I R T Electronics Pty Ltd A.B.N. 35 000 832 575
26 Hotham Parade, ARTARMON N.S.W. 2064 AUSTRALIA
National: Phone: (02) 9439 3744 Fax: (02) 9439 7439
International: +61 2 9439 3744 +61 2 9439 7439
Email: sales@irtelectronics.com
Web: www.irtelectronics.com

IRT Eurocard

Type AMS-4370
4 Port Changeover Relay switcher for High Definition Digital Video, SDI, ASI, G.703, or Analogue Video

Designed and manufactured in Australia

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

IRT Eurocard

AMS-4370 – 4 Port Changeover Relay switcher for High Definition Digital Video, SDI, ASI, G.703 or Analogue Video

Instruction Book

Table of Contents

This instruction manual applies to units later than S/N 0711001.

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.

General Description

The AMS-4370 is a magnetic latching 4 port changeover switcher using enhanced performance relays which provide switching capabilities for high speed data signals up to 1.485 Gb/s. It is suitable for switching high definition video (HDSDI*), ASI, SDI, G.703 data streams, or analogue video signals.

The AMS-4370 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 and impedances.

The magnetic latching characteristic of the high performance relays allows momentary control and also provides for no change of path during power loss. Remote changeover is by a momentary ground connection.

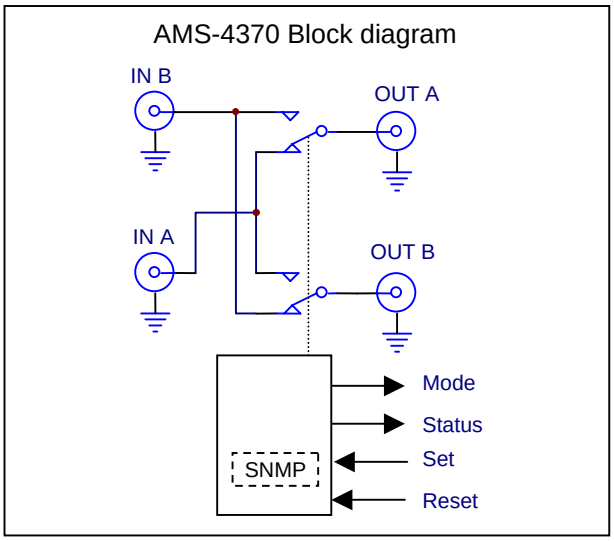
The AMS-4370 is ideally suited to applications where a simple choice between two inputs or outputs is required and may be easily driven by detector circuits for automatic path selection.

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

The AMS-4370 relay card is built to the Eurocard format and is designed to fit IRT's Standard Eurocard frame as well as IRT's 4000 series frame for use with IRT's SNMP system and may be used alongside any other of IRT's analogue or digital Eurocards.

Standard features:

- **Signal path suitable for HDSDI (1.485Gb/s), SDI , analogue video, ASI data streams and G703 signals @ 2, 8, 34, 45, 144, 155Mb/s.**
- **Momentary Set/Reset control.**
- **No path change on power fail.**
- **Local or remote control.**
- **Front panel LED status indicators.**
- **Optional plug in SNMP monitoring and switching module.**



NOTE: * For HDSDI applications, it is recommended that the AMS-4370 be used in either IRT's 1RU or 4000 series 3RU frames only.

Technical Specifications
IRT Eurocard module
Type AMS-4370

Signal path:

Signal types	HDSDI/SDI/ASI/G703/Video
Switching characteristic	Magnetic latching 4 port changeover relay.
Crosstalk between channels	< -50 dB to 300 MHz, < -30 dB to 1.5 GHz.
Frequency response	+0/-0.5 dB 0 Hz to 750 MHz, +0/-1.5 dB 750 MHz to 1.5 GHz.

Auxilliary Data:

Mode	TTL level: Local = 0V (LOW); Remote = 4.5V (HIGH) via pull-up resistor, or open drain (link selectable).
Data/Tally	Magnetic latching relay changeover contact set. Common can be left open, or linked to ground or +12V of the main board.

Remote Control:

Mode	Momentary ground, or TTL compatible circuit with 2k7 internal pull-up resistors to +4.5V.
Power requirement	1.5 mA sink to ground.

Connectors:

Video:	BNC.
Video Tally	3 pin Phoenix pluggable screw block.
Video Control	4 pin Phoenix pluggable screw block.

Other:

Relay contact rating		24 Vdc - 1 A 100 Vac - 0.3 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, silk-screened 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/mode outputs.
Optional accessories		Instruction manual. SMU-4000 SNMP plug-in module for use with 4000 series frame fitted with SNMP “Agent”.

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

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.

Internal Adjustments

The AMS-4370 requires no internal adjustments for correct operation.

Configuration

Link Settings:

LK1		Not fitted / Not used.
LK2		Hard wired pins 2-3 / Not configurable.
LK3	IN	External remote control acts in toggle (non magnetic latch) mode.
	OUT	External remote control acts in Set/Reset (magnetic latch) mode.
LK4	1-2	Relay K3 Common (SK6-1 on rear assembly) set to +12Vdc via a 4R7 resistor.
	2-3	Relay K3 Common (SK6-1 on rear assembly) set to Ground.
	OUT	Relay K3 Common (SK6-1 on rear assembly) open (floating).
LK5	IN	Local/Remote tally 4.5V via pull-up resistor for Remote setting.
	OUT	Local/Remote tally open drain for Remote setting.

Remote control mode:
With the front panel Local/Remote switch set for remote control operation, control of the AMS-4370 changeover relay is by momentary ground contact only, via SK5 on the rear assembly.

Local control mode:
With the front panel Local/Remote switch set for local control operation, control of the AMS-4370 changeover relay is by front panel momentary Main/Standby switch. Remote switching via SK5 is still possible even with the front panel Local/Remote switch set to local.

Input termination:
No terminations are provided on the module so that the switcher can function in changeover mode. For 2 x 1 switcher applications the following terminations should be installed.

Output A (Main) only is used and should be terminated at connected equipment.
Output B (Standby) should be terminated in 75 Ohms (or 50 Ohms if being used for 50 Ohm RF signals) using a BNC termination plug.

Installation & Operation

Installation in frame or chassis:

See details in separate manual for selected frame type.

See also *Configuration* section.

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.

Control connections:

Switch status is made by a relay contact on SK6 connector (Video Tally) located on the rear assembly. With pin 3 short circuited to pin 1 (pins 1 and 2 open circuited), module is in RESET position, i.e. Input A (Main) to Output A and Input B (Standby) to Output B. Likewise, if pin 2 is short circuited to pin 1 (pins 1 and 3 open circuited) then module is in SET position, i.e. Input A (Main) to Output B and Input B (Standby) to Output A.

Video Tally input connector SK6 pin configuration is as follows:

Pin	Description
1	Relay common (contact connected to either +12Vdc via 4R7 resistor, ground, or open via link LK4 position – see *Configuration* section)
2	Relay SET contact – I/P B (Standby) selected
3	Relay RESET contact – I/P A (Main) selected

Remote control connections are via SK5 connector located on the rear assembly.

Control input connector SK5 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	Local/Remote tally indication
4	Ground

Connecting the appropriate control input momentarily to ground will cause the relays to operate and the output state to cross over as follows:

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

With LK3 IN, the SET control (SK5-1) behaves as a toggle mode. Grounding this pin will set 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. Toggle mode of operation will also work with TTL logic level controls.

Local/Remote mode tally is made by pin 3 of SK5. The tally uses TTL logic to indicate local or remote setting. The local setting is indicated by approximately 0V (LOW) on pin 3 of SK5, whilst the remote setting, with link LK5 IN, is indicated by approximately 4.5V (HIGH) via a pull-up resistor on the same pin, or with link LK5 OUT remote setting is indicated by an open drain output of a FET transistor.

Front Panel controls:

On the front panel there are two switches. The upper switch is a centre position momentary 2 way switch for selecting between the inputs A (Main) and B (Standby). In order for this switch to operate the lower switch, which is a 2 way toggle switch, must be set to the *Local* position. With the lower switch set to the *Remote* position, the upper Input Select switch does not operate.

With the Local/Remote switch set to the *Local* position, a red LED illuminates to give a visual warning indication that the unit is in local operation.

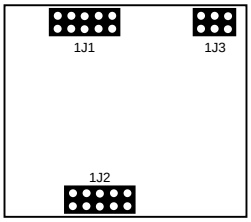
The AMS-4370 is intended to be controlled by momentary contact closures only. If a remote control was to be a permanent ground, as opposed to a momentary ground, then this control will hold control of the switcher. Even if the switcher was to be set to the local position, local control will not operate whilst this remote control has control.

With the switcher set to the *Local* control position, it is still possible for a remote control to operate and over-ride the local control setting.

Front panel LEDs give a visual indication of inputs selected. VID MAIN (Input A) LED is a green LED and indicates that Input A (Main) is switched to Output A, and Input B (Standby) is switched to Output B. VID STANDBY (Input B) LED is a yellow LED and indicates that Input A (Main) is switched to Output B, and Input B (Standby) is switched to Output A.

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

AMS-4370 SNMP Functions:

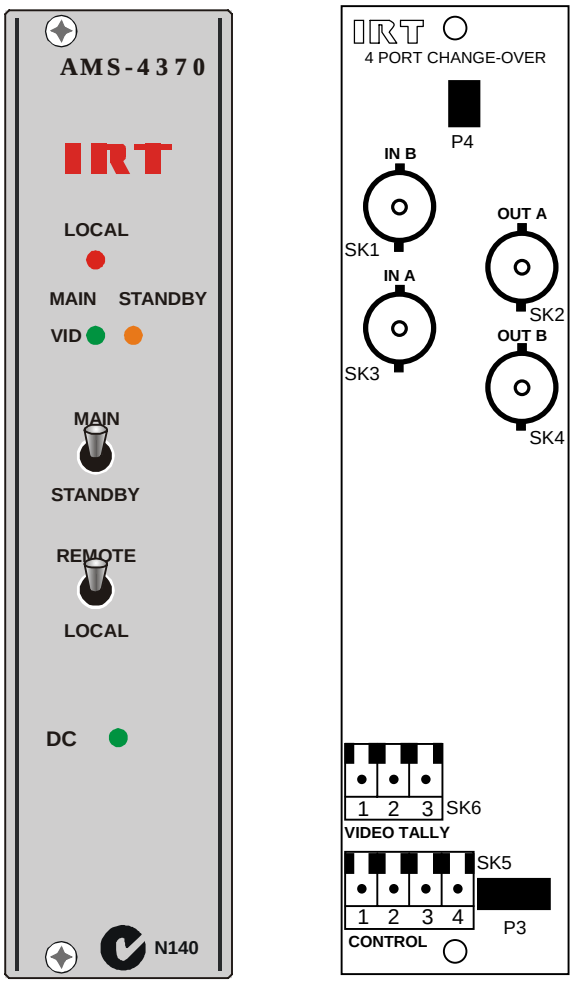
With the AMS-4370 fitted with the optional plug-in SMU-4000 SNMP module, programmed with the firmware to suit and installed in an IRT 4000 series frame with SNMP capability, the unit can be interrogated by an SNMP Network Management System (NMS).

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

An indication of the state of the magnetic latching relays.
InAoutA defines Input A connected to Output A and Input B connected to Output B. inAoutB defines Input A connected to Output B and Input B connected to Output A;
An indication of the state of the front panel Remote/Local Switch.
SNMP control is disabled and front panel control is enabled if this switch is in the Local position. External control (ie via the rear assembly) is always in operation;
An indication if any external controls (via the rear assembly), or the front panel Set/Reset switch are operated;
Whether "Trap" function is enabled;
Trap automatically sent, if enabled, when the module status changes;
A number that increases by one for every trap sent; and
Unit reset control.

Front & rear panel connector diagrams

The following front panel and rear assembly drawings are not to scale and are intended to show relative positions of connectors, indicators and controls 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.

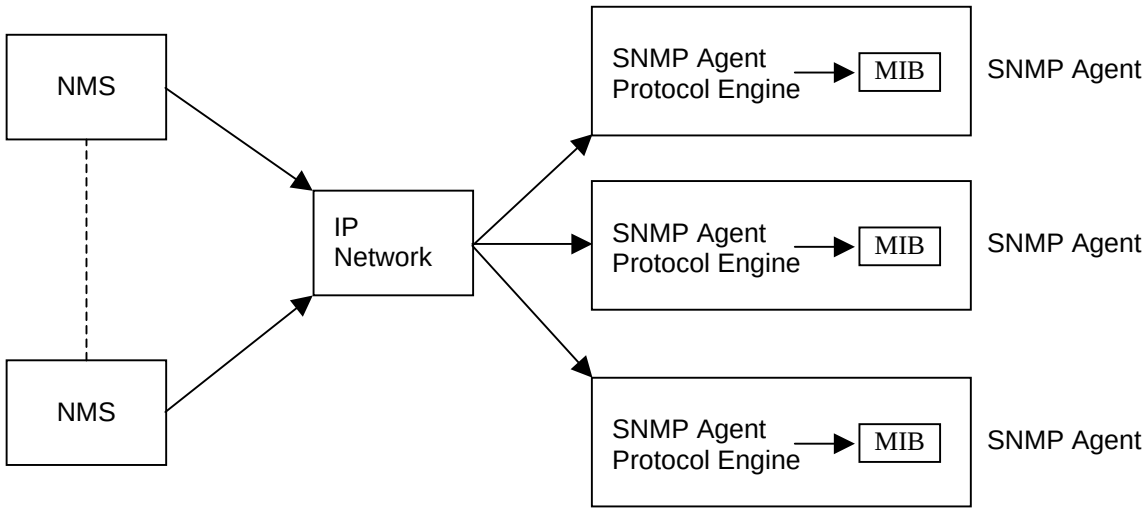
An *NMS* polls, or communicates with, an *agent*. An *agent* is a network management software module that resides in a *managed device*. An *agent* has local knowledge of management information and translates that information into a form compatible with SNMP. The *agent*, therefore, acts as an interface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

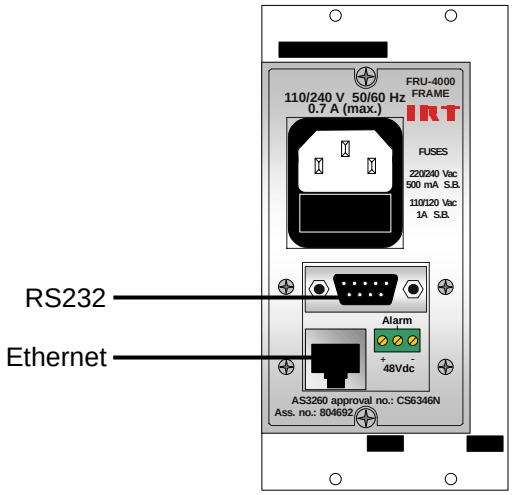
IRT Electronics currently employs SNMPv1 with its 4000 series frame. The frame acts as an *agent* when fitted with a CDM-4000 module. This module has its own designated slot next to the power supply so as to not affect the number of modules that the frame will take. Communication between the *NMS*, the 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.

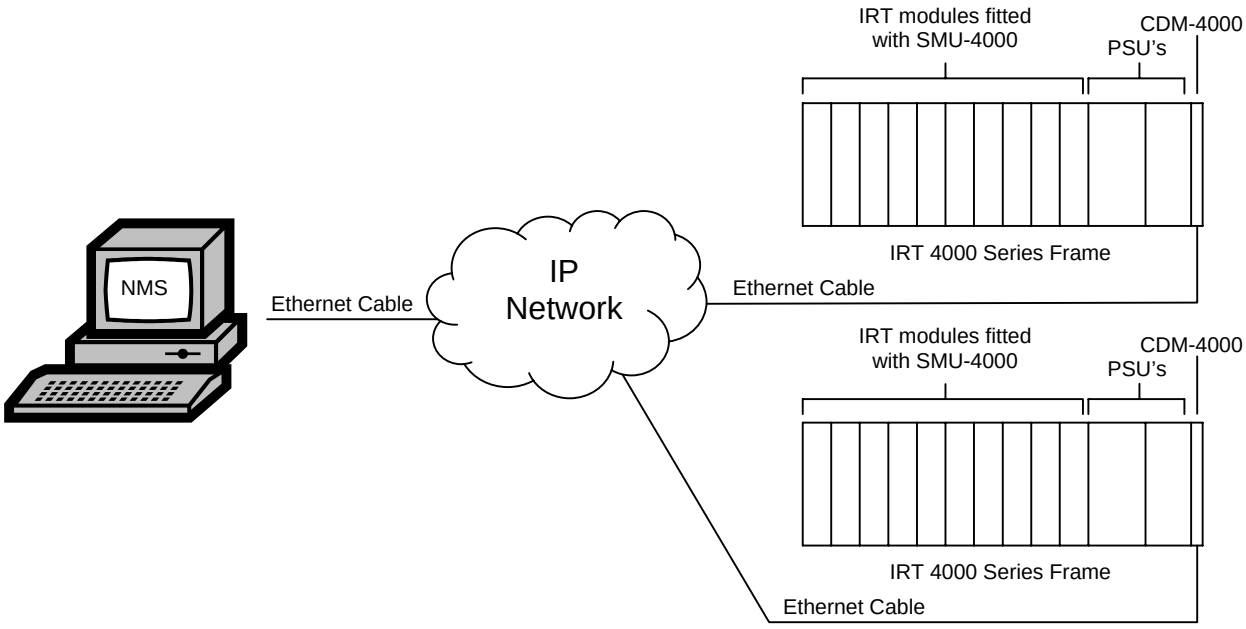
Frame parameters, such as Name, Address and Location, are set via an RS232 interface, a D9 connector on the rear of the frame below the mains inlet. A software terminal emulator, such as Tera Term or HyperTerminal, is used for setting and reading the parameters of the frame.

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

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.

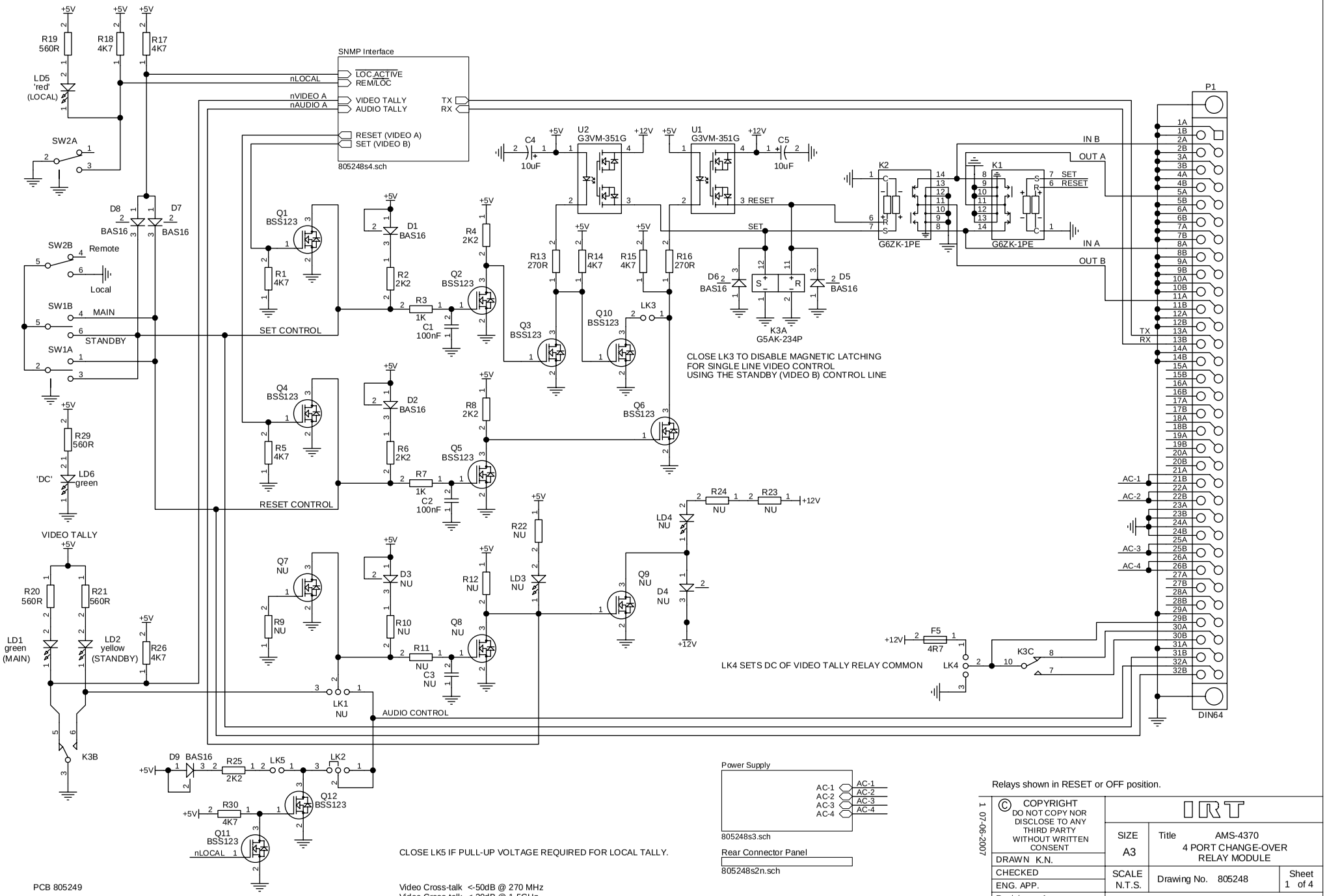
The equipment should be returned **to the agent who originally supplied the equipment** or, where this is not possible, to IRT direct as follows.

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

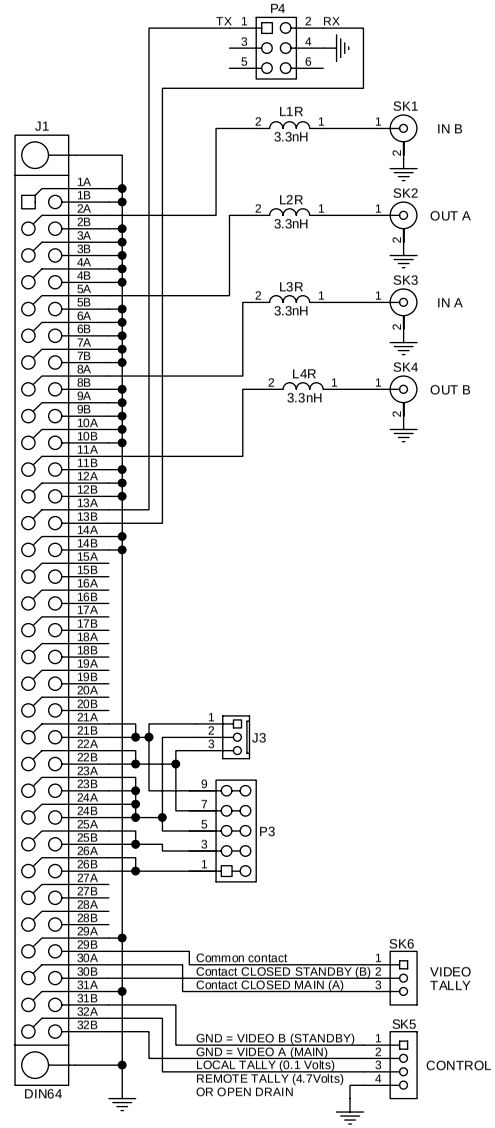
Phone: 61 2 9439 3744 Fax: 61 2 9439 7439
Email: service@irtelectronics.com

Drawing Index

Drawing #	Sheet #	Description
805248	1	AMS-4370 main circuit schematic.
805248	2	AMS-4370 Rear Connector Panel.
805248	3	AMS-4370 Power Supply.
805248	4	AMS-4370 SNMP interface.



1 07-06-2007	© COPYRIGHT DO NOT COPY NOR DISCLOSE TO ANY THIRD PARTY WITHOUT WRITTEN CONSENT	IRT
	DRAWN K.N.	SIZE A3 — Title AMS-4370 4 PORT CHANGE-OVER RELAY MODULE
	CHECKED	SCALE N.T.S. — Drawing No. 805248 — Sheet 1 of 4
	ENG. APP.	
	Revision: 1	IRT Electronics Pty. Ltd. ARTARMON NSW AUSTRALIA 2064
	Date: 17-Oct-2007	



1 07-06-2007

DRAWN K.N.
CHECKED
ENG. APP.
Revision: 1
Date: 17-Oct-2007

IRT

SIZE A3

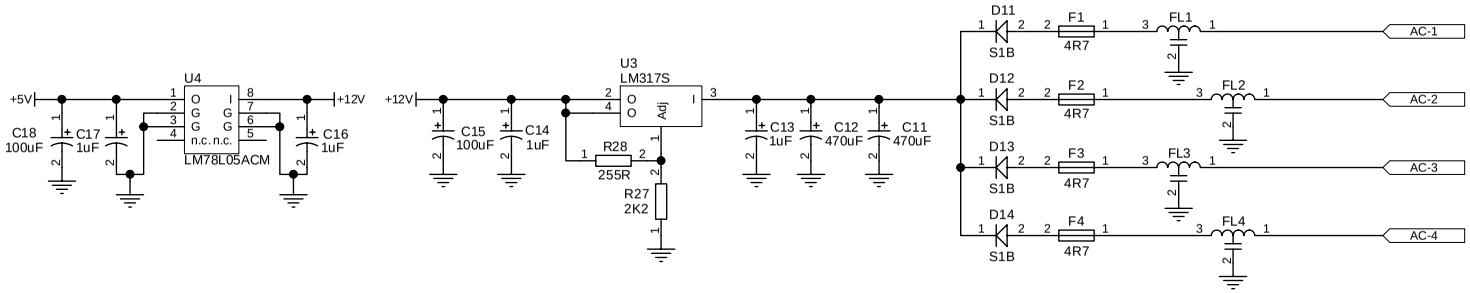
Title AMS-4370
Rear Connector Panel

SCALE N.T.S.

Drawing No. 805248

Sheet 2 of 4

IRT Electronics Pty. Ltd.
ARTARMON NSW AUSTRALIA 2064



1 07-06-2007

DRAWN K.N.
CHECKED
ENG. APP.
Revision: 1
Date: 17-Oct-2007

IRT

SIZE A3

Title AMS-4370 Power Supply

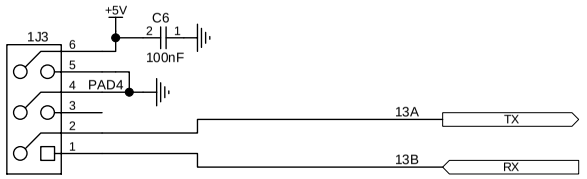
SCALE N.T.S.

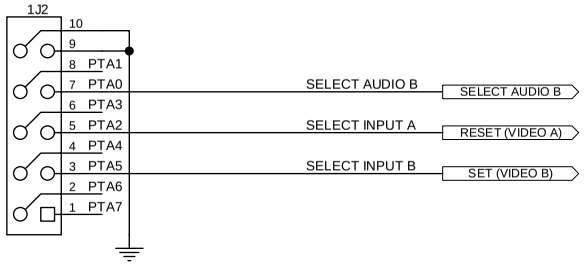
Drawing No. 805248

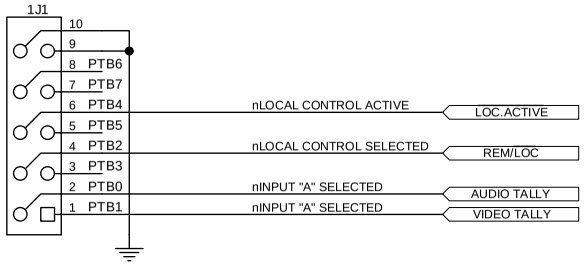
Sheet 3 of 4

IRT Electronics Pty. Ltd.
ARTARMON NSW AUSTRALIA 2064

SMU-4000
SNMP CPU Sub-Module
ASSEMBLY 804857







1 07-06-2007		IRT	
	SIZE A3	Title AMS-4370 SNMP interface	
DRAWN K.N.			
CHECKED	SCALE N.T.S.	Drawing No. 805248	Sheet 4 of 4
ENG. APP.			
Revision: 1	IRT Electronics Pty. Ltd. ARTARMON NSW AUSTRALIA 2064		
Date: 17-Oct-2007			