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IRT Eurocard

Type HDA-4510

1.485 Gb/s HD 6 O/P Reclocking Distribution Amplifier

Designed and manufactured in Australia

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

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1.485 Gb/s HD 6 O/P
Reclocking Distribution Amplifier

Instruction Book

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This instruction book applies to units later than S/N 0506001.

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.

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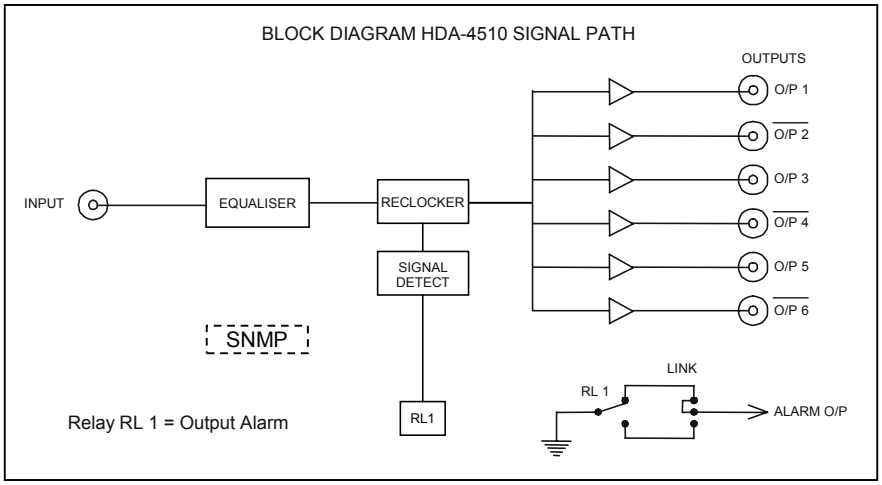
Type HDA-4510
1.485 Gb/s HD 6 O/P
Reclocking Distribution Amplifier

General Description



The HDA-4510 1.485 Gb/s serial digital video reclocking distribution amplifier provides the user with a single standard module to cover a wide range of distribution and monitoring functions for High Definition (HD) digital signals.

As well as accepting an HD signal, the HDA-4510 will also accept Standard Definition (SD) rates such as SDI. ASI is also possible, however as three of the six outputs are inverted only the non-inverted output ports are suitable for ASI.

Serial digital signals suffer severe deterioration over relatively short cable distances. This is especially so with the HD high data rate. The HDA-4510 provides a means of extending the working distances that can be achieved by equalising and re-transmitting the data mid route.

The HDA-4510 will automatically reclock either a 1.485 Gb/s HD signal or a lower rate SD signal and automatically adjust the output driver slew rate to suit.

Front panel LEDs indicate when an input signal is present and also whether it is either an HD or SD type of signal.

A relay alarm output, with a selectable N/O or N/C switch to ground contact, is available 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 when used in conjunction with IRT's 4000 series frame fitted with SNMP capability.

The HDA-4510 is designed to fit IRT's 4000 series frame for use with IRT's SNMP system as well as being suitable with IRT's Standard 1000 and 3000 series Eurocard frames and may be used alongside any other of IRT's analogue or digital Eurocards.

Standard features:

- **Automatic selection of either High Definition or Standard Definition digital signals**
- **6 reclocked outputs**
- **Automatic input equalisation**
- **Locked signal presence LED and external relay alarm contact**
- **Optional plug-in SNMP monitoring module**

Technical Specifications

IRT Eurocard module
Type HDA-4510

Input:

Number	1.
Type	1.485 Gb/s High Definition, or 270 Mb/s Standard Definition.
Impedance	75 Ohm.
Return loss*	>20 dB 5 MHz to 270 MHz, >15 dB to 1.485Gb/s.
Equalisation	Automatic, >250 metres at 270 Mb/s, >100 metres at 1.485 Gb/s for Belden 8281 or equivalent cable.

Outputs:

Number	6 HD or SD, output slew rate automatically selected.
Signal level	800 mV ± 10%
Impedance	75 Ohm.
Return loss*	>20 dB 5 MHz to 270 MHz, >15 dB to 1.485Gb/s.
DC offset	Nil.

Performance:

Output rise time	<200 ns, (180 ns typically).
Residual Jitter	<0.15 UI at 1.485 Gb/s (measured with up to 100m of Belden 8281 or equivalent cable)

Connectors:

BNC.

Indicators:

Power	LED (green) for +5 Vdc.
Signal present	LED (green) when signal present.
HD	LED (green) when input signal is 1.485 Gb/s HD.
SD	LED (yellow) when output signal is 270, 360 or 540 Mb/s SD.

Power requirement:

Voltage	28 Vac CT (14-0-14) or ±16 Vdc
Consumption	4.0 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).
Weight	With rear assembly 385g.
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
Supplied accessories	Rear connector assembly with matching connector for alarm outputs.
Optional accessories	SMU-4000 SNMP plug-in module for use with 4000 series frame fitted with SNMP "Agent"

*** Note:** When mounted in an IRT 1000 or 4000 series frame.

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

Configuration

Link Settings:

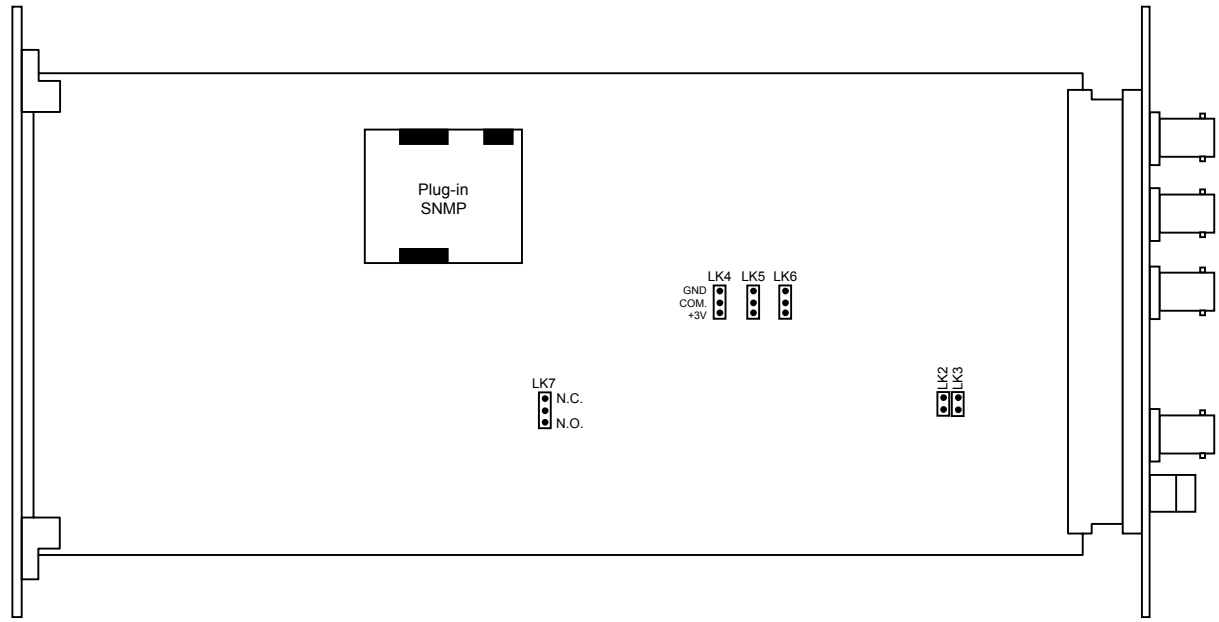
LK2	IN	Reclocker set for HD or SD operation (Default position IN).
	OUT	Reclocker automatically bypassed on lock loss.
LK3	IN	Selects Manual PLL rate.
	OUT	Selects Auto PLL rate (Default position OUT, LK3 not installed).
LK4, LK5, LK6		Set manual PLL rate. **Must be left open when Auto PLL selection (LK3 OUT) used.**

Rate (Mb/s)	LK4	LK5	LK6
143	0	0	0
270	0	1	0
360	1	1	0
540	0	0	1
1485	1	0	1

LK7	N.C.	Output alarm switches to ground on loss of input, or loss of power.
	N.O.	Output alarm switches (breaks) from ground on loss of input, or loss of power.

Location of links & user settings

The following location diagram is not to scale and is intended only to assist in finding the location of links and other settings, which may need to be changed by the user during *Configuration*.



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.

Digital Input and Outputs:

Input and outputs are all 75 Ω BNC type for connection with high quality 75 Ω coaxial cable suitable for either 1.485 Gb/s high definition digital signals for HD use, or for 270 Mb/s standard definition signals for SD use.

Ensure that links settings are correctly set for the mode of operation required as described in the *Configuration* section of this manual.

Alarm Output Connection:

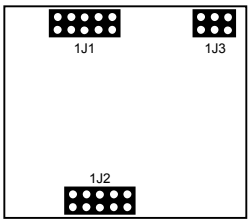
A normally open, or normally closed, 2-pin connector is provided on the rear assembly for an alarm connection on loss of signal input or loss of power. Pin 1 is permanently tied to ground. During an alarm condition an on board relay contact either shorts or open circuits pin 2 to/from ground dependent on the position of link LK7, as described in the *Configuration* section of this manual.

Front Panel Indicators:

Front panel LED's indicate the presence of an input signal (SIG – Green); whether the input signal is an HD signal (HD – Green) or an SD signal (SD – Yellow); and the presence of power to the module (DC – 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 4000 series frame fitted with a CDM-4000 SNMP agent and being interrogated by a suitable Network Management System.

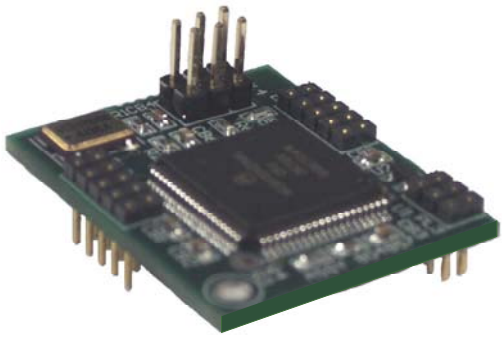


Figure 1: SMU-4000 module

HDA-4510 SNMP Functions:

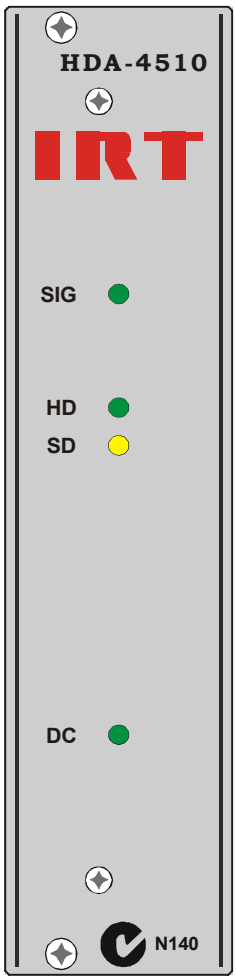
With the HDA-4510 installed in an IRT 4000 series frame with SNMP capability, the HDA-4510 can be interrogated by an SNMP Network Management System (NMS).

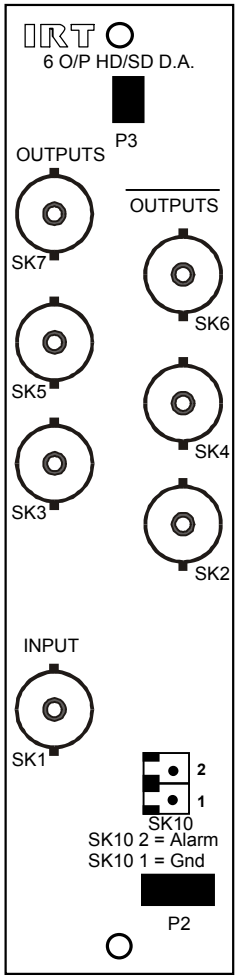
The following SNMP functions are capable of being monitored by an NMS:

An indication that an input signal is present;
An indication of the current state of the Urgent Alarm;
Trap automatically sent, if enabled, when an Urgent Alarm occurs or is restored;
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 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.

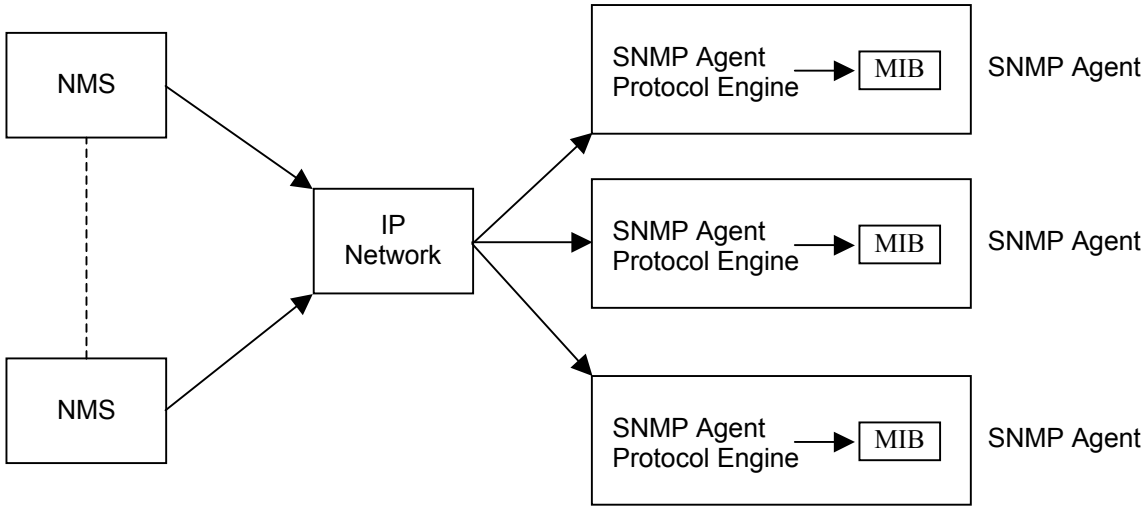
An *NMS* polls, or communicates with, an *agent*. An *agent* is a network management software module that resides in a *managed device*. An *agent* has local knowledge of management information and translates that information into a form compatible with SNMP. The *agent*, therefore, acts as an interface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

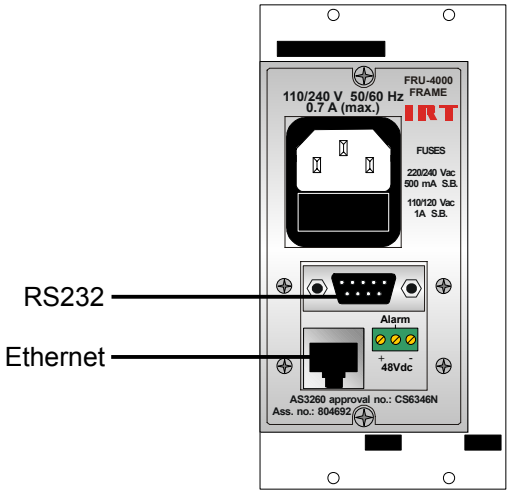
IRT Electronics currently employs SNMPv1 with its 4000 series frame. The frame acts as an *agent* when fitted with a CDM-4000 module. This module has its own designated slot next to the power supply so as to not affect the number of modules that the frame will take. Communication between the *NMS*, the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

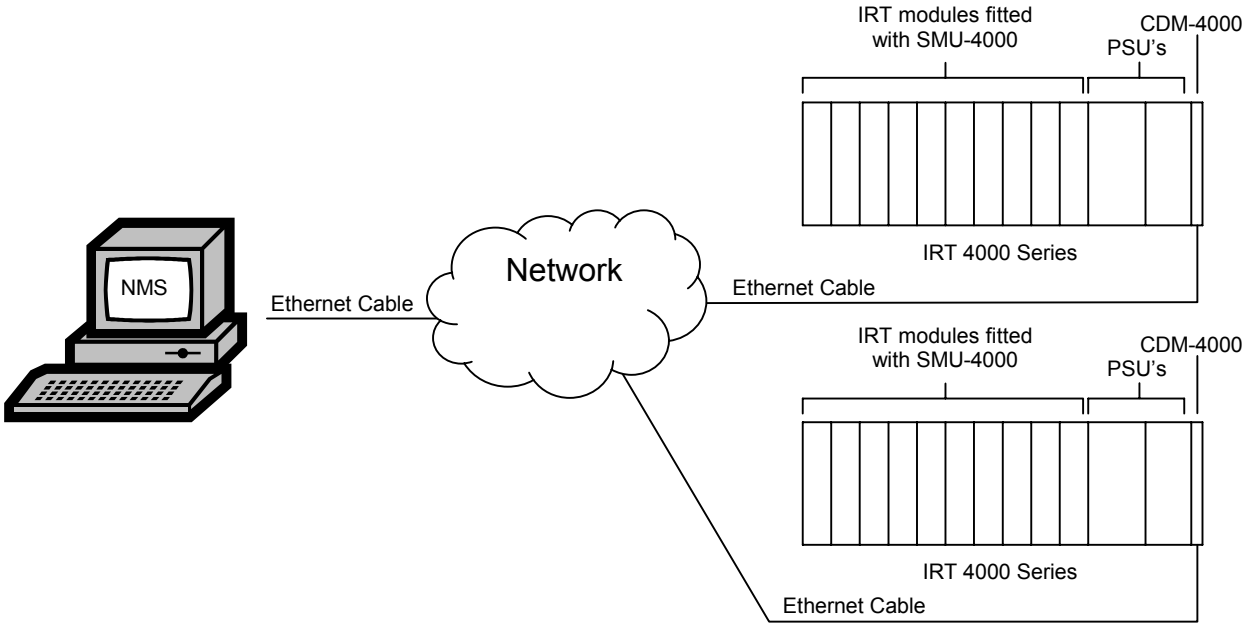
Frame parameters, such as Name, Address and Location, are set via an RS232 interface, a D9 connector on the rear of the frame below the mains inlet. A software terminal emulator, such as Tera Term or HyperTerminal, is used for setting and reading the parameters of the frame.

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.

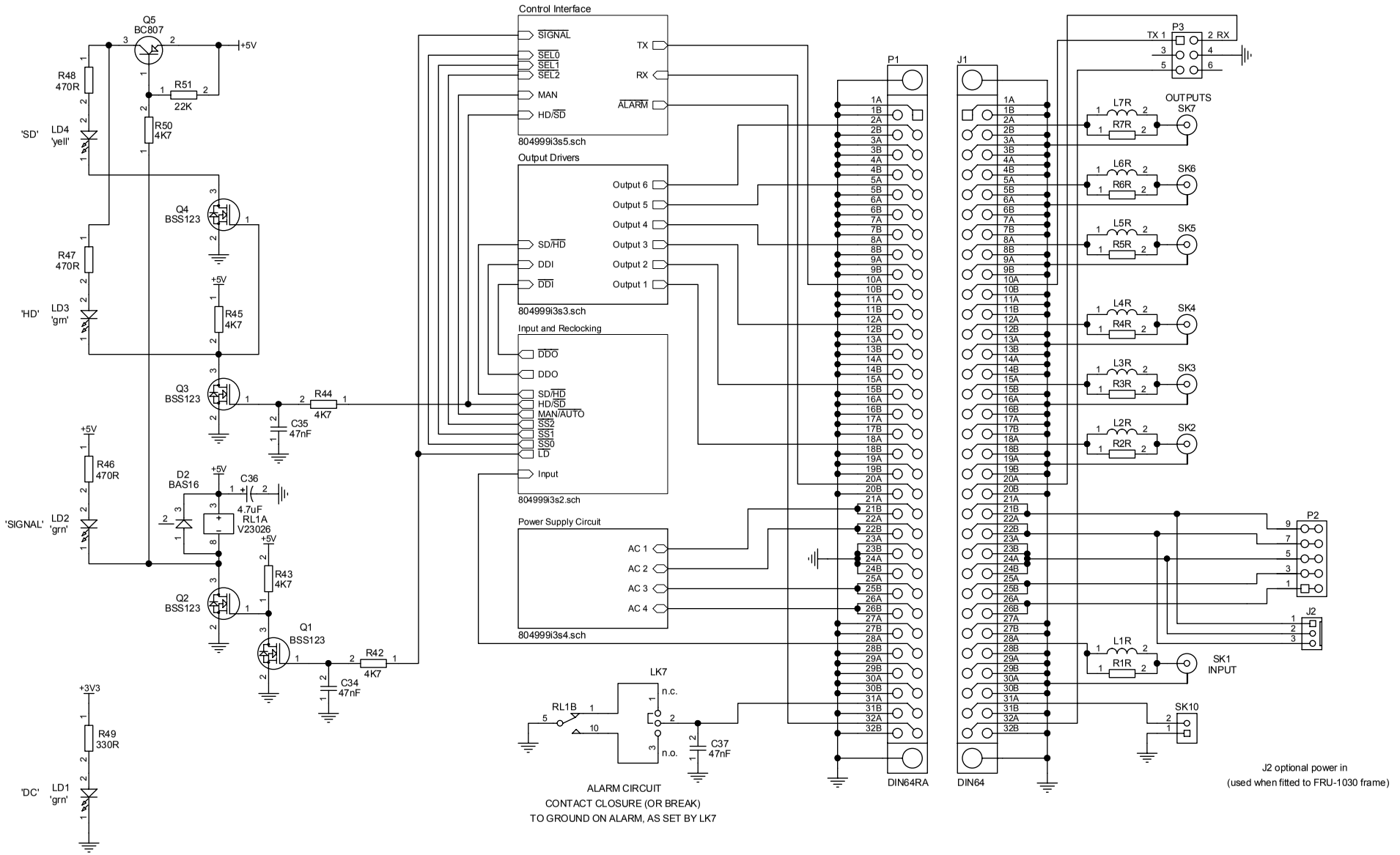
The equipment should be returned **to the agent who originally supplied the equipment** or, where this is not possible, to IRT direct as follows.

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 List Index

Drawing #	Sheet #	Description
804999	1	HDA-4510 HD/SD Distribution Amplifier Schematic Diagram



1	11-10-2004	
2	08-06-2005	ECR1794
3	18-10-2005	ECR1823

IRT

SIZE A3	Title HDA-4510 HD/SD Distribution Amplifier	
DRAWN K.N.		
CHECKED	SCALE N.T.S.	Drawing No. 804999 — Sheet 1 of 5
ENG. APP.		
Revision: 2	IRT Electronics Pty. Ltd.	
Date: 18-Jul-2006	ARTARMON NSW AUSTRALIA 2064	