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IRT Eurocard

Type EOT-4580

Gigabit Ethernet to Optical Fibre Transceiver

Designed and manufactured in Australia

IRT can be found on the Internet at:
http://www.irtelectronics.com

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Instruction Book

Table of Contents

This instruction book applies to units later than S/N 0707001.

Operational Safety:

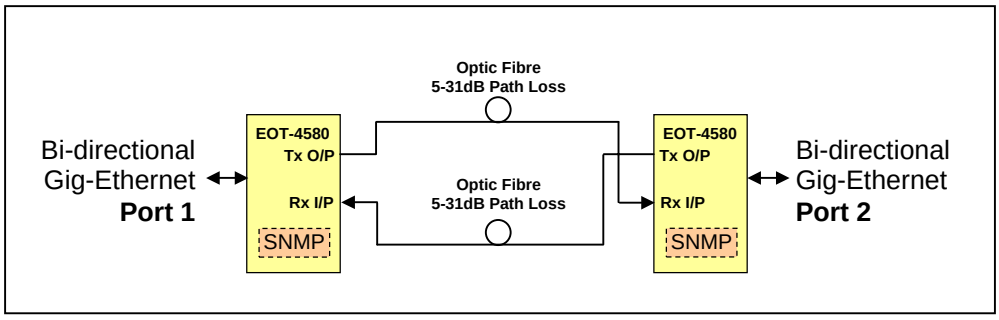
WARNING

Operation of electronic equipment involves the use of voltages and currents that may be dangerous to human life. Note that under certain conditions dangerous potentials may exist in some circuits when power controls are in the **OFF** position. Maintenance personnel should observe all safety regulations.

Do not make any adjustments inside equipment with power **ON** unless proper precautions are observed. All internal adjustments should only be made by suitably qualified personnel. All operational adjustments are available externally without the need for removing covers or use of extender cards.

IRT Eurocard
Type EOT-4580
Gigabit Ethernet to Optical Fibre Transceiver

General Description



The IRT EOT-4580 transceiver module is designed principally for use as a Gigabit Ethernet to fibre optic transmission link, using 9/125µm single mode fibre, with optical paths losses up to 31dB.

The EOT-4580 conforms to the IEEE 802.3ab standard for Gigabit Ethernet over CAT-5 cable, and the IEEE 802.3z standard for Gigabit Ethernet over optical fibre.

A fibre transmitter and separate fibre receiver are incorporated on the one card allowing bi-directional communication over a pair of single mode fibre optic cables.

The EOT-4580 is ordered as the main base-board (EOT-4580) and separate plug-in laser and receiver modules.

The laser transmitter is a plug-in module allowing a choice of wavelengths to be used, the standard module being fitted with an FP type SC/PC 1310nm laser – part number HOO-1300.

Likewise the receiver is also a separate plug-in module. The standard module being an APD detector – part number HOI-4000/PC.

An optional SNMP (Simple Network Management Protocol) plug-in module is available for remote monitoring when used in conjunction with IRT's 4000 series frame fitted with SNMP capability.

The EOT-4580 is a Eurocard module designed to fit IRT's 1RU frame or IRT's 4000 series frames for use with IRT's SNMP system and may be used alongside any other of IRT's Eurocards.

Standard features:

- **Standard RJ-45 CAT-5 Ethernet connection.**
- **Path lengths up to 31dB optical path loss using 9/125µm single mode fibre.**
- **Front panel LED indicators.**
- **Fibre, Ethernet connections at rear.**
- **Optional plug-in SNMP monitoring module.**

Technical Specifications

IRT Eurocard module
Type EOT-4580

Ethernet

Type	Standard IEEE 802.3ab
Data Rate	1,000 Mb/s
Connector	RJ-45

Optical

Type	Standard 802.3z
Optical path loss*	5 to 31 dB.
Optical fibre	Designed for use with 9/125 single mode fibre.
Optical wavelength	See laser sub-board ordering information.
Optical connectors	SC/PC (standard).
EOT-4580 optical output	With LASER sub-board fitted, 0 dBm typically.
Laser sub-board ordering information:	
HOO-1300	1310 nm ± 50 nm FP laser (SC/PC) - (standard).
HOO-1510	1510 nm ± 3 nm DFB laser (SC/PC).
HOO-1530	1530 nm ± 3 nm DFB laser (SC/PC).
HOO-1550	1550 nm ± 3 nm DFB laser (SC/PC).
HOO-1570	1570 nm ± 3 nm DFB laser (SC/PC).
EOT-4580 optical input*	With APD detector sub-board fitted, -5 to -31 dBm input level.
Receiver sub-board ordering information:	
HOI-4000/PC	APD detector (SC/PC) - (standard).

Power requirements:

Voltage	28 Vac CT (14-0-14) or ± 16 Vdc.
Consumption	< 5 VA

Front Panel Indicators:

DC	LED (green) for +5V power.
LINK/ACT	LED (Green) on Ethernet link connected/LAN activity.
LASER	LED (red) on laser failure
RX	LED (red) on no receiver input.

General:

Operating temperature	0 to 50° C ambient.
Mechanical	Suitable for mounting in IRT 1RU 1000 series and 3RU 4000 series 19" rack chassis types with input, output and power connections to the rear.
Size	6 HP x 3U Extended Eurocard (220 mm x 100 mm).
Front panel	Grey background, black lettering & red IRT logo.
Rear assembly	Detachable silk-screened PCB with direct mount connectors to Eurocard and external signals.
Optional accessories	SMU-4000 SNMP plug in module for use with 4000 series frame fitted with SNMP "Agent". ATT-BLUE 5dB – 5dB optical attenuator for use where optical path losses are less than 5dB.

Note: * Optical attenuator recommended for EOT-4580 when optical path loss is less than 5dB.

Due to our policy of continuing development, these specifications are subject to change without notice.

Installation

Pre-installation:

Handling:

This equipment may contain or be connected to static sensitive devices and proper static free handling precautions should be observed.

Where individual circuit cards are stored, they should be placed in antistatic bags. Proper antistatic procedures should be followed when inserting or removing cards from these bags.

Power:

AC mains supply: Ensure that operating voltage of unit and local supply voltage match and that correct rating fuse is installed for local supply.

DC supply: Ensure that the correct polarity is observed and that DC supply voltage is maintained within the operating range specified.

Earthing:

The earth path is dependent on the type of frame selected. In every case particular care should be taken to ensure that the frame is connected to earth for safety reasons. See frame manual for details.

Signal earth: For safety reasons a connection is made between signal earth and chassis earth. No attempt should be made to break this connection.

Installation in frame or chassis:

See details in separate manual for selected frame type.

Ethernet Connection:

The Ethernet port on the rear assembly is for a standard non-crossover Ethernet cable fitted with an RJ-45 connector. This port connects directly to an Ethernet link, or via an Ethernet router or Ethernet switch.

Fibre Connections:

Optical connections are made to the panel adapter mounted on a bracket at the rear of the modules. Care must be taken to provide a clean surface on the optical connectors and in inserting the plug on the external fibre to prevent damage to the alignment ferrule of the panel adapter. The optical connector supplied on a standard unit is an SC/PC type. Other fibre connector adapters are available by request to IRT when ordering.

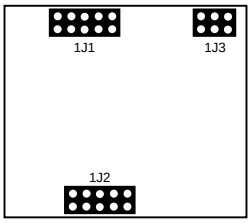
The upper fibre connector is the laser transmitter output, whilst the lower fibre connector is the receiver input.

For bi-directional operation both input and output fibre connections need to be made with second unit's output and input connections respectively, by two separate single mode fibres.

If there is only one fibre connecting between points, then it is possible to connect the units together using a Course Wave Division Multiplexer (CWDM), such as IRT's OFM-3241. However, different wavelength laser modules need to be installed in each of the two EOT-4580 fibre optic transceivers to suit the CWDM device in use (e.g. 1310nm and 1550nm for IRT's OFM-3241).

SMU-4000 Installation

The SMU-4000 plug-in SNMP management controller module can only be fitted to IRT's 4000 series modules that are capable of being SNMP upgradeable. To determine whether a module is SNMP upgradeable, a square section on the main PCB is silk screened and fitted with three multipin sockets – as shown below:



This is where the SMU-4000 plug-in SNMP management controller module is fitted. The three sets of multipins on the underside of the SMU-4000 line up with the three sets of multipin sockets on the main PCB module. Align all pins and then gently press the SMU-4000 all the way down into place.

If the SMU-4000 is not already programmed with the correct firmware to match the module that it is being plugged into, it then needs to be programmed via the pins on the topside of the SMU-4000.

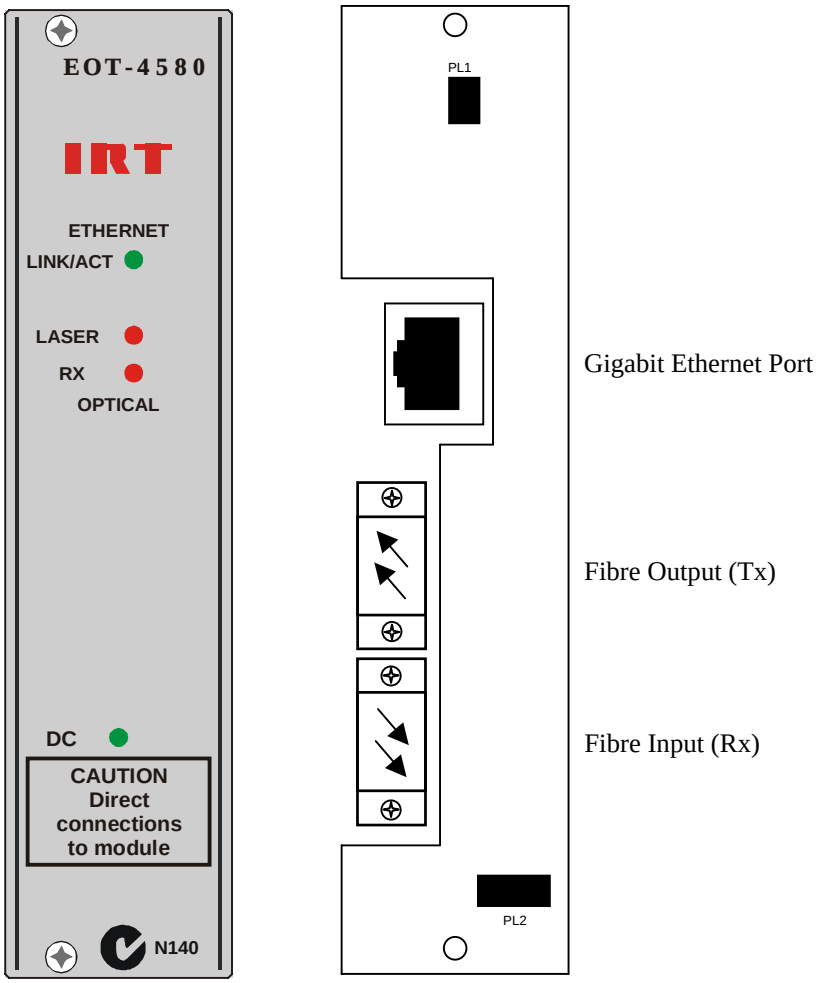
Note that installation will generally be done by IRT Electronics at the time of ordering.

Note also that an SMU-4000 will only be functionally operational when the main module that it is plugged into is fitted into an IRT 4000 series frame fitted with a CDM-4000 SNMP agent and being interrogated by a suitable Network Management System.

Figure 1: SMU-4000 module

Front & rear panel connector diagrams

The following front panel and rear assembly drawings are not to scale and are intended to show connection order and approximate layout only.



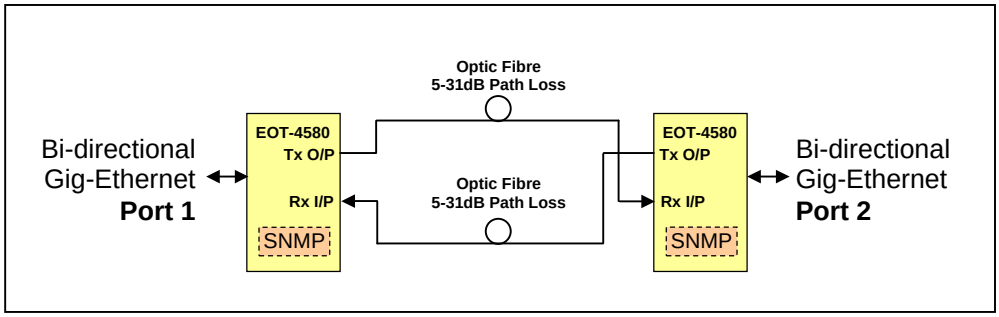
Operation

The EOT-4580 is designed to operate as a pair with a second EOT-4580. Each unit does the Ethernet to Optical conversion and the reciprocal Optical to Ethernet conversion.

The EOT-4580 Ethernet port will automatically configure itself to match the Gigabit Ethernet link. It also automatically sets itself up for MDI or MDI-X operation, so there are no setup options required for connecting to an Ethernet link.

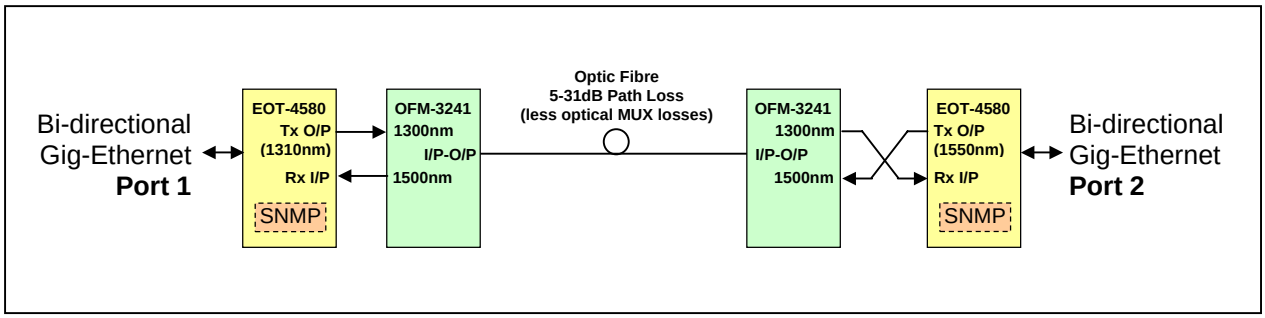
The laser output connector (upper connector) connects at one end of a single mode fibre fitted with the corresponding fibre connector (SC/PC - standard). The other end of the fibre connects to another EOT-4580 into the receiver input connector (lower connector). Likewise the reverse is true with a second fibre to supply the return path.

Application Diagram:



Alternatively, to run bi-directionally on a single fibre, if the two EOT-4580's each have a different wavelength laser fitted, such as 1310nm and 1550nm, then it is possible to run the pair through a CWDM optical MUX, such as IRT's OFM-3241. See application diagram below.

Application Diagram:



Front Panel Indicators:

DC	LED (green) for +5V power.
LINK/ACT	LED (Green) on Ethernet link connected/LAN activity.
LASER	LED (red) on laser failure
RX	LED (red) on no receiver input.

Note: For optical path lengths < 5dB an optical attenuator must be used at the receiver input to avoid overloading the optical detector.

SNMP

What Is It?

SNMP stands for Simple Network Management Protocol. It is an application layer protocol for managing IP (Internet Protocol) based systems. SNMP enables system administrators to manage system performance, and to find and solve system problems. SNMP runs over UDP (User Datagram Protocol), which in turn runs over IP.

Three types of SNMP exist: SNMP version 1 (SNMPv1), SNMP version 2 (SNMPv2) and SNMP version 3 (SNMPv3). It is not the intention here to discuss the differences between various versions, only to bring attention to the fact that IRT Electronics modules, fitted with SNMP capability, use SNMPv1.

An SNMP managed network consists of three key components: Network Management Systems (*NMS*), *agents*, and *managed devices*.

An *NMS* is the console through which the network administrator performs network management functions, such as monitoring status (e.g. alarm states) and remote controlling, of a set of managed devices. One or more *NMS*s must exist on any managed network. Generally the *NMS* is a computer running third party SNMP control software. There are a number of third party SNMP software applications currently available on the market.

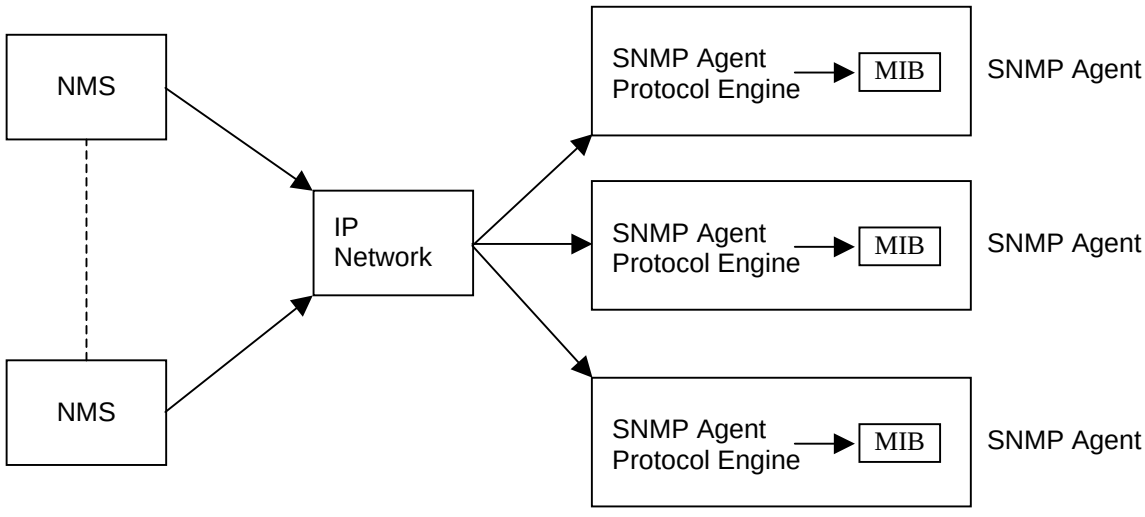
An *NMS* polls, or communicates with, an *agent*. An *agent* is a network management software module that resides in a *managed device*. An *agent* has local knowledge of management information and translates that information into a form compatible with SNMP. The *agent*, therefore, acts as an interface between the *NMS* and the managed devices. The *NMS* sends a request message, and control commands for the managed devices, to the *agent*, which in turn sends a response message, containing information about the *managed devices*, back to the *NMS*.

A *managed device* contains an SNMP *agent* and resides on a managed network. *Managed devices* collect and store management information and make this information available to *NMS*s using SNMP.

Managed device agent variables are organised in a tree structure known as a Management Information Base (*MIB*). Within the *MIB* are parameters pertaining to the *managed device*. An Object Identifier (OID) number within the *MIB* defines the managed device type. This is a unique number specific to the model of *managed device*. Other information relating to the device is also stored, information such as alarm states, controllable settings, etc. The *MIB* tree is organised in such a way that there will be no two *MIB* files with conflicting placements.

Normally an *NMS* polls an *agent* for information relating to the *MIB* in a managed device to be sent back to the *NMS*. When certain conditions are met within the *MIB*, such as major alarm conditions, for example, the *agent* automatically sends what is known as a *trap* to the *NMS* without any prompting from the *NMS*. This allows automatic notification of a predetermined event.

SNMP Block Diagram



SNMP with IRT Products:

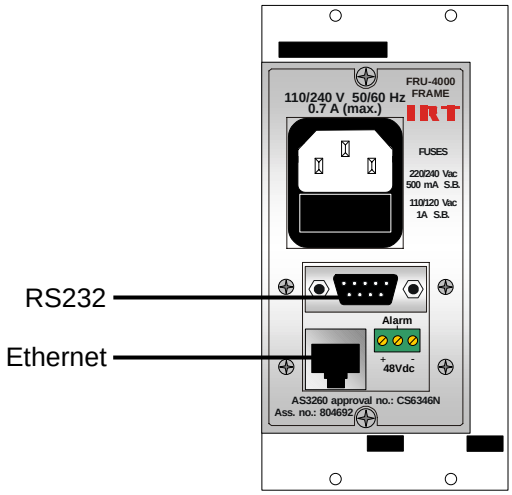
IRT Electronics currently employs SNMPv1 with its 4000 series frame. The frame acts as an *agent* when fitted with a CDM-4000 module. This module has its own designated slot next to the power supply so as to not affect the number of modules that the frame will take. Communication between the *NMS*, the frame and its loaded modules are via this CDM-4000 module. Note that the *NMS* software is third party and not supplied by IRT Electronics.

Ethernet connection for SNMP operation is via an RJ45 connector on the rear of the frame, below the mains inlet. Ethernet rate runs at either 10 baseT or 100 baseT.

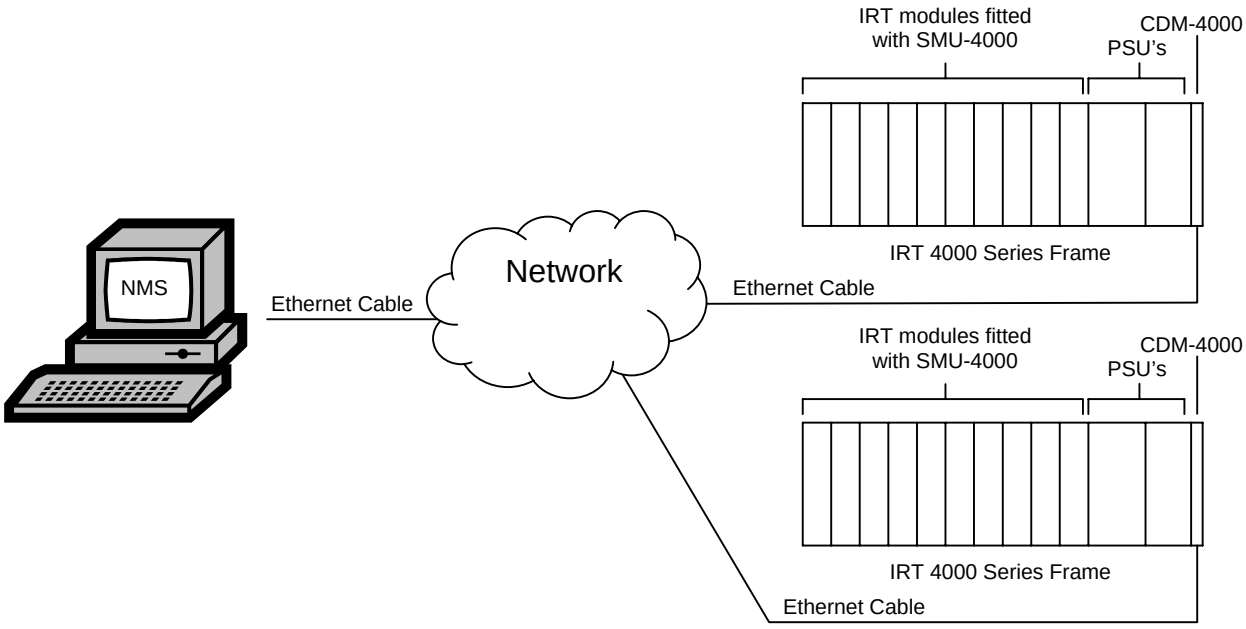
Frame parameters, such as Name, Address and Location, are set via an RS232 interface, a D9 connector on the rear of the frame below the mains inlet. A software terminal emulator, such as Tera Term or HyperTerminal, is used for setting and reading the parameters of the frame.

IRT modules that are SNMP compatible need a plug-in SMU-4000 module with a program relevant to the module that it is plugged into. Depending on the module, besides the module identification, parameters such as alarm states, inputs and controls etc. are communicated to the CDM-4000 *agent* via a data bus on the rear of the frame. Thus the CDM-4000 collects information on what is loaded within the frame, what positions they occupy, and their current status for communication to the *NMS* when the *NMS* sends a request for information.

In the event of a major alarm from any of the SNMP compatible modules, or power supplies, a *trap* is automatically sent by the CDM-4000 *agent* to the *NMS* without any prompting by the *NMS*. This alerts the operator to any fault conditions that may exist that need immediate attention.



IRT SNMP Connections



IRT 4000 Series SNMP Setup

EOT-4580 SNMP Functions:

With the EOT-4580 fitted with an SMU-4000 and installed in an IRT 4000 series frame with SNMP capability, the EOT-4580 can be interrogated by an SNMP Network Management System (NMS).

The following SNMP functions are capable of being monitored and controlled by an NMS:

An indication if a successful link is established on the Ethernet network;
An indication that there is an output from the transmitter laser;
An indication that there is an optical input to the receiver;
An indication of the laser wavelength;
An indication of the optical receiver type (APD (standard) or PIN diode (currently not available));
An indication of the light output of the transmitter;
An indication of the light level input of the receiver;
Set the conditions that can cause a Trap - optical loss of receiver, transmitter, both or none;
An indication of what conditions will cause a trap – optical loss of receiver, transmitter, both or none;
If enabled, Traps will be sent when an enabled alarm occurs;
If enabled, a Trap will be sent when an enabled alarm restores;
An indication of the number of Traps sent since the last reset;
Unit reset control.

Maintenance & Storage

Maintenance:

No regular maintenance is required.

Care however should be taken to ensure that all connectors are kept clean and free from contamination of any kind. This is especially important in fibre optic equipment where cleanliness of optical connections is critical to performance.

Storage:

If the equipment is not to be used for an extended period, it is recommended the whole unit be placed in a sealed plastic bag to prevent dust contamination. In areas of high humidity a suitably sized bag of silica gel should be included to deter corrosion.

Where individual circuit cards are stored, they should be placed in antistatic bags. Proper antistatic procedures should be followed when inserting or removing cards from these bags.

Warranty & Service

Equipment is covered by a limited warranty period of three years from date of first delivery unless contrary conditions apply under a particular contract of supply. For situations when "**No Fault Found**" for repairs, a minimum charge of 1 hour's labour, at IRT's current labour charge rate, will apply, whether the equipment is within the warranty period or not.

Equipment warranty is limited to faults attributable to defects in original design or manufacture. Warranty on components shall be extended by IRT only to the extent obtainable from the component supplier.

Equipment return:

Before arranging service, ensure that the fault is in the unit to be serviced and not in associated equipment. If possible, confirm this by substitution.

Before returning equipment contact should be made with IRT or your local agent to determine whether the equipment can be serviced in the field or should be returned for repair.

The equipment should be properly packed for return observing antistatic procedures.

The following information should accompany the unit to be returned:

1. A fault report should be included indicating the nature of the fault
2. The operating conditions under which the fault initially occurred.
3. Any additional information, which may be of assistance in fault location and remedy.
4. A contact name and telephone and fax numbers.
5. Details of payment method for items not covered by warranty.
6. Full return address.
7. For situations when "**No Fault Found**" for repairs, a minimum charge of 1 hour's labour will apply, whether the equipment is within the warranty period or not. Contact IRT for current hourly rate.

Please note that all freight charges are the responsibility of the customer.

The equipment should be returned **to the agent who originally supplied the equipment** or, where this is not possible, to IRT direct as follows.

Equipment Service
IRT Electronics Pty Ltd
26 Hotham Parade
ARTARMON
N.S.W. 2064
AUSTRALIA

Phone: 61 2 9439 3744 Fax: 61 2 9439 7439
Email: service@irtelectronics.com