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## **IRT Eurocard**

### **Type MMM-4682 & MMX-4682**

### **4 ASI to STM-1 Combiner / DeCombiner**

**Designed and manufactured in Australia**

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



# IRT Eurocard

## Type MMM-4682 & MMX-4682

### 4 ASI to STM-1 Combiner / DeCombiner

#### Instruction Book

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This instruction book applies to units fitted with firmware  $\geq$  MMM4682i3AS1v2 and MMX4682i3AS1v3.

### 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.

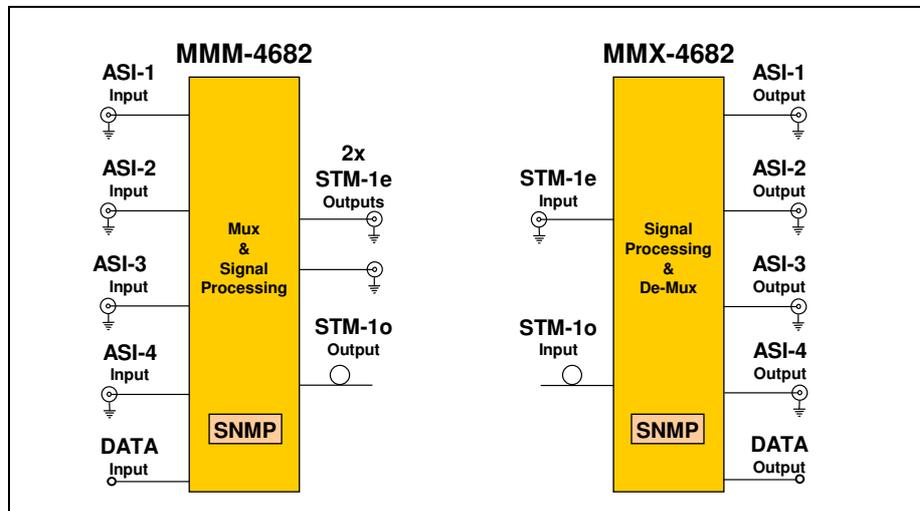
Do not make any adjustments inside equipment with power **ON** unless proper precautions are observed. All internal adjustments should only be made by suitably qualified personnel. All operational adjustments are available externally without the need for removing covers or use of extender cards.

# IRT Eurocard

## Type MMM-4682 & MMX-4682

### 4 ASI to STM-1 Combiner / DeCombiner

#### General Description



The MMM-4682 and MMX-4682 are part of a family of data transcoders for converting between the commonly used MPEG2 Transport Stream formats for video distribution in the broadcast industry.

With the MMM-4682 up to four ASI and one RS232 data signals can be combined together and converted into a 155Mb/s G.703 (STM-1) electrical CMI and optical NRZ signals.

The sum of the ASI input payload rates can be anything up to 148 Mb/s. Inputs may be 188 or 204 byte packet length, burst or continuous, and may have energy dispersal scrambling, interleaving and/or Reed Solomon bytes included.

The MMX-4682 separates the 155 Mb/s G.703 signal back into the original four ASI signals (at their original rates) and the RS232 data signal. The ASI outputs are suitable for Single Frequency Network use, in that there is no data rate conversion or PCR restamping of the ASI streams.

Inputs are automatically equalised for lengths of up to 200m of Belden 8281 or equivalent cable.

RS232 uni-directional data may also be sent on the same link. It can pass rates up to 19.2 kb/s with any combination of start/stop & parity bits. The data rate does not affect the payload available for the ASI streams.

Front panel indication and relay alarm on the MMM-4682 transmitter shows if there is an input data rate violation. Corresponding alarm on the MMX-4682 receiver shows a loss of STM-1 input.

SNMP (Simple Network Management Protocol) is available for monitoring and control when used in an IRT frame fitted with SNMP capability. Bandwidth capping of channels can be user set so as limit input rates so that maximum combined input is not exceeded, as well as channels being individually enabled or disabled, via SNMP.

The MMM-4682 and MMX-4682 are designed to fit IRT's standard Eurocard frames and may be used alongside any other of IRT's analogue or digital Eurocards.

#### Standard features:

- **Up to 4 ASI and 1 Data stream on one 155 Mb/s (STM-1) G.703 electrical or optical link**
- **Automatic Input equalisation up to 200m**
- **Suitable for Single Frequency Network (SFN) use**
- **Recovers transmitted ASI signal with minimal user setup**
- **Maintains original ASI rate, packet size & coding (energy dispersal scrambling, interleaving or Reed Solomon bytes)**
- **Eurocard format**

## Technical Specifications

### MMM-4682:

#### Inputs:

Type 1	4 x ASI-C 75Ω, 800 mVp-p, BNC connector.
Maximum Data Rate per channel	Up to a combined maximum rate of 148 Mb/s
Equalisation	Automatic, better than 200m at 270Mb/s for Belden 8281 or equivalent cable.
Type 2	RS232 Uni directional data input.

#### Output:

Type 1	2 x 1 Vp-p, G.703, 75Ω BNC connector;
Electrical Characteristics	CMI (STM-1e) or NRZ (STM-1o) <sup>1</sup> encoded, selectable.
Type 2	1 x optical, G.703, SC/PC (standard) optical connector.
Optical Characteristics	NRZ (STM-1o) encoded.
Data Rate	155.52 Mb/s.

<b>Alarm Output:</b>	MAJOR	Open circuit on sum of ASI input payload rates in excess of maximum allowable 148Mb/s, or loss of power.
	MINOR	Open circuit on no valid input ASI streams present, or loss of power.

### MMX-4682:

#### Input:

Type 1	1 x G.703, 75Ω BNC connector.
Electrical Characteristics	CMI (STM-1e) or NRZ (STM-1o) <sup>1</sup> encoded, selectable.
Equalisation	Automatic, better than 200m at 155Mb/s for Belden 8281 or equivalent cable.
Type 2	1 x G.703, optical, SC/PC optical connector (standard).
Optical Characteristics	NRZ (STM-1o) encoded.
Data Rate	155.52 Mb/s.

#### Outputs:

Type 1	4 x ASI-C 75Ω, 800 mVp-p, BNC connector.	
	Mode	Continuous.
Data Rate		same as MMM-4682 input rate.
Type 2		RS232 Uni directional data output.
<b>Alarm Output:</b>	MAJOR	Open circuit on no valid STM-1 input present, AIS on STM-1 input detected, or loss of power.
	MINOR	Open circuit on no valid output ASI signals present within the encoded STM-1 input, or loss of power.

#### Optical

Optical path loss <sup>2</sup>	3 to 18 dB with PIN detector (typically 20dB),
Optical fibre	Designed for use with 9/125 μm single mode fibre.
Optical wavelength	1310nm (DFB laser - standard).
Optical connectors	SC/PC (standard).
MMM-4682 optical output	0 dBm +3/-0 dB standard DFB laser,
MMX-4682 optical input	PIN detector, -3 to -18 dBm input level

#### Power Requirements

Power consumption	28 Vac CT (14-0-14) or ±16 Vdc. 6 VA.
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#### Other

Temperature range	0 - 50° C ambient.
Mechanical	Suitable for mounting in IRT 19" rack chassis with input, output and power connections on the rear panel.
Finish	Front panel: Grey background, black lettering & red IRT logo. Rear assembly: Detachable silk-screened PCB with direct mount connectors to Eurocard and external signals.
Dimensions	6 HP x 3 U x 220 mm IRT Eurocard.

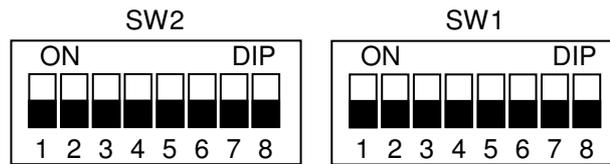
<b>NOTE:</b>	1	CMI encoding standard for STM-1 electrical. NRZ encoding on electrical outputs and electrical input for use with external optical transmitters and receivers (for backwards compatibility with previous models).
	2	Optical attenuator required for optical paths <3dB optical loss.

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

## Configuration

### MMM-4682:

The only user settings on the MMM-4682 is on the DIP switch SW1 as shown below:

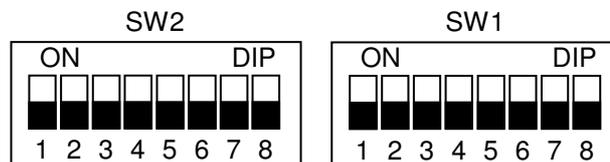


- SW1-1 - Not used.
  - SW1-2 - Not used.
  - SW1-3 - Not used.
  - SW1-4 - OFF - BNC electrical output CMI standard (default);  
ON - BNC electrical output NRZ standard<sup>3</sup>.
  - SW1-5 - Not used.
  - SW1-6 - Not used.
  - SW1-7 - Not used.
  - SW1-8 - OFF - Enable major and minor SNMP alarms to the frame Agent (CDM card)<sup>4</sup>;  
ON - Disable major and minor SNMP alarms to the frame Agent (CDM card)<sup>4</sup>.
- SW2-1 to SW2-8 – Not used.

- NOTE:**
- 3 CMI encoding standard for STM-1 electrical.  
NRZ encoding on electrical outputs for use with external optical transmitters (for backwards compatibility with previous models).
  - 4 When using TRAPS via SNMP, depending on how system is set up, in order to avoid double reporting of alarms via the MMM-4682 card itself and the CDM card (SNMP Agent) of the frame, major and minor SNMP alarms that are reported to the CDM card of the frame can be disabled.

### MMX-4682:

The only user settings on the MMX-4682 is on the DIP switch SW1 as shown below:



- SW1-1 - OFF - 1 second hysteresis delay on alarm output;  
ON - Immediate action on alarm output.
- SW1-2 - OFF - ASI outputs not muted on loss of I/P;  
ON - ASI outputs muted on loss of input<sup>5</sup>.
- SW1-3 - OFF - CMI encoding on electrical input (default);  
ON - NRZ encoding on electrical input<sup>6</sup>.
- SW1-4 - OFF - Electrical input (BNC SK7) selected;  
ON - Optical input selected<sup>7</sup>.
- SW1-5 - Not used.
- SW1-6 - Not used.
- SW1-7 - Not used.
- SW1-8 - OFF - Enable major and minor SNMP alarms to the frame Agent (CDM card)<sup>8</sup>;  
ON - Disable major and minor SNMP alarms to the frame Agent (CDM card)<sup>8</sup>.

- NOTE:**
- 5 SW1-2 not used on firmware versions prior to MMX-4682i3AS1v3. Not applicable to PCB issues prior to issue 3.
  - 6 CMI encoding standard for STM-1 electrical.  
NRZ encoding on electrical input for use with external optical receiver (for backwards compatibility with previous models).
  - 7 Only one input, electrical or optical, can be selected at one time. With no optical options fitted, leave SW1-4 switch position OFF.
  - 8 When using TRAPS via SNMP, depending on how system is set up, in order to avoid double reporting of alarms via the MMX-4682 card itself and the CDM card (SNMP Agent) of the frame, major and minor SNMP alarms that are reported to the CDM card of the frame can be disabled.

## 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.

### Connections:

#### MMM-4682:

##### ASI Inputs:

Four ASI inputs each with any payload to a combined maximum total payload of 148 Mb/s. That is,

$$\text{Total payload (148Mb/s maximum)} = \text{ASI 1 rate} + \text{ASI 2 rate} + \text{ASI 3 rate} + \text{ASI 4 rate}$$

**WARNING:** If the total maximum payload rate is exceeded, all ASI channels will be corrupted unless channel capping has been set via SNMP control.

ASI inputs may be of 188 or 204 byte packet length, burst or continuous mode, and may have scrambling / interleaving and Reed Solomon bytes if desired.

ASI inputs are by BNC connectors each terminated in 75Ω. Input cable equalisation is automatic for up to 200m of high quality 75Ω coaxial cable (Belden 8281 or equivalent). No adjustments are required.

##### STM-1 Outputs:

1. Two identical STM-1 CMI encoded (equivalent to STM-1 electrical standard) or NRZ (equivalent to STM-1 optical standard, in an electrical form) outputs are provided by BNC connectors with a 75Ω characteristic output impedance. Only high quality 75Ω coaxial cable (Belden 8281 or equivalent) should be used. No adjustments are required, but cable must be terminated in 75Ω at the connected load.
2. One STM-1 NRZ encoded (equivalent to STM-1 optical standard) output is provided by an SC/PC (standard) optical connector.

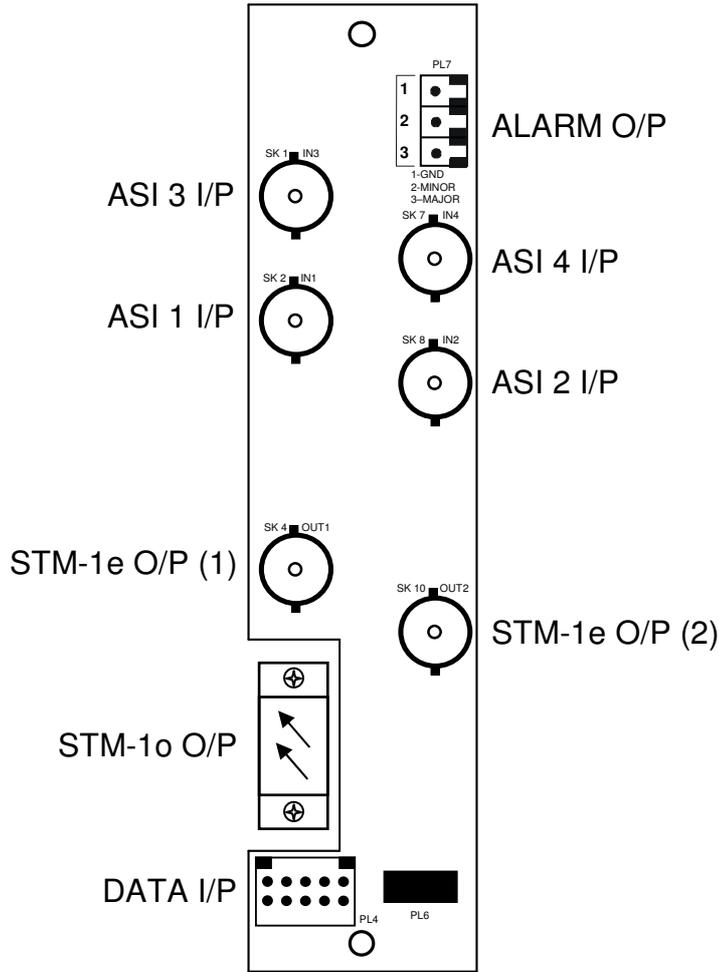
##### Alarm Outputs:

Two relay alarm output states are provided via a phoenix style 3-pin plug. Pin 3 is designated as Major, pin 2 is designated as Minor, and pin 1 is ground. Both alarms are referenced to ground.

Alarm conditions are as follows:

- Major switch to Open Circuit on sum of ASI input payload rates in excess of maximum allowable 148Mb/s;
  - Minor switch to Open Circuit on no valid input ASI streams present.
- Both Major and Minor alarms switch to Open Circuit on power failure.

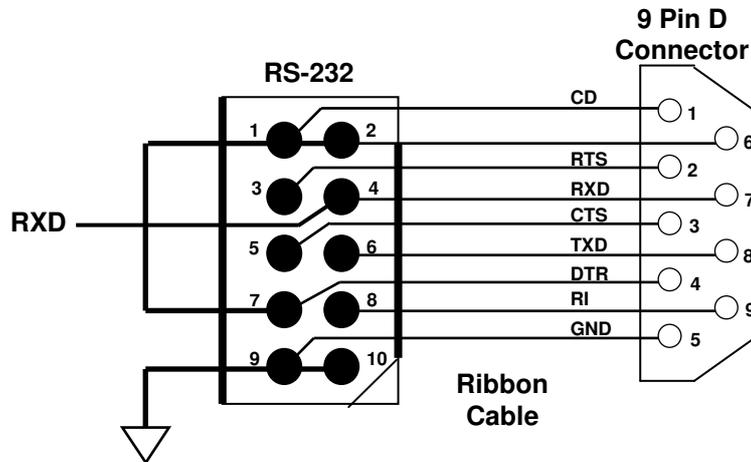
### MMM-4682 Rear Assembly Connections



**RS-232 Data Input:**

The RS-232 data input port is via a 10 pin HE14 style of header. Pins 1, 2 and 7 are connected together on the PCB. Pins 9 and 10 are both earthed. Pin 3 is the RS-232 *receive data* (RXD) connection. Data rates may be up to 19k2 Baud. Note that data transfer is unidirectional only, i.e. there is no direct data return path.

For connection to a standard RS-232 9 pin D connector, wire as per the diagram below:



**MMX-4682:**

**STM-1 Input:**

There are two STM-1 input ports on the rear assembly, an electrical and an optical. Only one can be active at any one time. This is set by the DIP switch setting SW1-4:

- SW1-4 OFF selects the BNC electrical input;
- SW1-4 ON selects the optical input.

The electrical STM-1 input port on the rear assembly is a 75Ω terminated BNC connector for an MMM-4682 encoded signal. Use of high quality 75Ω coaxial cable (Belden 8281 or equivalent) is recommended.

The optical STM-1 input port on the rear of the unit is an SC/PC (standard) optical connector for use with single mode fibre.

**ASI Outputs:**

Four ASI outputs are provided as 75Ω output BNC connectors. Each ASI output has a payload rate and packet size equivalent to the corresponding ASI input on the matching MMM-4682.

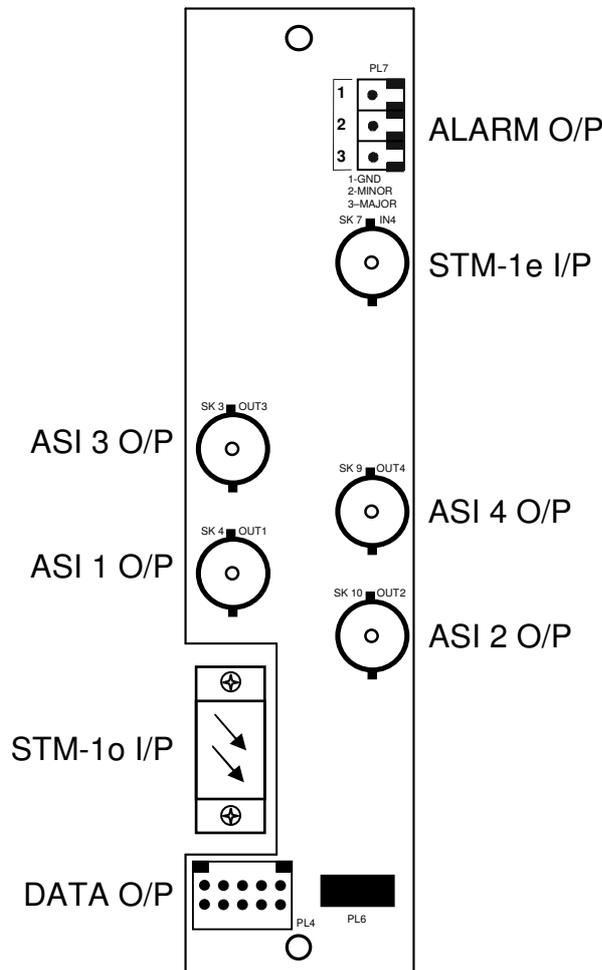
**Alarm Outputs:**

Two relay alarm output states are provided via a phoenix style 3-pin plug. Pin 3 is designated as Major, pin 2 is designated as Minor, and pin 1 is ground. Both alarms are referenced to ground.

Alarm conditions are as follows:

- Major switch to Open Circuit on no valid STM-1 input present;
- Minor switch to Open Circuit on no valid ASI signals present within the encoded STM-1 input.
- Both Major and Minor alarms switch to Open Circuit on power failure.

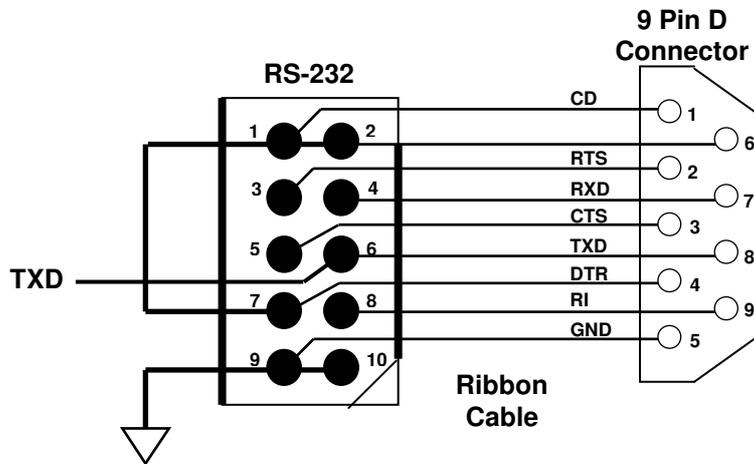
MMX-4682  
Rear Assembly Connections



**RS-232 Data Output**

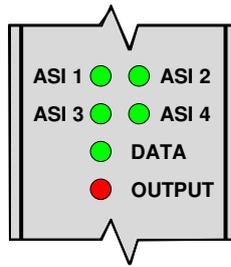
The RS-232 data output port is via a 10 pin HE14 style of header. Pins 1, 2 and 7 are connected together on the PCB. Pins 9 and 10 are both earthed. Pin 5 is the RS-232 *transmit data* (TXD) connection. Data transfer is unidirectional only, this is a receive path only.

For connection to a standard RS-232 9 pin D connector, wire as per the diagram below:



## Front Panel LEDs:

### MMM-4682:



ASI 1, ASI 2 ASI 3 and ASI 4 LEDs correspond to ASI inputs 1, 2, 3 and 4 respectively. When a valid ASI input is present corresponding LED will illuminate green.

Should a channel be disabled via SNMP, provided there is a valid input signal present, corresponding LED will flash on and off.

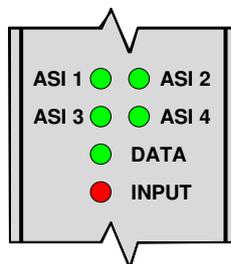
Likewise, if channel bandwidth capping has been enabled via SNMP and the ASI input rate exceeds the SNMP settable maximum allowed rate, corresponding LED will flash on and off.

So if any of the ASI LEDs are flashing on and off, then either the corresponding channel has been disabled or the ASI input rate has exceeded the maximum settable ASI rate with bandwidth capping enabled.

The DATA LED illuminates green when there is an RS232 data port connected and transmitting data.

The OUTPUT LED illuminates RED when the sum of the ASI inputs exceeds the maximum 148 Mb/s allowed with channel bandwidth capping disabled.

### MMX-4682:



ASI 1, ASI 2 ASI 3 and ASI 4 LEDs correspond to ASI outputs 1, 2, 3 and 4 respectively. When a valid ASI signal is present within the incoming STM-1 signal corresponding LED will illuminate green.

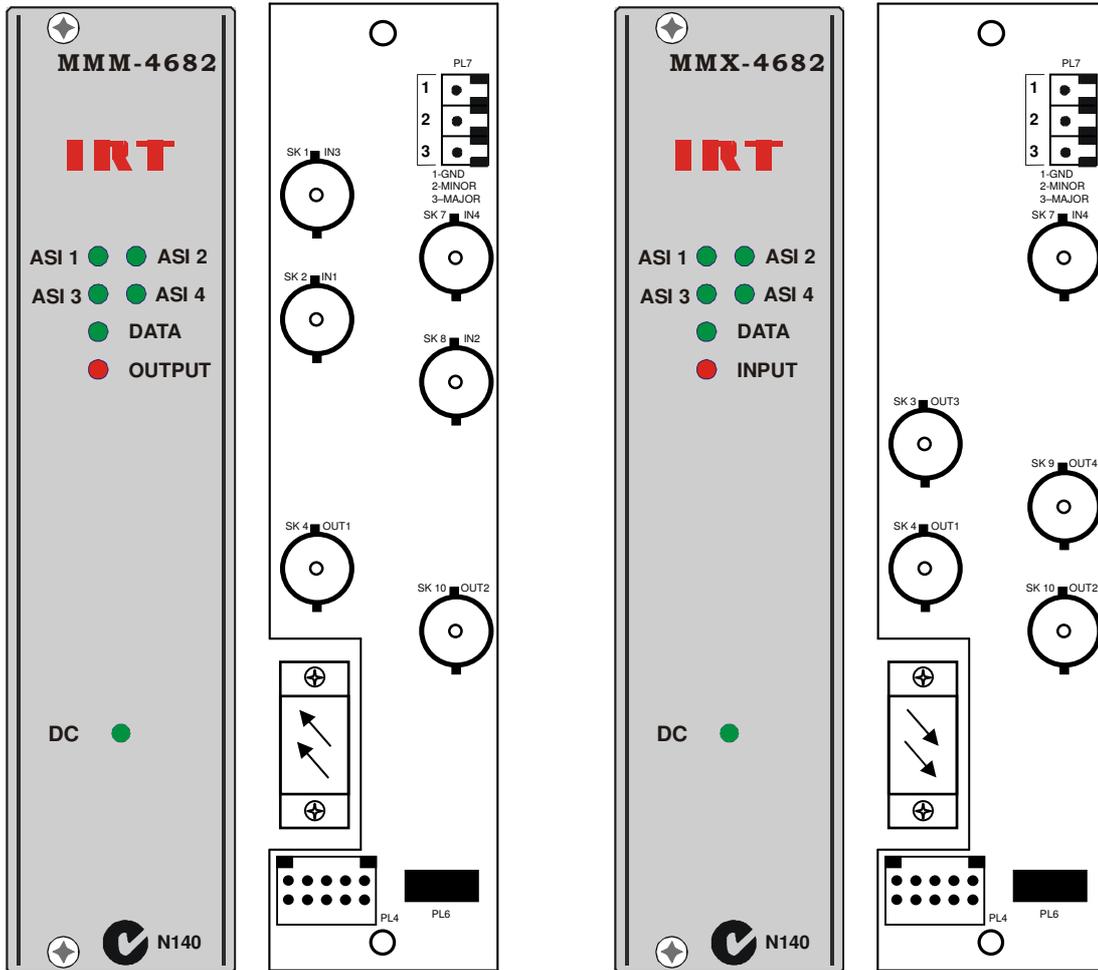
Should a channel be disabled via SNMP, provided there is a corresponding valid ASI signal present within the STM-1 signal, corresponding LED will flash on and off.

The DATA LED illuminates green when there is data present on the RS232 data stream within the STM-1 signal.

The INPUT LED illuminates RED when there is no valid STM-1 input present. Note that switch SW1-3 sets whether the MMX-4682 is set up for a CMI or NRZ encoded signal on the electrical input, and switch SW1-4 sets whether the MMX-4682 is set up for electrical or optical input.

### 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.



## 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.

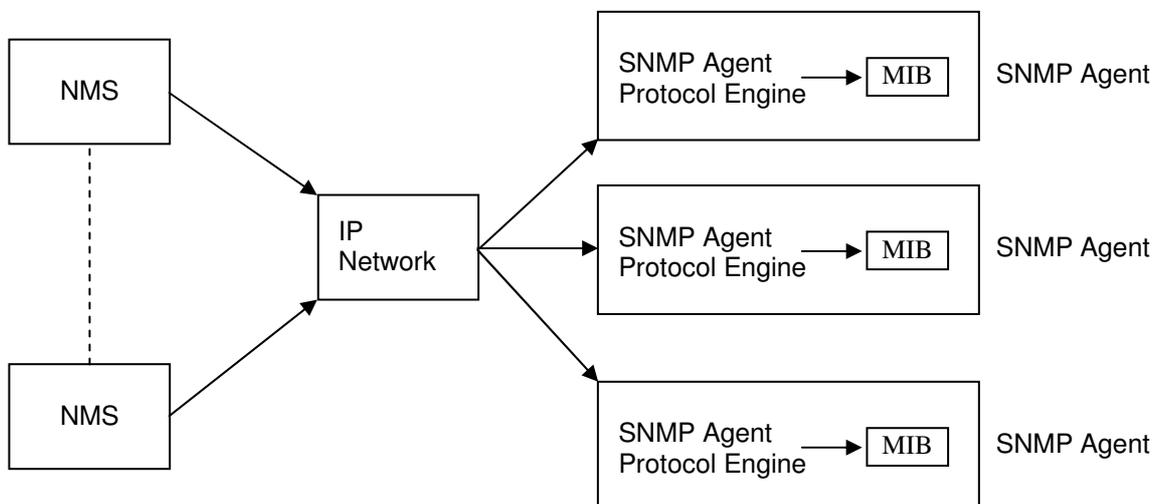
An *NMS* polls, or communicates with, an *agent*. An *agent* is a network management software module that resides in a *managed device*. An *agent* has local knowledge of management information and translates that information into a form compatible with SNMP. The *agent*, therefore, acts as an interface 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:**

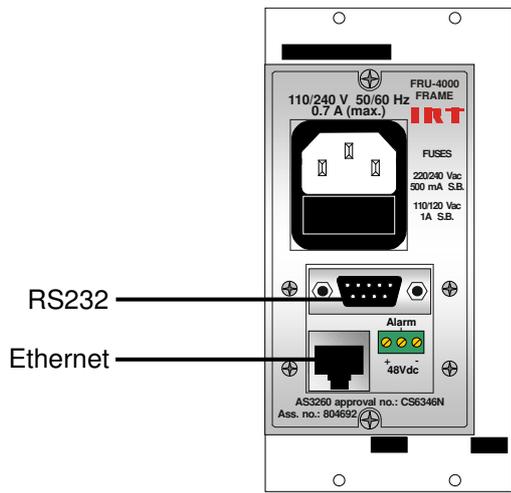
IRT Electronics currently employs SNMPv1 with its SNMP capable frames. The frame acts as an *agent* when fitted with a CDM-xxxx module. This module has its own designated slot next to the power supply so as to not affect the number of modules that the frame will take. Communication between the *NMS*, the frame and its loaded modules are via this CDM-xxxx 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.

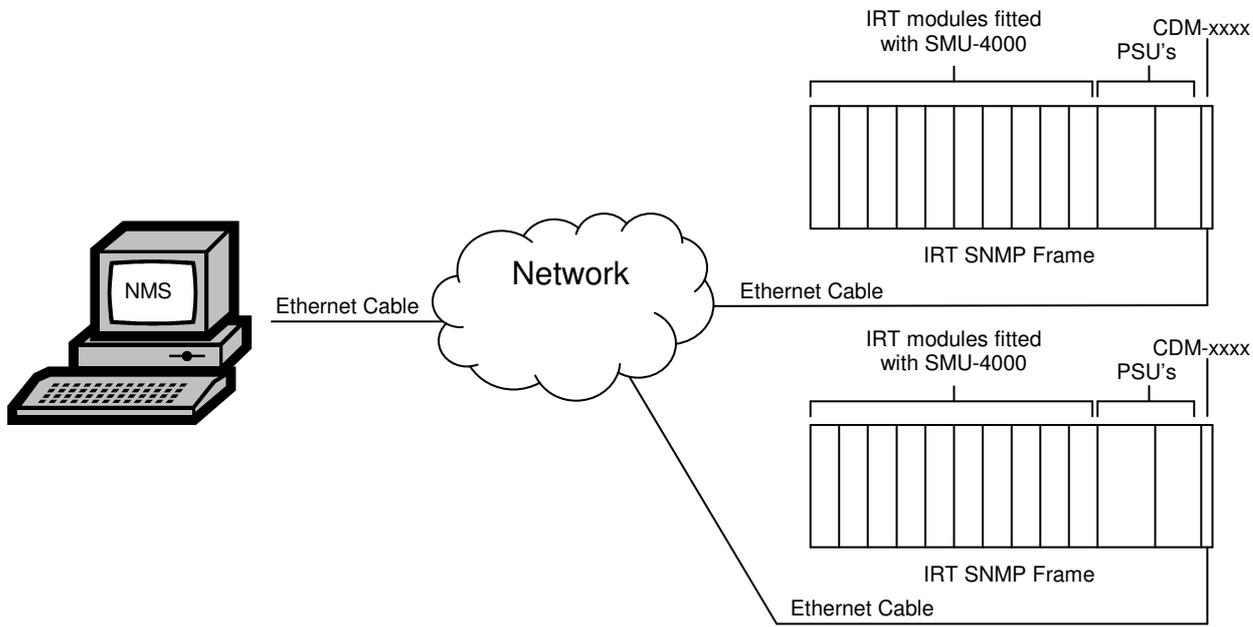
Frame parameters, such as Name, Address and Location, are set via an RS232 interface, a D9 connector on the rear of the frame below the mains inlet. A software terminal emulator, such as Tera Term or HyperTerminal, is used for setting and reading the parameters of the frame.

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-xxxx *agent* via a data bus on the rear of the frame. Thus the CDM-xxxx 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-xxxx *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 SNMP Setup**

## MMM-4682 & MMX-4682 SNMP Functions:

As both the MMM-4682 and MMX-4682 are compatible with the earlier models MMM-4681 and MMX-4681, they share the same MIBs. Current MIB names for both are IRT4681&2MMM-MIB.my and IRT4681&2MMX-MIB.my.

The following SNMP functions are capable of being controlled and monitored by an SNMP Network Management System (NMS):

### MMM-4682:

alarms	- An indication of the current state of the Urgent and Non Urgent alarms: (1) noAlarms: No Urgent and no Non Urgent alarms present. (2) UrgentAlarms: Sum of ASI input payload rates in excess of 148Mb/s. (3) nonUrgentAlarms: No valid input ASI streams present.
globalBandwidthCapping	- Allows bandwidth capping <sup>9</sup> to be enabled or disabled (1) disabled: Bandwidth capping disabled. (2) enabled: Bandwidth capping enabled.
channelInfoTable	- Information on each ASI input in table form:
channelNumber	- ASI Input Number.
channelPresent	- An indication that the channel input signal is present or not: (1) notPresent: No input ASI present on channel. (2) present: Input ASI is present on channel.
channelEnabled	- An indication, and control of, whether the channel is enabled or not <sup>10</sup> : (1) notEnabled: Channel not enabled (2) enabled: Channel enabled.
channelPacketSize	- An indication of the packet size: (1) bytes188: 188 bytes. (2) bytes204: 204 bytes.
channelDataRate	- An indication of the approximate data rate of the input.
channelDataRateLimit	- Set <sup>11</sup> and read the maximum allowed data rate of the channel. (Applicable only if 'globalBandwidthCapping' is enabled).
channelRateAlarm	- An indication if the input ASI data rate is too high for the channel assignment. (Applicable only if 'globalBandwidthCapping' is enabled). (1) noAlarm: Input ASI data rate $\leq$ the set 'channelDataRateLimit'. (2) alarm: Input ASI data rate exceeds set 'channelDataRateLimit'.
channelAlias	- A 15 byte maximum Alias (name) for the channel can be read and set.
outputConfig	- An indication of the SW1-4 DIP switch setting for the BNC electrical STM-1 output: (1) cMI: SW1-4 set to OFF. Electrical STM-1 output is CMI encoded. (2) invertedNRZ: Not applicable to MMM-4682. (Relates to earlier MMM-4681 model). (3) nRZ: SW1-4 set to ON. Electrical STM-1 output is NRZ encoded.
fpgaVersion	- The software version of the main FPGA in the format 'x.y', where x is the major revision number and y the minor.
reset	- Unit reset control - resets system up time counter. A set with a value of 2 sent to this OID will cause a system reset to occur. When queried returns a Null (0).
generalAlarmTrapEnable	- Trap automatically sent, if enabled, when a Major (Urgent) or Minor (non Urgent) alarms occurs and when it clears: (1) notEnabled: General Alarm Trap disabled. (2) enabled: General Alarm Trap enabled.
chanRateAlarmTrapEnable	- Trap automatically sent, if enabled, when a Channel Rate Alarm occurs and when it clears: (1) notEnabled: Channel Rate Alarm Trap disabled. (2) enabled: Channel Rate Alarm Trap enabled.
chanPresTrapEnable	- Trap automatically sent, if enabled, when a channel is first present and when it is first absent: (1) notEnabled: Channel Present Trap disabled. (2) enabled: Channel Present Trap enabled.

**NOTE:** 9 With channel bandwidth capping enabled, if ASI signal rate exceeds the set capping bandwidth for this particular channel, front panel LED corresponding to this channel will flash.

10 When a channel is disabled via SNMP, if ASI signal is present at this channel input to MMM-4682, front panel LED corresponding to disabled channel will flash.

11 When setting channel rates the total sum is inhibited from exceeding the allowable maximum rate of 148Mb. It may be necessary to enter the lower rate channels first depending on the existing overall sum.

**MMX-4682:**

alarms	- An indication of the current state of the Urgent and Non Urgent alarms: (1) noAlarms: No Urgent and no Non Urgent alarms present. (2) UrgentAlarms: No valid STM-1 input present. (3) nonUrgentAlarms: No valid ASI signals are present within the encoded STM-1 input.
inputSignalPresent	- An indication of the presence of a valid STM-1 input: (1) notPresent: no valid STM-1 input present. (2) present: valid STM-1 signal present.
channelInfoTable	- Information on each ASI output in table form:
channelNumber	- ASI Input Number.
channelPresent	- An indication whether the channel signal is present or not: (1) notPresent: No ASI present on channel. (2) present: ASI is present on channel.
channelEnabled	- An indication, and control of, whether the channel is enabled or not <sup>12</sup> : (1) notEnabled: Channel not enabled (2) enabled: Channel enabled.
channelPacketSize	- An indication of the packet size: (1) bytes188: 188 bytes. (2) bytes204: 204 bytes.
channelDataRate	- An indication of the approximate data rate of the ASI output.
channelAlias	- A 15 byte maximum Alias (name) for the channel can be read and set.
inputConfig	- An indication of the SW1-3 DIP switch setting for the BNC electrical input: (1) cMI: SW1-3 set to OFF. Electrical STM-1 input is CMI encoded. (2) invertedNRZ: Not applicable to MMX-4682. (Relates to earlier MMX-4681 model). (3) nRZ: SW1-3 set to ON. Electrical STM-1 input is NRZ encoded.
fpgaVersion	- The software version of the main FPGA in the format 'x.y', where x is the major revision number and y the minor.
reset	- Unit reset control - resets system up time counter. A set with a value of 2 sent to this OID will cause a system reset to occur. When queried returns a Null (0).
generalAlarmTrapEnable	- Trap automatically sent, if enabled, when a Major (Urgent) or a Minor (non Urgent) alarm occurs and when it clears: (1) notEnabled: General Alarm Trap disabled. (2) enabled: General Alarm Trap enabled.
chanPresTrapEnable	- Trap automatically sent, if enabled, when an ASI channel is first present and when it is first absent: (1) notEnabled: Channel Present Trap disabled. (2) enabled: Channel Present Trap enabled.

**NOTE:12** When a channel is disabled via SNMP, if ASI signal is present at this channel within the STM-1 stream, front panel LED of MMX-4682 corresponding to disabled channel will flash. This gives visual indication that channel is disabled.

## MMM-4682 TRAP Examples:

With Traps enabled, the following Trap information is automatically sent (Note: Requires the use of Trap Receiver software to receive the sent Traps):

### General Alarm Trap:

When an Urgent or Non Urgent alarm occurs, the following Trap information is sent:

**Trap Name :** irt468xMMMGGeneralAlarmOnTrap  
**sysObjectID :** irt468xMMM  
**sysName :** MMM-4682<sup>13</sup>  
**alarms :** urgentAlarms<sup>14</sup> (or nonUrgentAlarms<sup>15</sup>, depending on actual alarm state)

When an Urgent<sup>14</sup> or Non Urgent<sup>15</sup> alarm clears, the following Trap information is sent:

**Trap Name :** irt468xMMMGGeneralAlarmOffTrap  
**sysObjectID :** irt468xMMM  
**sysName :** MMM-4682<sup>13</sup>  
**alarms :** noAlarms

### Channel Rate Alarm Trap:

When a Channel Rate Alarm occurs, the following Trap information is sent:

**Trap Name :** irt468xMMMChanRateAlarmOnTrap  
**sysObjectID :** irt468xMMM  
**sysName :** MMM-4682<sup>13</sup>  
**channelRateAlarm(1) :** alarm (at time of Trap, Channel Rate exceeded on ASI input 1)  
**channelRateAlarm(2) :** noAlarm (at time of Trap, no Channel Rate Alarm on ASI input 2)  
**channelRateAlarm(3) :** noAlarm (at time of Trap, no Channel Rate Alarm on ASI input 3)  
**channelRateAlarm(4) :** noAlarm (at time of Trap, no Channel Rate Alarm on ASI input 4)  
**channelNumber :** 1 (indicates which ASI input this Trap relates to, in this case input 1)

If multiple Channel Rate Alarms occur at the same time, multiple Traps will be sent in order of which input alarm registers first. Each Trap is identified by the 'channelNumber' field. At the time of the Trap, Channel Rate Alarm status information is indicated for each ASI input.

When a Channel Rate Alarm clears, the Trap name sent is 'irt468xMMMChanRateAlarmOffTrap'. All other information is as per when a Channel Rate Alarm occurs (irt468xMMMChanRateAlarmOnTrap) description.

### Channel Present Trap:

When an ASI input is applied to an ASI input, the following Trap information is sent:

**Trap Name :** irt468xMMMChanPresTrap  
**sysObjectID :** irt468xMMM  
**sysName :** MMM-4682<sup>13</sup>  
**channelPresent(1) :** present (at time of Trap, ASI signal is present into input 1)  
**channelPresent(2) :** notPresent (at time of Trap, no ASI signal is present into input 2)  
**channelPresent(3) :** notPresent (at time of Trap, no ASI signal is present into input 3)  
**channelPresent(4) :** notPresent (at time of Trap, no ASI signal is present into input 4)  
**channelNumber(1) :** 1 (indicates which ASI input this Trap relates to, in this case input 1)

If multiple ASI inputs occur at the same time, multiple Traps will be sent in order of which input registers first. Each Trap is identified by the 'channelNumber' field. At the time of the Trap, Channel Presence status information is indicated for each ASI input.

When an ASI input is removed from an ASI input, the Trap name sent is 'irt468xMMMChanLossTrap'. All other information is as per the application of an ASI input (irt468xMMMChanPresTrap) description.

**NOTE:** 13 SysName does not necessarily have to be MMM-4682. This is a settable parameter that can be changed by the user via SNMP.

14 An Urgent Alarm occurs when the sum of the ASI input payload rates are in excess of maximum allowable 148Mb/s.

15 A Non Urgent Alarm occurs when no valid input ASI streams are present.

## MMX-4682 TRAP Examples:

With Traps enabled, the following Trap information is automatically sent (Note: Requires the use of Trap Receiver software to receive the sent Traps):

### General Alarm Trap:

When an Urgent or Non Urgent alarm occurs, the following Trap information is sent:

**Trap Name :** irt468xMMXGeneralAlarmOnTrap  
**sysObjectID :** irt468xMMX  
**sysName :** MMX-4682<sup>16</sup>  
**alarms :** urgentAlarms<sup>17</sup> (or nonUrgentAlarms<sup>18</sup>, depending on actual alarm state)

When an Urgent<sup>17</sup> or Non Urgent<sup>18</sup> alarm clears, the following Trap information is sent:

**Trap Name :** irt468xMMXGeneralAlarmOffTrap  
**sysObjectID :** irt468xMMX  
**sysName :** MMX-4682<sup>16</sup>  
**alarms :** noAlarms

When a Channel Rate Alarm clears, the following Trap information is sent:

**Trap Name :** irt468xMMXChanRateAlarmOffTrap  
**sysObjectID :** irt468xMMX  
**sysName :** MMX-4682<sup>16</sup>  
**channelRateAlarm(1) :** noAlarm (at time of Trap, Channel Rate exceeded on ASI input 1)  
**channelRateAlarm(2) :** noAlarm (at time of Trap, no Channel Rate Alarm on ASI input 2)  
**channelRateAlarm(3) :** noAlarm (at time of Trap, no Channel Rate Alarm on ASI input 3)  
**channelRateAlarm(4) :** noAlarm (at time of Trap, no Channel Rate Alarm on ASI input 4)  
**channelNumber(1) :** 1 (indicates which ASI input this Trap relates to, in this case input 1)

### Channel Present Trap:

When an ASI input is applied to an ASI input, the following Trap information is sent:

**Trap Name :** irt468xMMXChanPresTrap  
**sysObjectID :** irt468xMMX  
**sysName :** MMX-4682<sup>16</sup>  
**channelPresent(1) :** present (at time of Trap, ASI signal is present into input 1)  
**channelPresent(2) :** notPresent (at time of Trap, no ASI signal is present into input 2)  
**channelPresent(3) :** notPresent (at time of Trap, no ASI signal is present into input 3)  
**channelPresent(4) :** notPresent (at time of Trap, no ASI signal is present into input 4)  
**channelNumber(1) :** 1 (indicates which ASI input this Trap relates to, in this case input 1)

If multiple ASI inputs occur at the same time, multiple Traps will be sent in order of which input registers first. Each Trap is identified by the 'channelNumber' field. At the time of the Trap, Channel Presence status information is indicated for each ASI input.

When an ASI input is removed from an ASI input, the Trap name sent is 'irt468xMMXChanLossTrap'. All other information is as per the application of an ASI input (irt468xMMXChanPresTrap) description.

**NOTE:** <sup>16</sup> SysName does not necessarily have to be MMX-4682. This is a settable parameter that can be changed by the user via SNMP.

<sup>17</sup> An Urgent Alarm occurs when no valid STM-1 input is present.

<sup>18</sup> A Non Urgent Alarm occurs when no valid ASI signals are present within the encoded STM-1 input.

## 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  
Email: service@irtelectronics.com

Fax: 61 2 9439 7439