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IRT Eurocard

Type AMS-4371

3G/HD/SD-SDI, ASI, G.703, Video
4 Port Changeover Relay

Designed and manufactured in Australia

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

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Revision History

Revision	Date	By	Change Description	Applicable to:
0	07/12/2009	AL	Original Issue.	Firmware versions AMS-4371i2

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Instruction Book

Table of Contents

This instruction book applies to units fitted with firmware version AMS-4371i2.

Operational Safety:

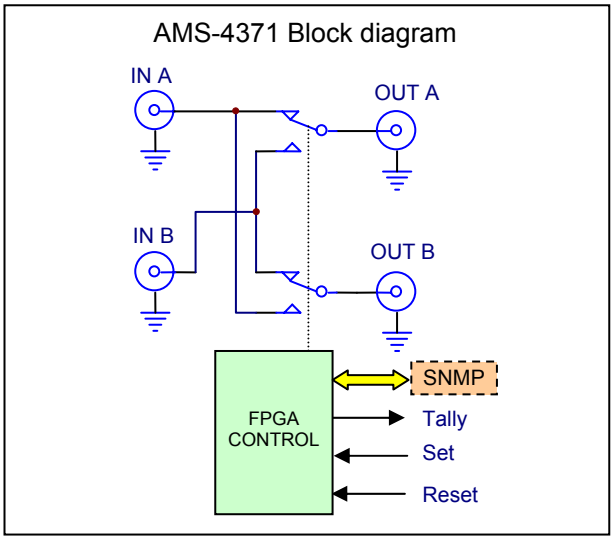
WARNING

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 AMS-4371
3G/HD/SD-SDI, ASI, G.703, Video
4 Port Changeover Relay

General Description



The AMS-4371 is a magnetic latching 4 port changeover switcher using enhanced performance relays which provide switching capabilities for high speed data signals up to 2970 Mb/s. It is suitable for switching 3G/HD/SD-SDI video, ASI, G.703 data streams, or analogue video signals.

The AMS-4371 is arranged as a changeover switch with two inputs and two outputs. No terminations are provided on the board allowing the switcher to be used in a wide variety of applications and with signals of various types.

The magnetic latching characteristic of the high performance relays allows momentary control and also provides for no change of path during power loss.

The AMS-4371 is ideally suited to applications where a simple choice between two inputs or outputs is required and may be easily driven by detector circuits for automatic path selection.

Local switching is possible using front panel push button switches. Remote switching is possible using external normally open or normally closed alarms.

Front panel switches use a one second delay to avoid accidental switching if bumped. After a period of approximately five to six minutes, the AMS-4371 automatically switches back into remote mode.

Remote indication of tally status is provided for integration into central alarm and monitoring systems.

An optional SNMP (Simple Network Management Protocol) plug-in module is available for monitoring and control when used in an IRT frame fitted with SNMP capability.

The AMS-4371 is designed to fit IRT's 1RU and 4000 series 3RU Eurocard frames[1] and may be used alongside any other of IRT's analogue or digital Eurocards.

Standard features:

- **Signal path suitable for 3G-SDI, HD-SDI, SD-SDI, analogue video, ASI data streams and G.703 signals @ 2, 8, 34, 45, 144, 155Mb/s.**
- **Momentary Set/Reset control.**
- **No path change on power fail or board removal.**
- **Local or remote control.**
- **Front panel LED status indicators.**
- **Optional plug in SNMP monitoring and switching module.**

[1] Not compatible with pre-4000 series 3RU frames.

Technical Specifications

IRT Eurocard module
Type AMS-4371

Signal path:

Signal types		3G-SDI/HD-SDI/SD-SDI/ASI/G.703/Video.
Impedance		Non-terminating, designed for 75 Ω use.
Switching characteristic		Magnetic latching 4 port changeover relay.
Frequency response		+0/-1 dB 0 Hz to 1500 MHz, +0/-1.5 dB 1500 MHz to 3 GHz.

Auxilliary Data:

Tally		Magnetic latching relay changeover contact set.
	Main	Connection between pins 2 & 3 (IN A - OUT A, IN B – OUT B).
	Standby	Connection between pins 1 & 2 (IN A - OUT B, IN B – OUT A).

Control:

Mode		Momentary ground or open circuit, switch selectable.
	Set	Pin 1 (IN A - OUT B, IN B – OUT A);
	Reset	Pin 2 (IN A - OUT A, IN B – OUT B);
	Gnd	Pin 3.
Front panel switches		Momentary illuminated push button. Note that front panel switch needs to be held down approximately 1 second for activation to occur. Automatic remote default setting after approx. 5 - 6 minutes. Note that remote setting does not take control until there is a change in state of remote signals.

Connectors:

Video:	BNC.
Video Tally:	3 pin Phoenix pluggable screw block.
Video Control:	3 pin Phoenix pluggable screw block.

DIP Switch Settings:

Control:	SW3-1 OFF	Switch to ground control.
	SW3-1 ON	Switch to open circuit control.
Relay	SW3-2 OFF	Magnetic Latch relay control.
	SW3-2 ON	Toggle relay control.

Other:

Relay contact rating		30 Vdc – 0.5 A.
Power requirements:		28 Vac CT (14-0-14) or ± 16 Vdc.
Power consumption		1 VA.
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.
Supplied accessories		Rear connector assembly with matching connectors for control input and tally outputs.
Optional accessories		SMU-4000 SNMP plug-in module for use with IRT frame fitted with SNMP “Agent”.

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

Configuration

DIP Switch Settings:

Control:	SW3-1	OFF	Switch to ground control (Default).
		ON	Switch to open circuit control.
Relay	SW3-2	OFF	Magnetic Latch relay control (Default).
		ON	Toggle relay control.

Remote switching control is either by switch to ground operation, or switch to open circuit. This allows for connection to either alarm type condition of external equipment being used to drive the AMS-4371.

Magnetic latch relay control needs a ‘set’ and ‘reset’ operation to switch between the two relay states, whilst toggle relay control only requires a ‘set’ and ‘removal of set’ to switch between the two states.

NOTE: Open circuit control implies removing a ground contact.

Installation

Pre-installation:

Hanidlng:

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.

Not compatible with pre-4000 series 3RU frames such as 700 series or 3000 series.

Signal Connections:

Signal connections are made to BNC coaxial connectors. No termination of inputs is provided on the module. When switched to the output the input load impedance is that of the load connected to the output. Where the input signal is required to be terminated, and one of the outputs is not connected to anything, then this unconnected output should be terminated by an appropriate BNC terminator of the required impedance.

Remote Control Connections:

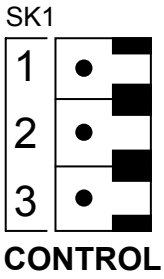
Remote switch control is made by either a switch to ground or switch to open circuit contact, depending upon the DIP switch SW3-1 setting as described in the *Configuration* section of this manual, on the 3-pin SK1 connector located on the rear assembly.

Connecting the appropriate control input momentarily to ground, or open circuit depending on the SW3-1 setting as described in the *Configuration* section of this manual, will cause the relays to operate and the output state to cross over as follows:

Control	Input		Output
SET (Gnd/Open Circuit)	A (Main)	↔	B
	B (Standby)	↔	A
RESET (Gnd/Open Circuit)	A (Main)	↔	A
	B (Standby)	↔	B

Control input connector SK1 pin configuration is as follows:

Pin	Description
1	SET control – select Input B (Standby) to Output A
2	RESET control – select Input A (Main) to Output A
3	Ground



Tally connections:

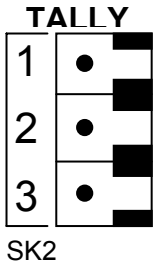
Switch status is made by a relay contact on the SK2 connector (Tally) located on the rear assembly.

With pins 1 & 2 short circuited together module is in the STANDBY (SET) position:
Input A (Main) to Output B; and
Input B (Standby) to Output A.

With pins 2 & 3 short circuited together module is in the Main (RESET) position:
Input A (Main) to Output A; and
Input B (Standby) to Output B.

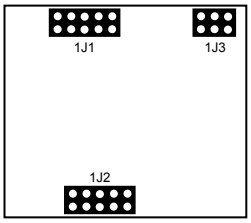
Tally output connector SK2 pin configuration is as follows:

Pin	Description
1	Relay SET contact – I/P B (Standby) to O/P A selected
2	Relay Common
3	Relay RESET contact – I/P A (Main) to O/P A selected



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 SNMP capable frame fitted with a CDM-xxxx SNMP agent and being interrogated by a suitable Network Management System.

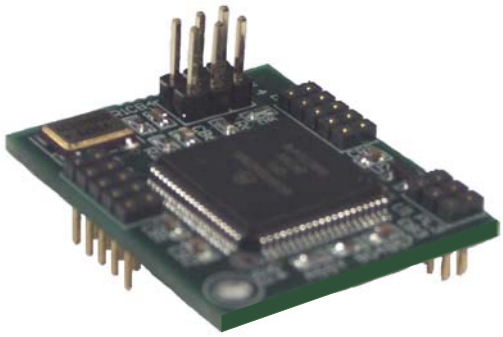
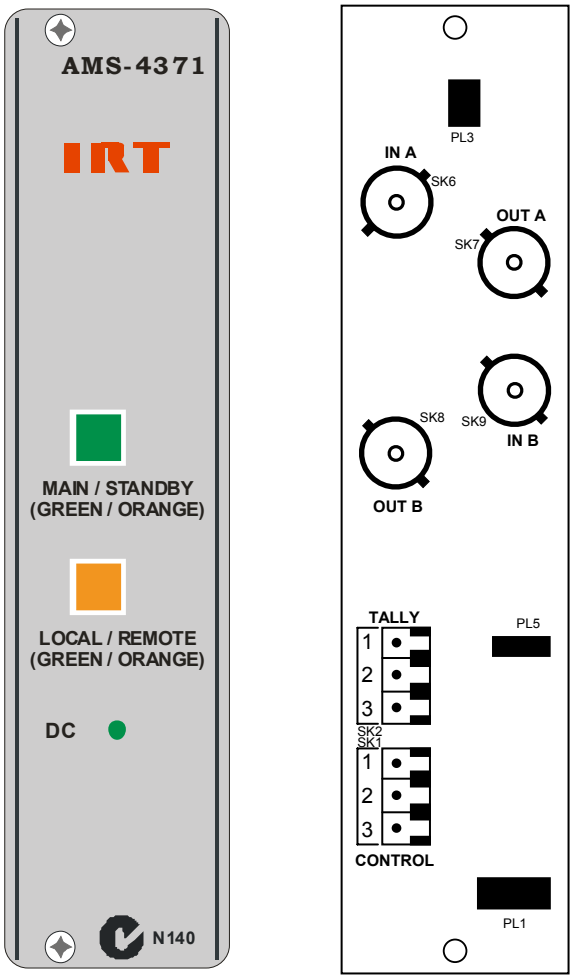


Figure 1: SMU-4000 module

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.



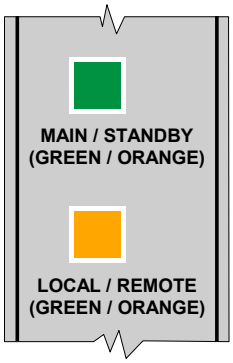
Operation

The AMS-4371 can be used for a MAIN / STANDBY changeover switch, or a 2x1 switcher, application.

Switcher control is done either locally via the front panel pushbutton switches, remotely by external signals/ alarms connected via the SK1 control connector on the rear assembly, or via SNMP (Simple Network Management Protocol) using a Network Management System (NMS).

Local Control:

There are two front panel momentary pushbuttons marked LOCAL / REMOTE and MAIN / STANDBY.



The LOCAL / REMOTE switch switches between front panel local control and remote control via the SK1 connector on the rear assembly. The default state is in the remote (orange) setting. To switch to front panel local control, press this button and hold for approximately a second. Switch colour then changes to green indicating that the MAIN / STANDBY switch is now operational.

The MAIN / STANDBY switch switches between MAIN (Input A goes to Output A, Input B goes to Output B) and STANDBY (Input B goes to Output A, Input A goes to Output B) positions. To activate, press and hold for approximately a second. Switch colour changes between green (MAIN) and orange (STANDBY) to indicate which position the changeover relays are in.

Switches need to be held down for approximately a second before activation takes place. This is so to avoid accidental switching taking place should the switches be pressed accidentally as they are momentary, not latched, contact type switches.

Remote Control:

Magnetic Latch Mode:

With SW3-2 OFF, the SET (SK1-1) and RESET (SK1-2) controls operate in the magnetic latch mode.

Switch to ground operation:

If the AMS-4371 has been set to switch to ground operation with the DIP switch SW3-1 OFF, provided the RESET pin (SK1-2) isn't already being held to ground, momentarily grounding the SET pin (SK1-1) will select Input A (Main) to Output B, and Input B (Standby) to Output A.

Provided the SET pin (SK1-1) isn't already being held to ground, momentarily grounding the RESET pin (SK1-1) will select Input A (Main) to Output A, and Input B (Standby) to Output B.

Switch to open circuit operation:

If the AMS-4371 has been set to switch to open circuit operation with the DIP switch SW3-1 ON, provided the RESET pin (SK1-2) isn't already being held open circuit, momentarily open circuiting the SET pin (SK1-1) will select Input A (Main) to Output B, and Input B (Standby) to Output A.

Provided the SET pin (SK1-1) isn't already being held to open circuit, momentarily open circuiting the RESET pin (SK1-1) will select Input A (Main) to Output A, and Input B (Standby) to Output B.

Toggle Mode:

With SW3-2 ON, the SET control (SK1-1) behaves in a toggle mode of operation.

Switch to ground operation:

If the AMS-4371 has been set to switch to ground operation with the DIP switch SW3-1 OFF, grounding this pin will select Input A (Main) to Output B, and Input B (Standby) to Output A. Removing this ground will automatically reset Input A (Main) to Output A, and Input B (Standby) to Output B.

Switch to open circuit operation:

Likewise if the AMS-4371 has been set to switch to open circuit operation with the DIP switch SW3-1 ON, open circuiting this pin, that is removing a ground, will select Input A (Main) to Output B, and Input B (Standby) to Output A. Grounding this pin will automatically reset Input A (Main) to Output A, and Input B (Standby) to Output B.

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.

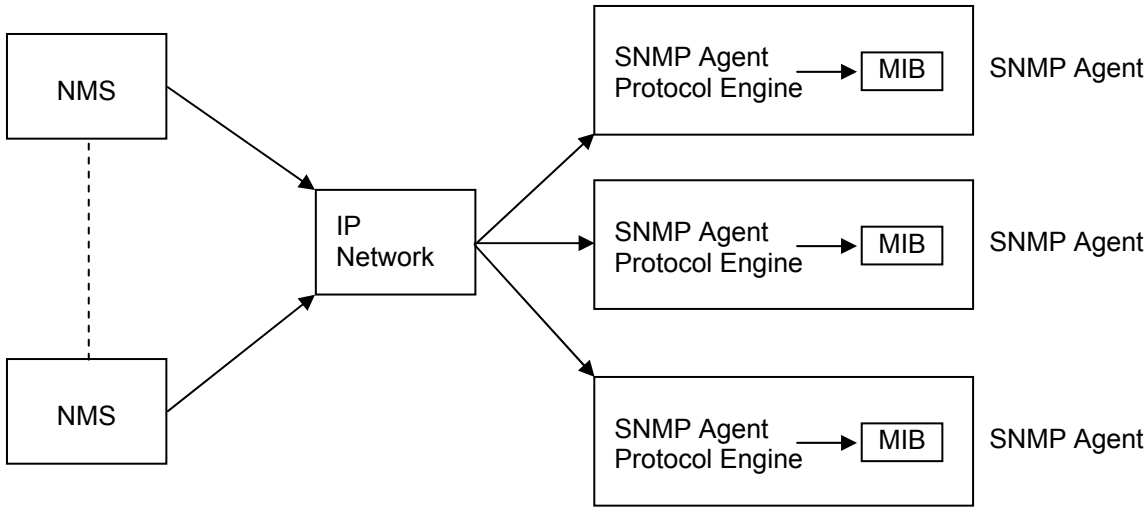
An *NMS* polls, or communicates with, an *agent*. An *agent* is a network management software module that resides in a *managed device*. An *agent* has local knowledge of management information and translates that information into a form compatible with SNMP. The *agent*, therefore, acts as an interface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

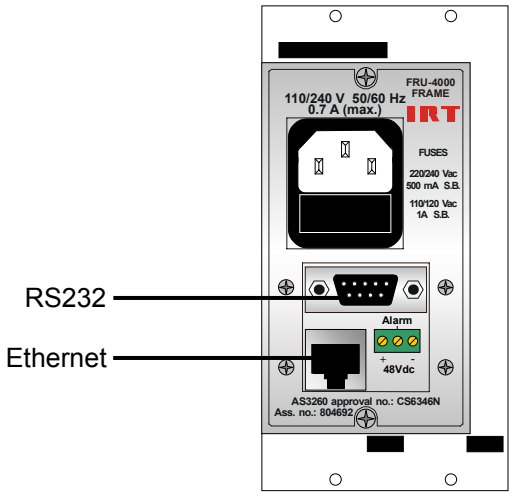
IRT Electronics currently employs SNMPv1 with its SNMP capable frames. The frame acts as an *agent* when fitted with a CDM-xxxx module. This module has its own designated slot next to the power supply so as to not affect the number of modules that the frame will take. Communication between the *NMS*,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

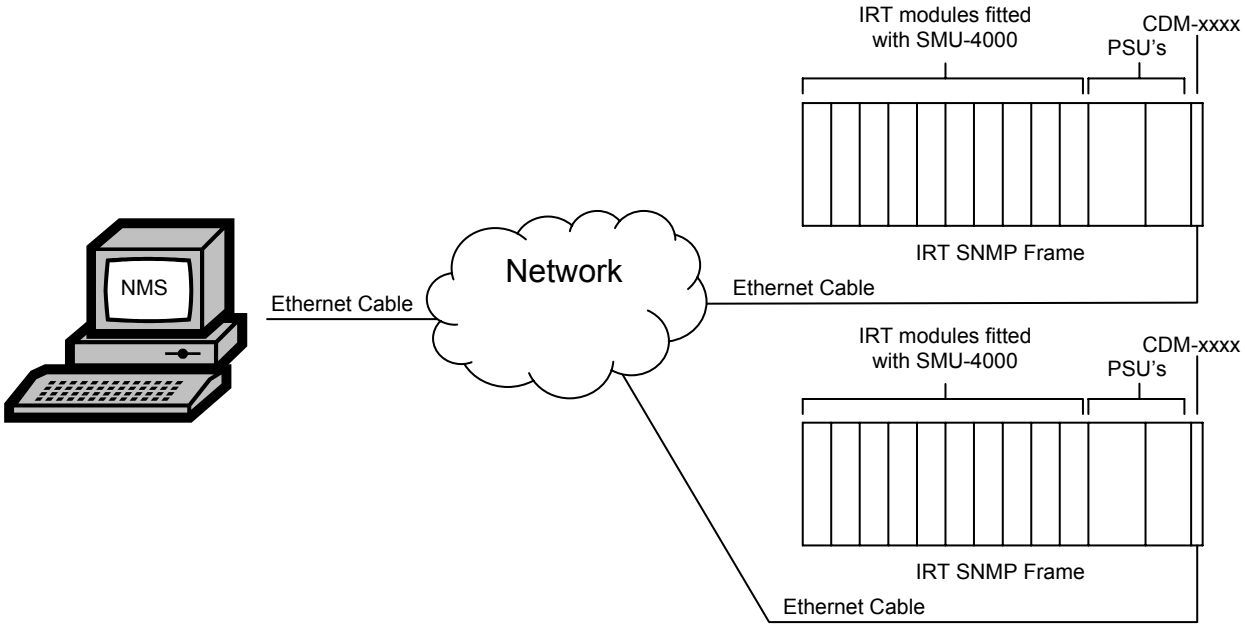
Frame parameters, such as Name, Address and Location, are set via an RS232 interface, a D9 connector on the rear of the frame below the mains inlet. A software terminal emulator, such as Tera Term or HyperTerminal, is used for setting and reading the parameters of the frame.

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

AMS-4371 SNMP Functions:

With the AMS-4371 fitted with the optional plug-in SMU-4000 SNMP module, programmed with the firmware to suit and installed in an IRT frame with SNMP capability, the unit 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 and control of the state of the selected relay path (main (1), standby (2));
- (1) Main defines Input A connected to Output A and Input B connected to Output B.
- (2) Standby defines Input A connected to Output B and Input B connected to Output A;

An indication of the firmware version of the FPGA in the format x.y where x is the major revision number and y is the minor revision number;

An indication of the software version of the SMU-4000 in the format x.y where x is the major revision number and y is the minor revision number;

Trap automatically sent, if enabled, when the module status changes (enabled (1), disabled (2)); and

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 1.

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