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IRT Eurocard

Type HDA-4521

**Dual 1 In, 3 Out HD/SD Digital
Reclocking Distribution Amplifier**

Designed and manufactured in Australia

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

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Instruction Book

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This instruction book applies to units later than S/N 0810001.

Operational Safety:

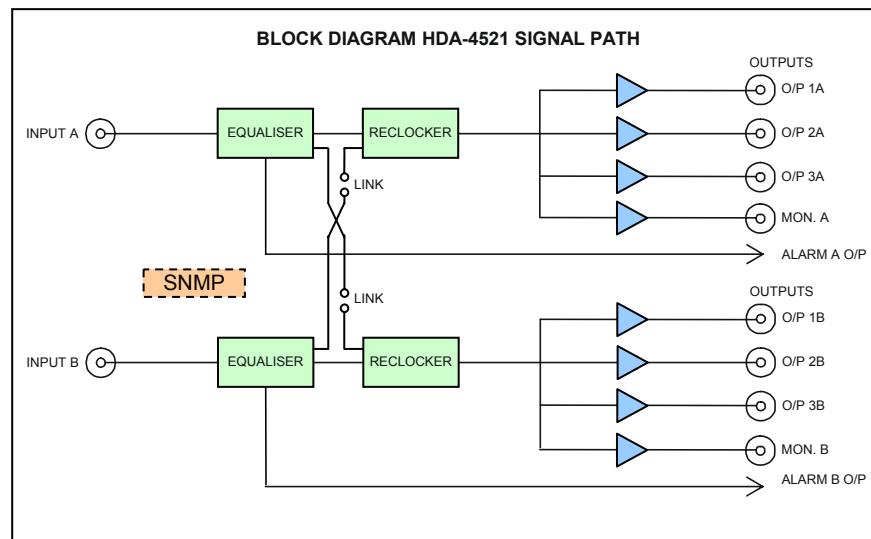
WARNING

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 HDA-4521 Dual 1 In, 3 Out HD/SD Digital Reclocking Distribution Amplifier

General Description



The HDA-4521 HD/SD dual serial digital reclocking video distribution amplifier provides the user with a single standard module to cover a wide range of distribution and monitoring functions for High Definition (HD) and/or Standard Definition (SD) digital signals. Two triple output reclocking distribution amplifiers are provided on the one card.

As well as accepting HD or SD signals, the HDA-4521 will also accept ASI signals. To provide for the polarity sensitive nature of ASI signals, all outputs of the HDA-4521 are in phase with the inputs.

Serial digital signals suffer severe deterioration over relatively short cable distances. This is especially so with the HD high data rate. The HDA-4521 provides a means of extending the working distances that can be achieved by equalising and reclocking the data mid route.

The HDA-4521 will automatically reclock either 1.485 Gb/s HD signals or lower rate 270Mb/s SD signals. Both sides of the HDA-4521 can be run independently allowing a mixture of signal types to be used.

On board link settings allow either of the inputs to feed all outputs to create a one in, six out distribution amplifier.

Front panel LEDs indicate when an input signal is present and whether the output is an HD or SD type.

Separate alarm outputs switch to ground for indication of loss of input signal or loss of power.

An optional SNMP (Simple Network Management Protocol) plug in module is available for remote monitoring and control when used in conjunction with IRT's 4000 series frame fitted with SNMP capability. Extra features are available via SNMP such as automatic switching on loss of one input to the other input.

The HDA-4521 is designed to fit IRT's 4000 series 3RU frame for use with IRT's SNMP system as well as being suitable with IRT's 1000 series 1RU Eurocard frames and may be used alongside any other of IRT's Eurocards.

Standard features:

- **3 non inverting outputs per input.**
- **Link settable for 1 in, 6 out single distribution amplifier operation.**
- **Automatic reclocking of High Definition or Standard Definition digital signals.**
- **Input equalisation > 100 m for HD, > 250 m for SD.**
- **Automatic output muting on no input.**
- **Front panel monitoring outputs, signal presence LEDs and external alarm contacts.**
- **Optional plug-in SNMP monitoring module.**

Technical Specifications

IRT Eurocard module Type HDA-4521

Input:

Number	2.
Type	1.485 Gb/s HD, or 270 Mb/s SD. (Non HD/SD rates possible with optional plug-in SNMP module installed and run in 'bypass' reclocker mode).
Impedance	75 Ohm.
Return loss	>15 dB 5 MHz to 1.485 GHz.
Equalisation	Automatic, >100 metres (typically 130m) at 1.485 Gb/s, > 250 metres (typically 300m) at 270 Mb/s for Belden 8281 or equivalent cable. (reduces to approx. 70m at 1.485 Gb/s and 270 Mb/s when LK3 (I/P A), LK4 (I/P B) is closed).

Outputs:

Number	3 per input + Front Monitor.
Signal level	800 mV \pm 10%
Impedance	75 Ohm.
Return loss	>15 dB 5 MHz to 1.485 GHz.
DC offset	Nil.

Alarms:

Signal Loss on either channel or power failure	Switch to ground via FET transistor.
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Connectors:

BNC.

Indicators:

Power	LED (green) for +5 Vdc.
Signal present	LED (green) when signal present for each input.
Signal type	LED (green);
HD	LED (orange).
SD	

Power requirement:

Voltage	28 Vac CT (14-0-14) or \pm 16 Vdc
Consumption	5 VA

General:

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.
Dimensions	6 HP x 3U Extended Eurocard (220 mm x 100 mm).
Finish:	Grey background, with black lettering & red IRT logo
Front panel	Detachable silk-screened PCB with direct mount connectors to Eurocard and external signals
Rear assembly	
Supplied accessories	Rear connector assembly with matching connector for alarm outputs.

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

Configuration

Link Settings:

LK1	IN	Disable Major & Minor Alarms to CDM card in frame (valid for SNMP only).
	OUT	Enable Major & Minor Alarms to CDM card in frame (valid for SNMP only).
LK2		Not Used.
LK3	IN	Input "A" equalisation reduced to approximately 70m, for use in noisy environments or when short input cable is used.
	OUT	Input "A" equalisation extended to full specified rate.
LK4	IN	Input "B" equalisation reduced to approximately 70m, for use in noisy environments or when short input cable is used.
	OUT	Input "B" equalisation extended to full specified rate.
LK5	IN	Input "B" goes to Output "A".
	OUT	Input "A" goes to Output "A" (default).
LK6	IN	Input "A" goes to Output "B".
	OUT	Input "B" goes to Output "B" (default).

To set the HDA-4521 to act as a one input, 6 output distribution amplifier, set:

[LK5	OUT	Input "A" goes to both Outputs "A & B".
	LK6	IN	

or

[LK5	IN	Input "B" goes to both Outputs "A & B".
	LK6	OUT	

NOTE: If using the HDA-4521 with SNMP, with the possible exception of LK1, all links should be in the OUT position, otherwise SNMP control will not take proper effect even though indications may say otherwise.

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.

Signal Connections:

The rear assembly has two inputs designated as "Input A" and "Input B", and two sets of three outputs corresponding to outputs A and B. All inputs and outputs are 75 Ω BNC type for connection with high quality 75 Ω coaxial cable. Both inputs are self-terminating. No loop through facility is available.

Each input is independent from the other. 1.485 Gb/s HD and 270 Mb/s SD can both be run simultaneously, likewise both inputs can be HD or both can be SD.

It is recommended that unused inputs on the rear panel be terminated with 75 Ω termination.

Monitoring is possible via front panel "CH A" & "CH B" BNC connectors. The presence of signals is indicated by the "PRESENT" front panel LEDs A & B (green). Reclocked outputs are designated by the front panel "OUT A" and "OUT B" LEDs as being either HD (green) or SD (orange). If using SNMP it is possible to bypass the reclocking circuits so that rates other than HD or SD can be used. If doing so the HD/SD front panel LEDs will not illuminate, unless HD or SD rates are passed in this situation.

Outputs A can be switched to Input A or Input B, likewise outputs B can be switched to input A or input B, depending on link settings as per the *Configuration* section of this instruction book.

If the HDA-4521 has the optional plug-in SNMP module (SMU-4000) installed and is run in an IRT frame fitted with SNMP control, it is possible to change the configuration settings remotely via SNMP, and to also use the HDA-4521 as a Main/Standby DA. Details are described in the *HDA-4521 SNMP Functions* section of this instruction book.

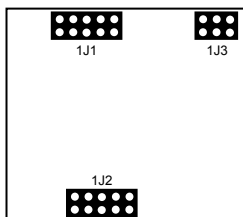
Alarm Output Connection:

A 4 pin phoenix style screw connector is provide on the rear assembly for an alarm connection for loss of input or loss of power. Inputs A and B both have separate alarm outputs on pins 1 and 2 respectively. Pins 3 and 4 are ground. The alarms switch to ground when activated. Both alarms operate independently from each other.

The presence of the internal +5 Vdc supply is indicated by the 'DC' front panel LED (green).

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.

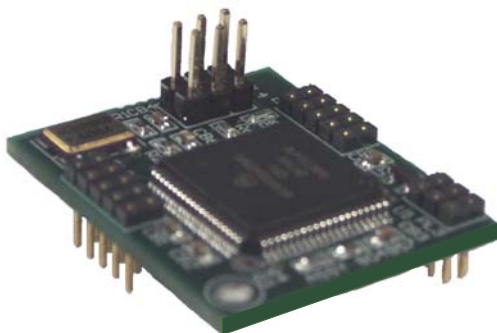
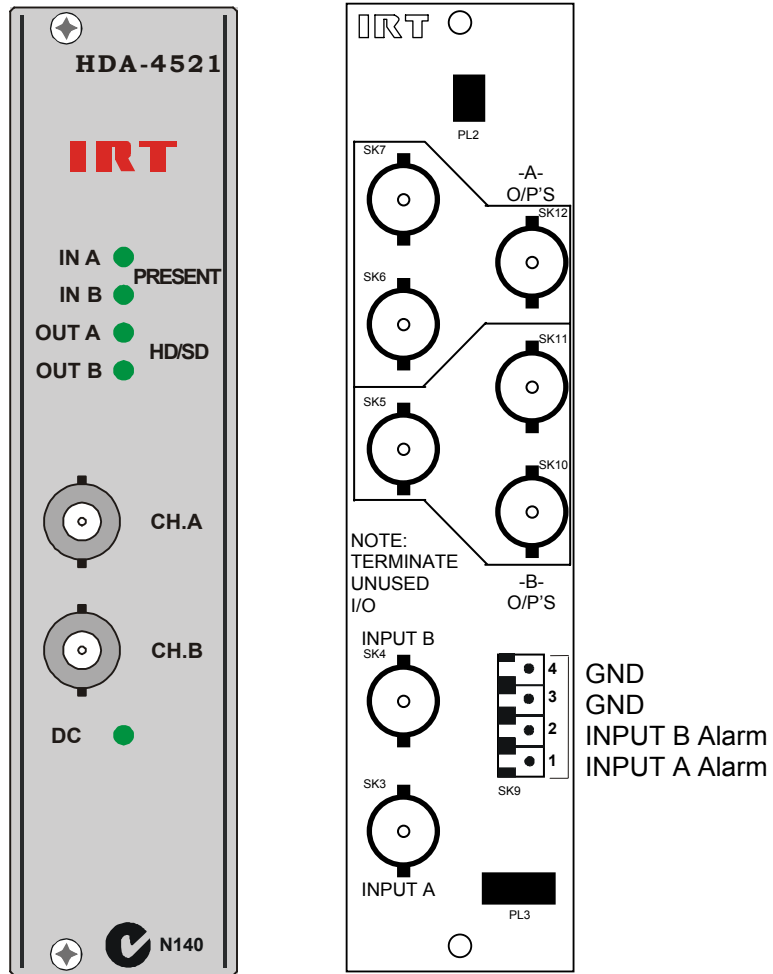


Figure 1: SMU-4000 module

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.



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.

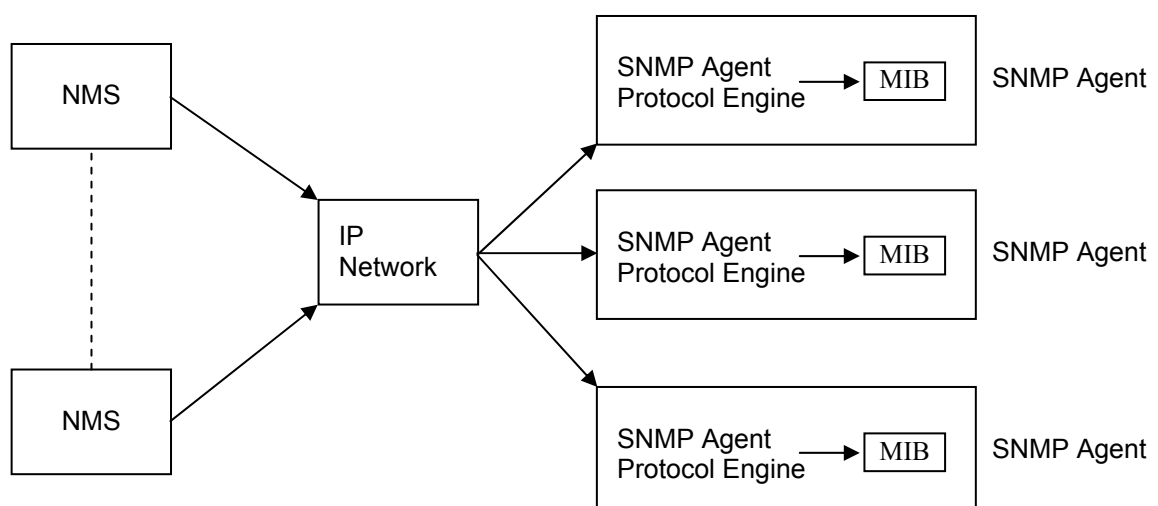
An *NMS* polls, or communicates with, an *agent*. An *agent* is a network management software module that resides in a *managed device*. An *agent* has local knowledge of management information and translates that information into a form compatible with SNMP. The *agent*, therefore, acts as an interface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

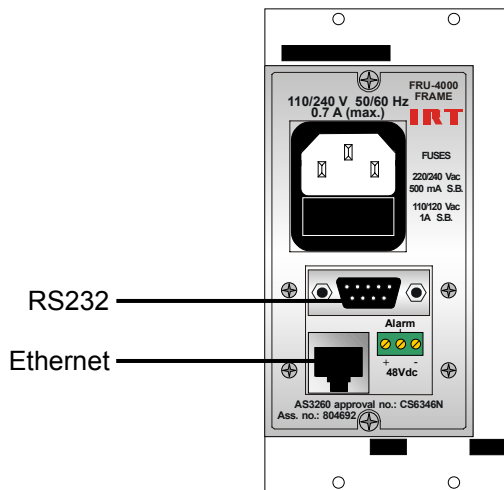
IRT Electronics currently employs SNMPv1 with its SNMP capable frames. The frame acts as an *agent* when fitted with a CDM-xxxx module. This module has its own designated slot next to the power supply so as to not affect the number of modules that the frame will take. Communication between the *NMS*,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

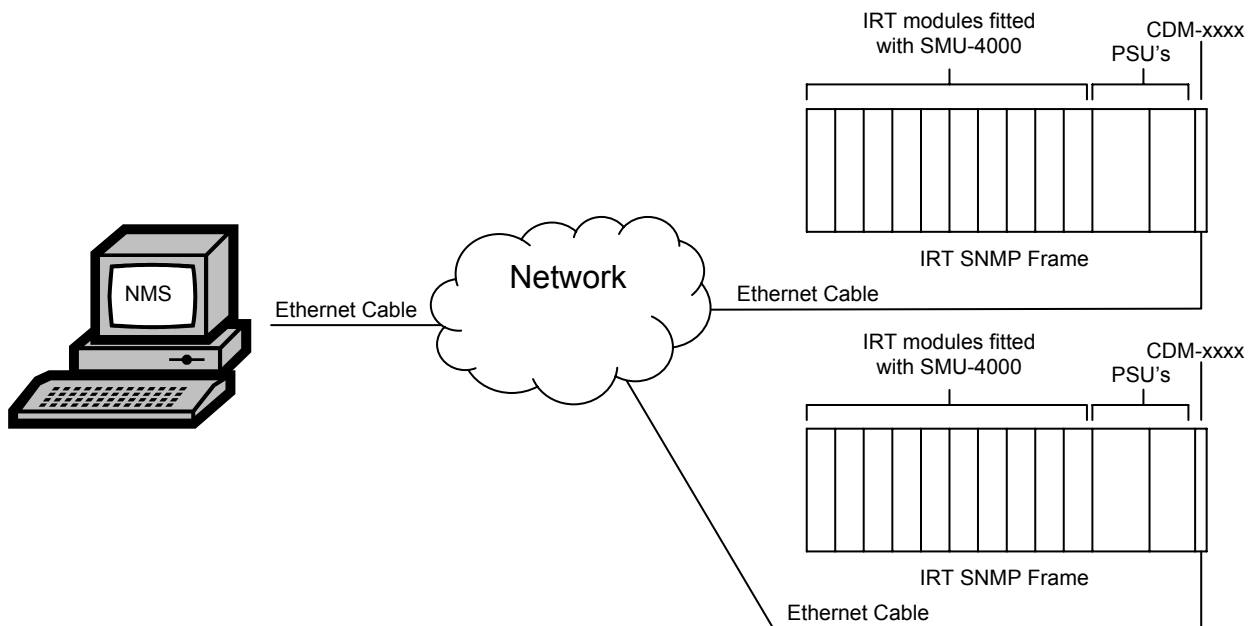
Frame parameters, such as Name, Address and Location, are set via an RS232 interface, a D9 connector on the rear of the frame below the mains inlet. A software terminal emulator, such as Tera Term or HyperTerminal, is used for setting and reading the parameters of the frame.

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

HDA-4521 SNMP Functions:

With the HDA-4521 fitted with the optional plug-in SMU-4000 SNMP module, programmed with firmware to suit, and installed in an IRT frame with SNMP capability, the following can be monitored and controlled via a Network Management System (NMS):

Alarm States:

- irt4521Alarms - The current state of the Urgent and Non Urgent Alarms¹
[noAlarm (1), nonUrgentAlarm (2), urgentAlarm (3)];

Status:

- irt4521InputAPresent - An indication that the 'A' input signal is present [notPresent (1), present (2)];
irt4521InputBPresent - An indication that the 'B' input signal is present [notPresent (1), present (2)];
irt4521OutputARate - An indication of the data rate² of the 'A' outputs [sd (1), hd (2), notLocked (3)];
irt4521OutputBRate - An indication of the data rate² of the 'B' outputs [sd (1), hd (2), notLocked (3)];
irt4521OutputASource - An indication of the input selected for the 'A' outputs [inputA (1), inputB (2)];
irt4521OutputBSource - An indication of the input selected for the 'B' outputs [inputA (1), inputB (2)];

Configuration:

- irt4521InputAAlias - An alias (name) for input 'A' can be set and read (63 character maximum);
irt4521InputBAlias - An alias (name) for input 'B' can be set and read (63 character maximum);
irt4521OutputASelect - The input source for the 'A' outputs³ [inputA (1), inputB (2), auto (3)];
irt4521OutputBSelect - The input source for the 'B' outputs⁴ [inputA (1), inputB (2), auto (3)];
irt4521OutputAReclock - Enable the reclocker⁵ for the 'A' outputs [enable (1), bypass (2)];
irt4521OutputBReclock - Enable the reclocker⁵ for the 'B' outputs [enable (1), bypass (2)];
irt4521InputAEqualiser - Reduce the input 'A' equaliser gain for use with short cable length or use in a noisy environment⁶ [normal (1), reduce (2)];
irt4521InputBEqualiser - Reduce the input 'B' equaliser gain for use with short cable length or use in a noisy environment⁶ [normal (1), reduce (2)];
irt4521Reset - Unit reset control. A set with a value of 2 sent to this OID will cause a system reset to occur. When queried returns 1;
irt4521InputAPresTrapEnable - Trap automatically sent, if enabled, on loss or re-application of input A [disabled (1), enabled (2)];
irt4521InputBPresTrapEnable - Trap automatically sent, if enabled, on loss or re-application of input B [disabled (1), enabled (2)];
irt4521OutputARateTrapEnable - Trap automatically sent, if enabled, when output 'A' rate changes [disabled (1), enabled (2)];
irt4521OutputBRateTrapEnable - Trap automatically sent, if enabled, when output 'B' rate changes [disabled (1), enabled (2)].

NOTE: 1 Urgent Alarm occurs on loss of both inputs, Non-Urgent Alarm occurs on loss of either input.

2 Not locked indication occurs when output signal rate is neither HD nor SD. Requires output reclocker to be in bypass mode to allow non HD/SD rate signals through. If non HD/SD rate is inputted, front panel HD/SD LEDs will not illuminate, even if output reclockers⁵ are in bypass mode. HD/SD LEDs will still correctly illuminate in bypass reclocker mode if HD or SD is outputted.

3 Auto is for automatic changeover of output 'A' to alternative input on loss of current input.

4 Auto is for automatic changeover of output 'B' to alternative input on loss of current input.

5 Reclocking enabled state only allows HD or SD signals to be outputted. Bypass² state allows rates other than standard 1.485Gb/s HD or 270Mb/s SD to pass through.

6 Reduces to approx. 70m for both HD and SD signals using Belden 8281 or equivalent cable.

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