157/RS232 and the OSD157/RS422. These options are identified in TABLE 1 below:

TABLE 1: PRODUCTS AND OPTIONS

ITEM	DESCRIPTION
OSD157/RS232	SYNCHRONOUS/ASYNCHRONOUS RS232 MODEM/MULTIPLEXER
OSD157/RS422	SYNCHRONOUS/ASYNCHRONOUS RS422 MODEM/MULTIPLEXER
OPTION L	SINGLEMODE OPTION FOR EITHER OF THE ABOVE
OPTION C	SINGLE UNIT CASE VERSION OF EITHER OF THE ABOVE
OPTION EC	RACK MOUNTED VERSION OF EITHER OF THE ABOVE
OPTION M	MIL-STD-188 (OSD157/RS232 ONLY)

1.4 TECHNICAL SPECIFICATION

TABLE 2 below is a table of the Technical Specifications for the OSD157.

TABLE 2: TECHNICAL SPECIFICATIONS

SPECIFICATION	PERFORMANCE
Data Rate	DC to 150kbps. Sapling rate on each line: 819kHz
Optical Transmit Power	-17 to -12dBm into 62.5/125 multimode fiber -20 to -12dBm into singlemode fiber (OSD157L only)
Receiver Sensitivity	<-33dBm
Optical Link Budget	>16dB at 850nm (>4km of multimode fiber) >13dB at 1310nm (>25km of singlemode fiber)
Receiver Saturation	>-10dBm
Optical Wavelength	850nm nominal (1310nm for OSD157L version)
Optical Connector	ST standard
Electrical Connector	25 Pin female D Subminature
Electrical Configuration	DCE
Electrical Interface	RS232C/V24 with output peak voltage between ±4 and ±6V or RS422
Power	+8V to +13V$_{DC}$ @150mA supplied by external power supply, or via pin 9 on the D connector on the RS232 version
Indicator	Link OK
Dimensions (mm) (excluding connectors)	Module: 104W x 144D x 25H Card: 25W x 208D x 100H
Weight	Module: 400g Card: 200g
Operating temperature	-20 to +75°C
Relative humidity	0 to 95% non-condensing
Cassis Current Consumption	0.15Amp

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1.5 PIN ASSIGNMENTS

1.5.1 RS232 D-CONNECTOR PIN ASSIGNMENTS

TABLE 3 below identifies the pin assignments for the 25 Pin D Connector on the OSD157/RS232. "OUTPUT" is out of the OSD157 and "INPUT" is into the OSD157. Pin 21 and Pin 23 are relay connections that can be used for external alarm when a sync error is detected.

TABLE 3: RS232 INPUT/OUTPUT

PIN	CH:	IN:	INTERNAL CONNECTION	PIN	CH:	OUT:	INTERNAL CONNECTION
Pin 2	TX 1	Input		Pin 3	RX 1	Output	
Pin 4	TX 2	Input	Pin 5	Pin 8	RX 2	Output	
Pin 14	TX 3	Input		Pin 16	RX 3	Output	
Pin 19	TX 4	Input	Pin 13	Pin 12	RX 4	Output	
Pin 20	TX 5	Input		Pin 6	RX 5	Output	Pin 22
Pin 24	TX 6	Input		Pin 17	RX 6	Output	Pin 15
Pin 11	TX 7	Input		Pin 10	RX 7	Output	
Pin 25	TX 8	Input		Pin 18	RX 8	Output	

FIGURE 2 below identifies the pin assignments with two OSD157's connected together. The cross over takes place within the units.
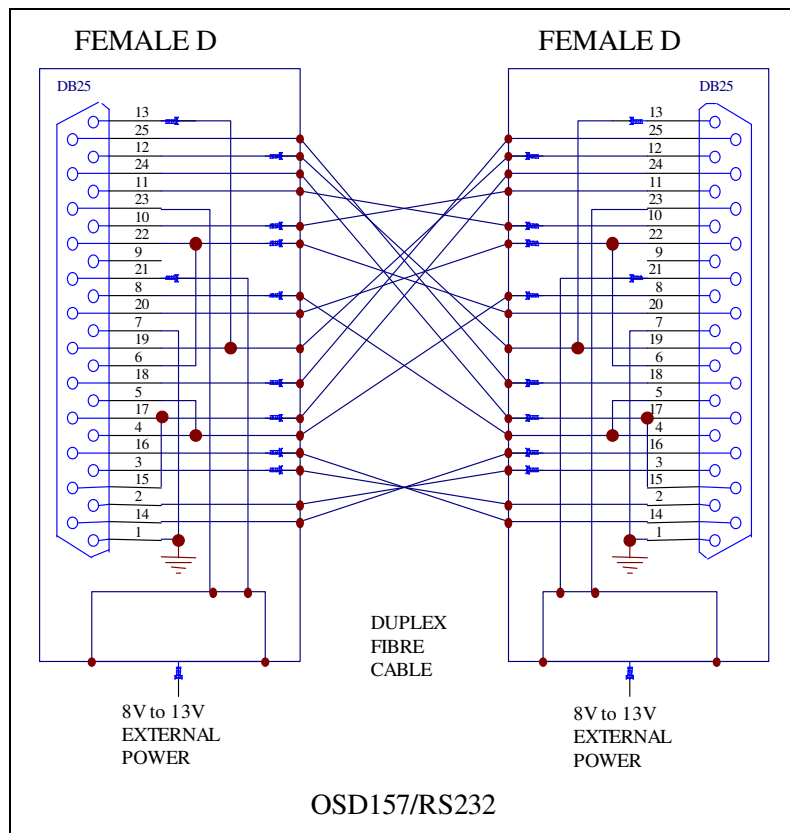

FIGURE 2: RS232 THROUGH CONNECTIONS

1.5.2   RS422 D-CONNECTOR PIN ASSIGNMENTS

TABLE 1 below identifies the pin assignments for the 25 Pin D Connector on the OSD157. OUTPUT is from the OSD157 and INPUT is to the OSD157.

TABLE 4: RS422 INPUT/OUTPUT

PIN:	NAME	INPUT/OUTPUT	PIN:	NAME	INPUT/OUTPUT
Pin 2	TX 1 +	Input	Pin 14	TX 1 -	Input
Pin 3	TX 2 +	Input	Pin 15	TX 2 -	Input
Pin 4	TX 3 +	Input	Pin 16	TX 3 -	Input
Pin 5	TX 4 +	Input	Pin 17	TX 4 -	Input
Pin 6	TX 5 +	Input	Pin 18	TX 5 -	Input
Pin 7	TX 6 +	Input	Pin 19	TX 6 -	Input
Pin 8	RX 1 +	Output	Pin 20	RX 1 -	Output
Pin 9	RX 2 +	Output	Pin 21	RX 2 -	Output
Pin 10	RX 3 +	Output	Pin 22	RX 3 -	Output
Pin 11	RX 4 +	Output	Pin 23	RX 4 -	Output
Pin 12	RX 5 +	Output	Pin 24	RX 5 -	Output
Pin 13	RX 6 +	Output	Pin 25	RX 6 -	Output

FIGURE 3 below identifies the pin assignments with two OSD157's connected together.
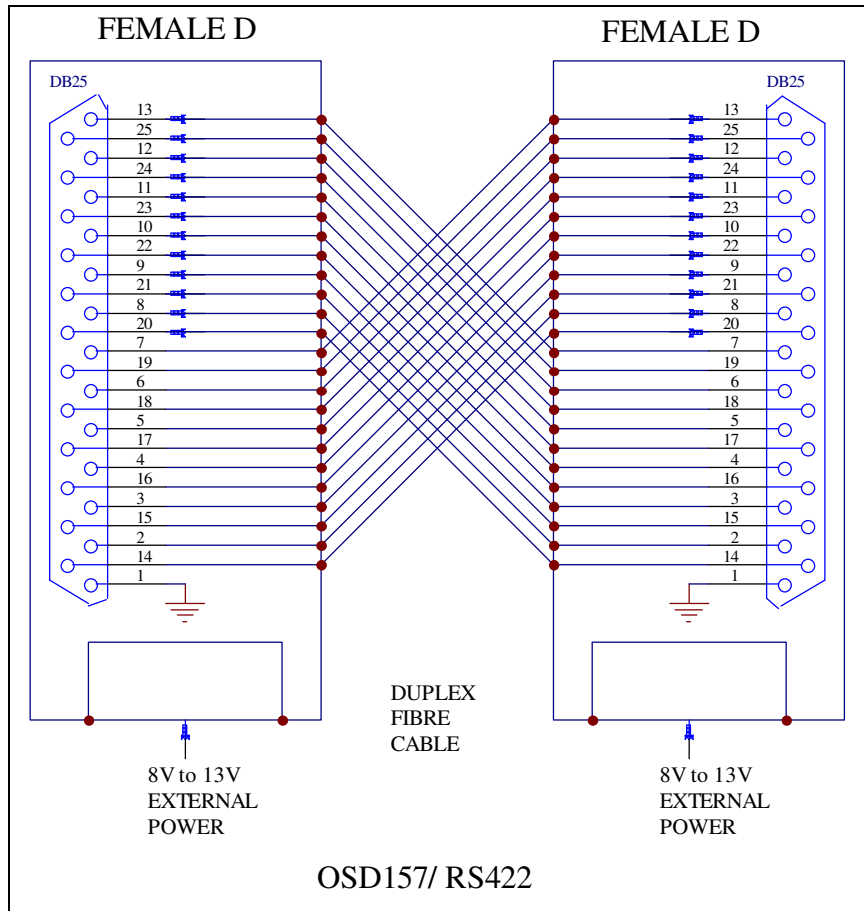

FIGURE 3: RS422 THROUGH CONNECTIONS

2. INSTALLATION AND OPERATION

2.1 INTRODUCTION

This section outlines the methods required to install and operate the OSD158T and OSD158R 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 OSD157 is a **Class 1 laser product.** |
| CLASS 1 LASER PRODUCT |
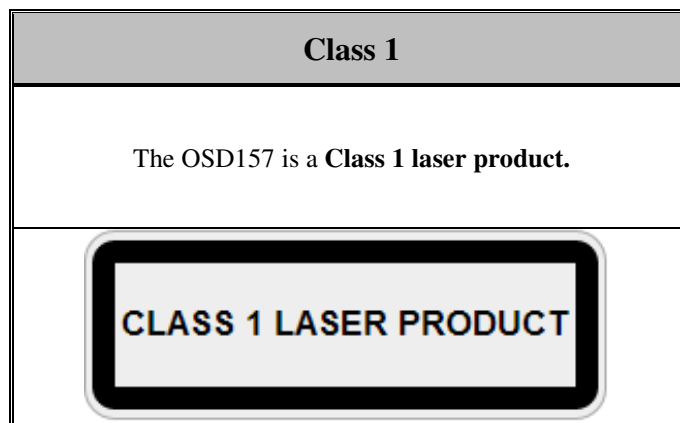
PRECAUTIONS

▲ 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.

2.2.2 PACKAGING

The OSD157C version is designed to be mounted on an even surface and secured by means of M4 or smaller screws. The rack mount option (OSD157EC) includes a flange for securing the unit to the rack (OSD350 or OSD370). Power is supplied via the DB9 connector from the OSD380.

FIGURE 4 provides the physical dimensions of the OSD157C (a) and OSD157EC (b).
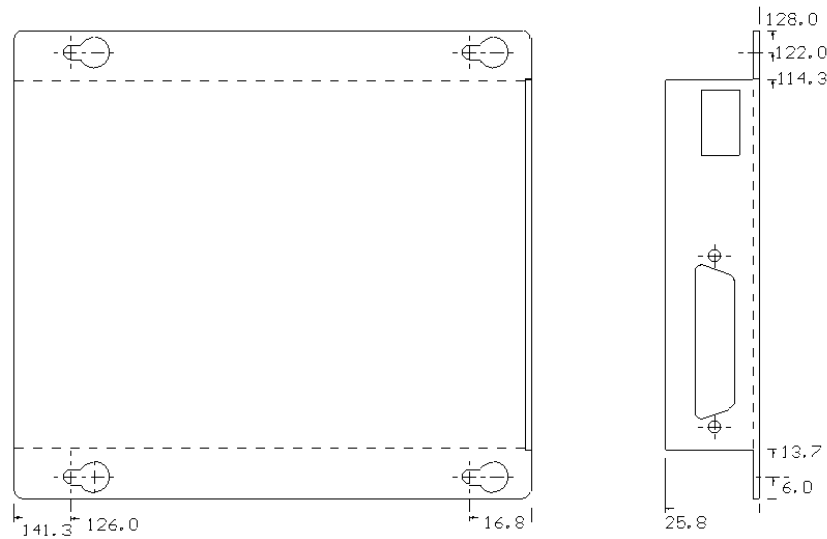
(a) OSD157C
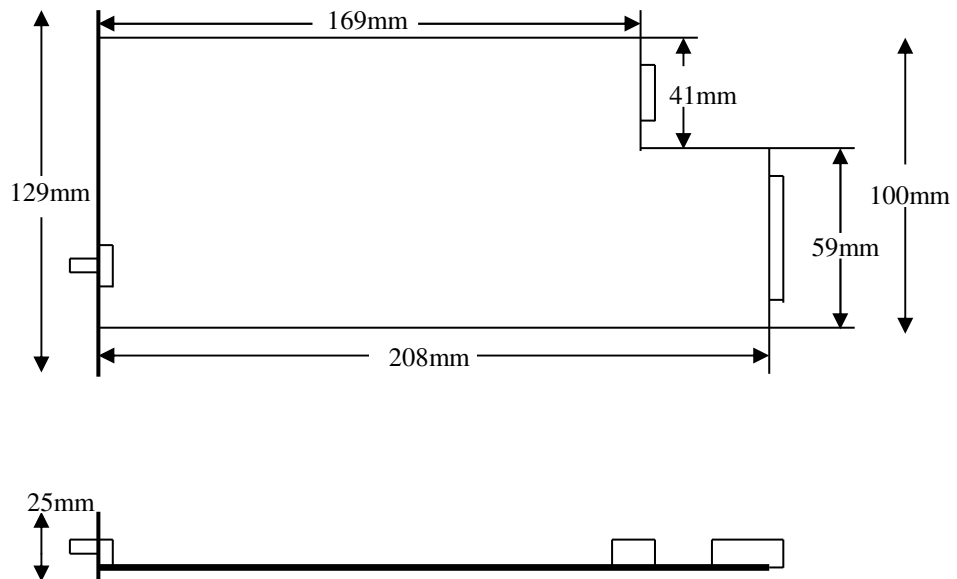
(b) OSD157EC

FIGURE 4: OSD157 DIMENSIONS

2.2.3 POWER SUPPLY CONNECTIONS

2.2.3.1 OSD157/RS232/RS422

The OSD157 requires external DC power. The DC voltage range is +8V DC to +13V$_{DC}$. This is connected to the 3 way socket located at the back of the case next to the D connector. Pin 3 (Gnd) and Pin 2 (+V) is used for DC power. DC power on the OSD157EC is connected via a DB9 connector. Power is supplied by the chassis. Pin 1(3 way socket) or Pin2 (DB9) are relay connections that can be used for external alarm when a sync error is detected.
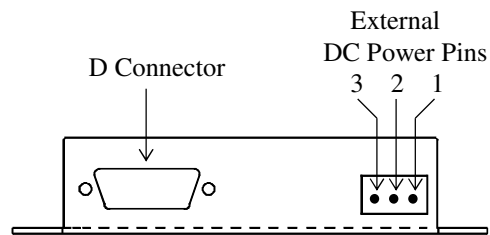

FIGURE 5: OSD157C POWER SUPPLY CONNECTION

2.2.4 OTHER CONNECTIONS

The RS232 signals are connected to or from external equipment via the 25 pin D connector as shown in TABLE 3 on page 7.

The RS422 signals are connected to or from external equipment via the 25 pin D connector as shown in TABLE 4 on page 8.

The optical fiber should be terminated using an 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.

2.2.5 LINK SETTINGS

2.2.5.1 OSD157/RS232

The RS232 product has two link settings within the unit, namely LK5 and LK6.

TABLE 5: RS232 LINK SETTINGS

LINK	FUNCTION	SETTING
LK5	RS232 SETTING	LK: 1 TO 2
LK5	MIL-STD-188 SETTING	LK: 2 TO 3
LK6	RELAY OUTPUT TO PIN 23	LK: OFF
LK6	RELAY OUTPUT TO GROUND	LK: ON

2.2.5.2 OSD157/RS422

The RS422 product has two link settings within the unit, namely LK13 and LK14.

TABLE 6: RS422 LINK SETTINGS

LINK	FUNCTION	SETTING
LK13	+ TX DATA LINES PULLED HIGH	LK: 1 TO 2
LK13	+ TX DATA LINES PULLED LOW	LK: 2 TO 3
LK13	+ TX DATA LINES OPEN	LK OUT
LK14	- TX DATA LINES PULLED HIGH	LK: 1 TO 2
LK14	- TX DATA LINES PULLED LOW	LK: 2 TO 3
LK14	- TX DATA LINES OPEN	LK OUT

OSD standard settings are LK13 pins 2&3 and LK14 pins 1&2.

2.3 OPERATIONS

2.3.1 BLOCK DIAGRM

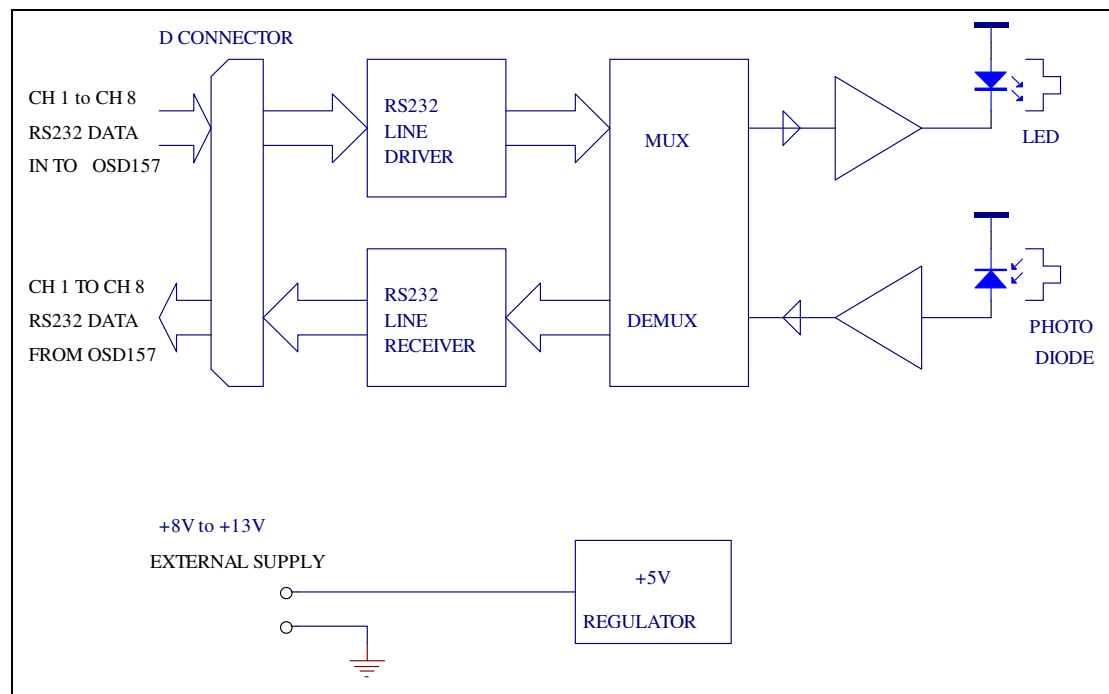Below in FIGURE 6 and FIGURE 7 are simple block diagrams for both products.
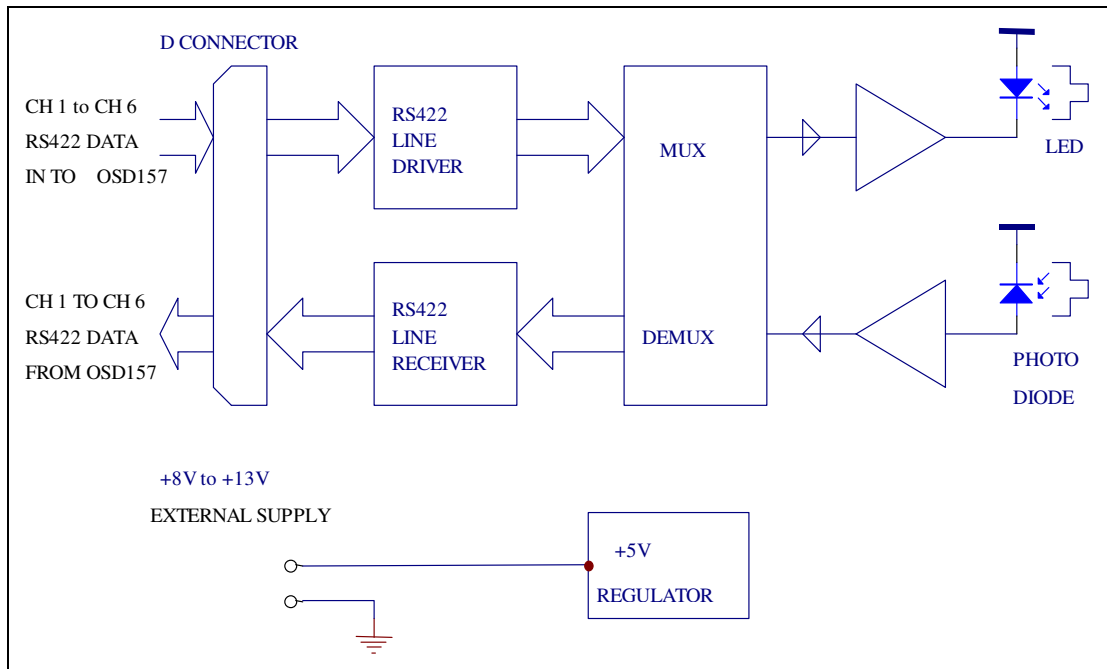

FIGURE 6**:** RS232 BLOCK DIAGRAM

FIGURE 7**:** RS422 BLOCK DIAGRAM

2.3.2 CONTROLS

Both the RS422 and the RS232 versions of the OSD157 have no controls.

2.3.3 INDICATORS

Both the RS422 and the RS232 versions of the OSD157 have an Rx DATA indicator. This indicator's function is described in TABLE 1 below.

TABLE 7: OSD157 INDICATOR

INDICATOR	COLOUR	FUNCTION
Rx DATA	Green	DATA Link OK
	Red	DATA Link Fail
Laser OK	Green	Laser working OK
	Red	Laser not working OK

3. MAINTENANCE

3.1 INTODUCTION

The following section outlines the fault-finding procedure for the OSD157 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 is connected to the power socket.

▲ Check that the data signals are connected to the modem correctly and that the distant OSD157 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 OSD157.

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 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.

4.3 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 is void if unauthorised removal and/or tampering with serial number and/or repair labels is evident.