IRT-6400-DAA

AES/EBU Distribution Amplifier

User Manual

Revision History:

Revision	Date	By	Change Description	Applicable to:
00	07/05/2014	AL	Original Issue.	Firmware ≥ Revision 2.1

Table of Contents:

This instruction book applies to units fitted with firmware ≥ Revision 2.1.

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.

openGear® INTRODUCTION

Developed by Ross Video, openGear® is a standard where various manufacturers can design their equipment to fit a common frame allowing the end user to mix and match the various openGear® cards available in the market place together in one frame. This allows a single frame to be used instead of multiple different vendor's frames that each would otherwise be using their own proprietary standard.

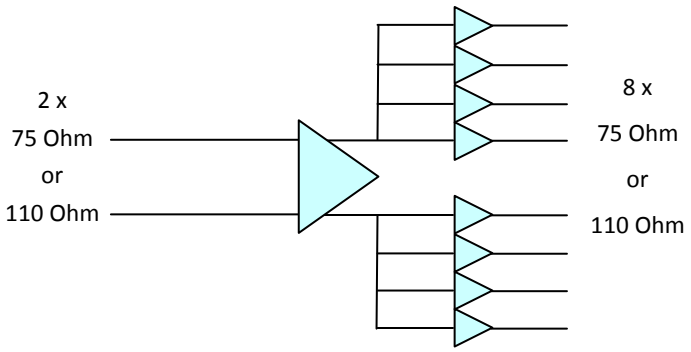
A simple to use monitoring and control software called DashBoard™ is a free program downloadable from the openGear® website (www.opengear.tv) that allows the user to remotely monitor and control an openGear® type card fitted within an openGear® frame that meets the openGear® standard for DashBoard™ control. A link is also supplied via the IRT Electronics website (www.irtelectronics.com) under the openGear® navigation section.

IRT Electronics' openGear® cards are designed to meet the openGear® standard for mounting within the openGear® OG3-FR frame and its earlier version DFR-8300 frame, and is fully compliant with DashBoard™ control.

The openGear® frame manual, DashBoard™ control software and information regarding the frame's power supplies, controller card and frame accessories are available for download at the openGear® website.

GENERAL DESCRIPTION

BLOCK DIAGRAM IRT-6400-DAA SIGNAL PATH



The IRT-6400-DAA is designed to provide a solution to most AES/EBU digital audio signal distribution requirements.

The IRT-6400-DAA can be configured as either a single 1 x 8 DA or a dual independent 1 x 4 DA.

The IRT-6400-DAA will operate at AES sample rates from 16 to 96 kHz. When operating in the 1 x 8 mode, the alternate input can be used as a reference to which the incoming AES audio can be resampled. An internal reference can be applied to either channel to resample to 48 kHz.

A choice of rear assembly is available for either 110 Ohm or 75 Ohm use.

The IRT-6400-DAA is designed to fit the openGear® standard 2RU frames which allow a mixture of cards from various manufacturers to be mounted within the same frame.

The DashBoard™ control software is available as a free download.

Standard features:

- **Dual 1 x 4 or 1 x 8 outputs.**
- **Choice of 75 or 110 Ohm inputs and outputs by changing rear connector assembly.**
- **All inputs and outputs transformer coupled.**
- **Digital circuit re-shapes output and restores level.Selectable resampling to alternate input or local reference.**
- **No cable compensation adjustments required.**
- **DashBoard™ software monitoring and control.**

TECHNICAL SPECIFICATIONS

Inputs:

Number		2.
Type		110 Ω balanced (standard); or 75 Ω unbalanced. Selected by choice of rear assembly and links on PCB.
Format		AES3-1992 standard.
Input level		200 mVp-p minimum.
Cable length		> 500 m 75 Ω (Belden 8281). > 200 m 110 Ω (AES digital high quality shielded pair).

Outputs:

Number		8 (2 banks of 4 outputs).
Type	**IRT-6400-BAL**	110 Ω balanced > 3 Vp-p (standard); or
	IRT-6400-UBAL	75 Ω unbalanced > 1 Vp-p (optional).
Format		AES3-1992 standard.

Performance:

AES sample rate	16 to 96 kHz continuous.
Resampled	16 to 96 kHz reference input or 48 kHz internal reference.
Rise & fall times	< 20 ns.

Connectors:

Balanced	Phoenix 3 terminal plug-in blocks.
Unbalanced	BNC.

Power Requirements:

Voltage	+ 12 Vdc.
Power consumption	< 2.4 VA.

Other:

Temperature range	0 - 50° C ambient.
Mechanical	Suitable for mounting in an openGear® 2RU rack chassis.
Dimensions (openGear® standard)	33.6 mm x 2U x 325 mm;
Supplied accessories	Choice of rear connector assembly (IRT-6400-BAL or IRT-6400-UBAL).

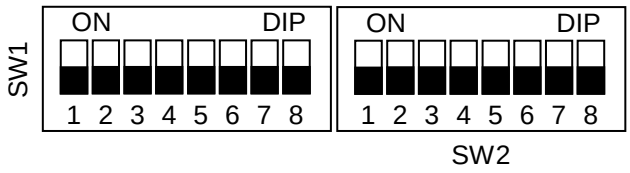
Ordering	**IRT-6400-DAA**	IRT-6400-DDA, programmed with DashBoard™ control + rear assembly.
	IRT-6400-BAL	Rear Assembly - 110 Ω balanced inputs and outputs (standard).
	IRT-6400-UBAL	Rear Assembly - 75 Ω unbalanced inputs and outputs.
	(**IRT-6400-BAL+UBAL**	Rear Assembly - 110 Ω balanced inputs and 75 Ω unbalanced outputs).
	(**IRT-6400-UBAL+BAL**	Rear Assembly - 75 Ω unbalanced inputs and 110 Ω balanced outputs).

CONFIGURATION

The IRT-6400-DAA may be configured as a Single 1 In, 8 Out or a Dual 1 In, 4 Out distribution amplifier either locally via on board DIP switch settings, or remotely via DashBoard™ or SNMP.

To configure IRT-6400-DAA via DashBoard™ or via SNMP, DIP switch Sw2-8 must be set to ON.

DIP Switch settings:



SW1-1 OFF Single 1x8 mode.
ON Dual 1x4 mode.

SW1-2[1] OFF Outputs NOT resampled (output rate matches input rate).
ON Outputs resampled (48 kHz default in Dual mode; as per SW1-3 in Single mode).

SW1-3[2] OFF 48 kHz resampling rate.
ON Reference input resampling rate.[3]

SW1-4 Not Used.
SW1-5 Not Used.
SW1-6 Not Used.
SW1-7 Not Used.
SW1-8 Not Used.

SW2-1[4] OFF Input A primary input (input B acts as reference input, if applicable).
ON Input B primary input (input A acts as reference input, if applicable).

SW2-2[5] OFF B Outputs not resampled (output rate matches input rate).
ON B Outputs resampled to 48kHz.

SW2-3 Not Used.
SW2-4 Not Used.
SW2-5 Not Used.
SW2-6 Not Used.
SW2-7 Not Used.

SW2-8 OFF DIP Switch control. Settings as per DIP switch settings.
ON DashBoard™/SNMP control. Settings as per DashBoard™ or SNMP settings.

NOTE:

1 In Single 1x8 mode SW1-2 applies to both A and B outputs.
In Dual 1x4 mode SW1-2 applies to A outputs only.

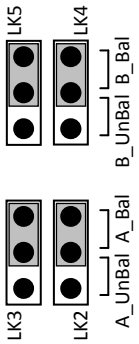
2 SW1-3 only applicable in Single 1x8 mode. Not used in Dual 1x4 mode.

3 If IRT-6400-DAA set to operate with a reference input and no reference input is actually present, no resampling takes place – output rate matches primary input rate.

4 SW2-1 only applicable in Single 1x8 mode. Not used in Dual 1x4 mode.

5 SW2-2 only applicable in Dual 1x4 mode. Not used in Single 1x8 mode.

Link settings:



The AES/EBU inputs can be set for either 110 Ω balanced (3 pin phoenix connector) or 75 Ω unbalanced (BNC), dependent upon the type of rear assembly chosen. On board link settings, both LK2 and LK3 for IN-A and both LK4 and LK5 for IN-B, need to be set for either 110 Ω balanced terminating or 75 Ω unbalanced terminating to match the input type of the chosen rear assembly.

Single 1 In, 8 Out Quick Set-up Guide:

Be sure to set links LK2, LK3, LK4 & LK5 to match the chosen rear assembly's input type – balanced or unbalanced.

ChAx8 - Input A to all 8 Outputs (4 x Output A and 4 x Output B) Non-Resampling DA:

SW1-1 = OFF Single 1 In, 8 Out DA mode.
SW1-2 = OFF Outputs NOT resampled (output rate matches input rate).
SW2-1 = OFF Input A primary input.
SW2-8 = OFF DIP Switch control. Settings as per DIP switch settings.

Note that it is also possible to set Input B to all 8 Outputs, if desired.

ChBx8 - Input B to all 8 Outputs (4 x Output A and 4 x Output B):

SW1-1 = OFF Single 1 In, 8 Out DA mode.
SW1-2 = OFF Outputs NOT resampled (output rate matches input rate).
SW2-1 = ON Input B primary input.
SW2-8 = OFF DIP Switch control. Settings as per DIP switch settings.

ChAx8 - Input A to all 8 Outputs (4 x Output A and 4 x Output B) Resampling DA:

SW1-1 = OFF Single 1 In, 8 Out DA mode.
SW1-2 = ON Outputs resampled to that of SW1-3 setting.
SW1-3 = OFF 48 kHz resampling rate.
= ON Reference input resampling rate[3].
SW2-1 = OFF Input A primary input; Input B reference input.
SW2-8 = OFF DIP Switch control. Settings as per DIP switch settings.

Note that it is also possible to set Input B to all 8 Outputs, if desired.

ChBx8 - Input B to all 8 Outputs (4 x Output A and 4 x Output B):

SW1-1 = OFF Single 1 In, 8 Out DA mode.
SW1-2 = ON Outputs resampled to that of SW1-3 setting.
SW1-3 = OFF 48 kHz resampling rate.
= ON Reference input resampling rate[3].
SW2-1 = OFF Input B primary input; Input A reference input.
SW2-8 = OFF DIP Switch control. Settings as per DIP switch settings.

NOTE: 3 If IRT-6400-DAA set to operate with a reference input and no reference input is actually present, no resampling takes place – output rate matches primary input rate.

Dual 1 In, 4 Out Quick Set-up Guide:

Note that in Dual 1 In, 4 Out mode, each half of the IRT-6400-DDA behaves as an independent DA, which means that each input can be set with independent resampling mode settings.

Be sure to set links LK2, LK3, LK4 & LK5 to match the chosen rear assembly's input type – balanced or unbalanced.

Input A to 4 x Output A, and Input B to 4 x Output B:

SW1-1 = ON Dual 1 In, 4 Out DA mode.
SW1-2 = OFF A outputs not resampled (A output rate matches A input rate).
= ON A outputs resampled to 48 kHz.
SW2-2 = OFF A outputs not resampled (B output rate matches B input rate).
= ON B outputs resampled to 48 kHz.
SW2-8 = OFF DIP Switch control. Settings as per DIP switch settings.

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.

Installation in openGear® frame:

See details in separate manual downloadable from the openGear® website (www.opengear.tv).

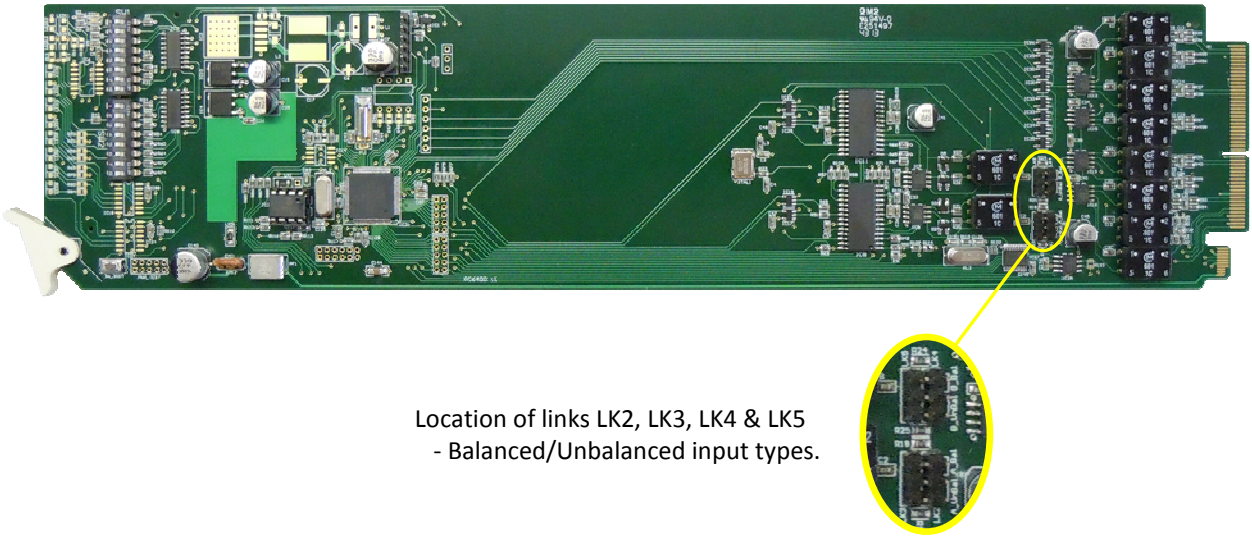
Signal Inputs & Outputs:

The IRT-6400-DAA can be configured as a single 1 IN, 8 OUT distribution amplifier, or as dual 1 IN, 4 OUT distribution amplifiers as described in the *Configuration* section of this handbook. If set up for a 1 IN, 8 OUT distribution amplifier, either input can be configured as the primary input. The other input is not used except when the unit is set up to act with a reference input to resample to. See the *Operation* section of this manual for a complete description.

The standard rear assembly, IRT-6400-BAL, Inputs and Outputs are 110 Ω 3-pin Phoenix type for connection with twisted pair audio or data cable. Optionally the IRT-6400-UBAL rear assembly inputs and outputs are 75 Ω BNC connectors for use with high quality 75 Ω coaxial cable. If balanced inputs and unbalanced outputs, or unbalanced inputs and balanced outputs are required other rear assembly options are available.

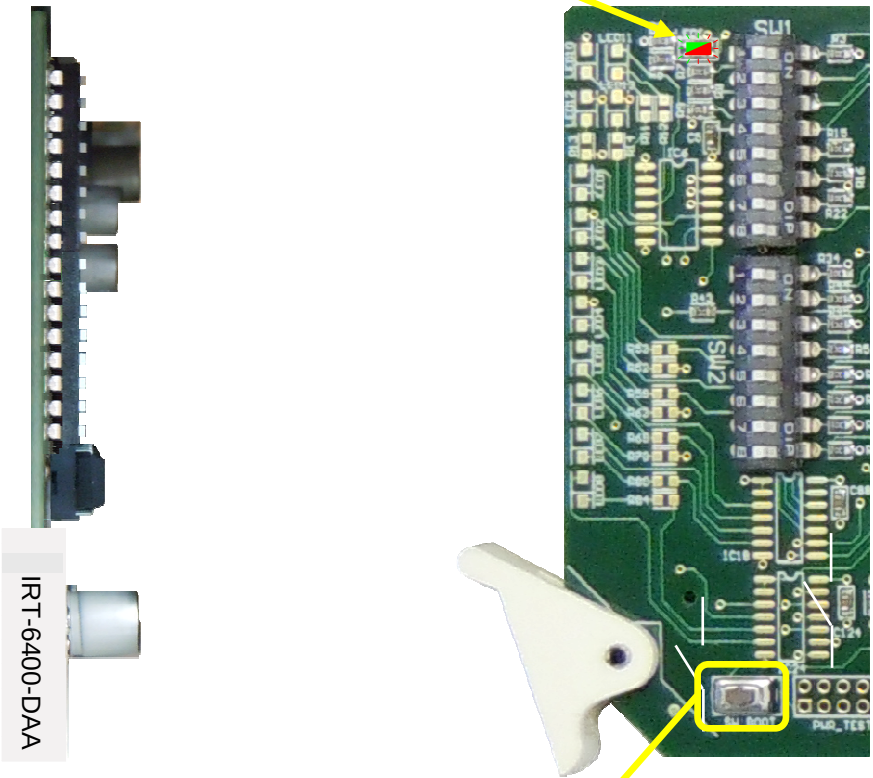
On board link settings must be set to match the input type – 110 Ω balanced or 75 Ω unbalanced, as described in the *Configuration* section of this manual. There are no link settings for the output type.

Switch & Link Locations



Location of links LK2, LK3, LK4 & LK5
- Balanced/Unbalanced input types.

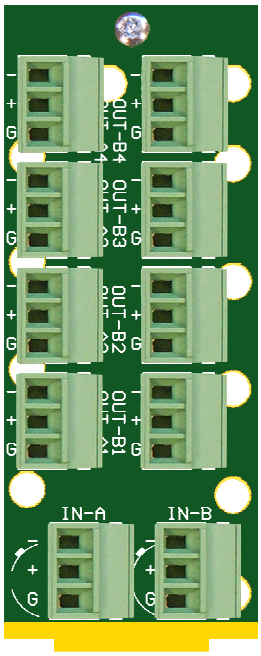
Green/Red LED: GREEN – Communication with frame's Network card.
RED - No communication with Network card / No Network card.



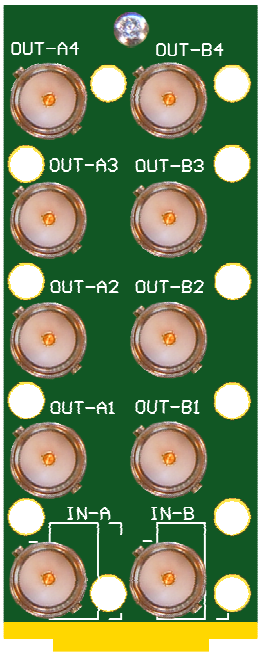
SW_boot switch: Default Reset Switch.
User set names and switch position are stored within memory so that in the event of a loss of power this information is restored on resumption of power.

If the default Reset Switch is pressed whilst powering or inserting the card, the IRT-6400-DAA will default to factory preset names and input position.

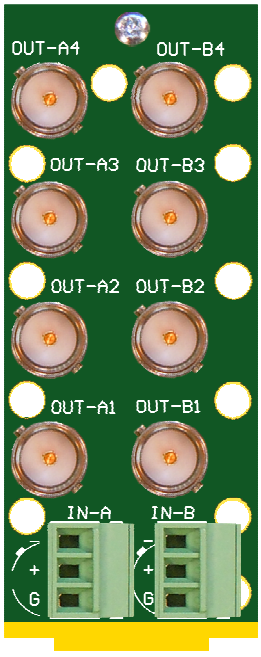
Rear Assembly Layouts



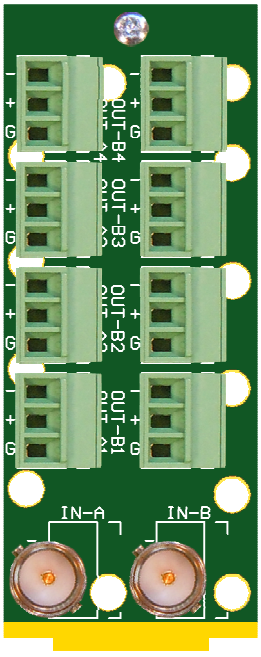
IRT-6400-BAL
Rear Assembly
(Standard)



IRT-6400-UBAL
Rear Assembly
(Optional)



IRT-6400-BAL+UBAL
Rear Assembly
(Optional)



IRT-6400-UBAL+BAL
Rear Assembly
(Optional)

OPERATION

Single 1 In, 8 Out Mode:

With the IRT-6400-DAA set-up in the single 1 In, 8 Out mode with input 'A' as the primary input, 'IN A' goes to all 8 outputs. Depending on the DIP switch settings, the input AES signal will either pass through at its current rate, be resampled to 48 kHz, or be resampled to match a reference AES signal that is connected to 'IN B'. If the IRT-6400-DAA has been setup with 'IN B' acting as a reference input and no AES signal has been connected to 'IN B' then no resampling takes place.

Likewise the IRT-6400-DAA can be set up with 'IN B' acting as the primary input and 'IN A' acting as the reference input.

Dual 1 In, 4 Out Mode:

With the IRT-6400-DAA set-up in the dual 1 In, 4 Out mode, 'IN A' feeds the 'A' outputs and 'IN B' feeds the 'B' outputs. Depending on the DIP switch settings, the input AES signals will either pass through at their own current rates, or be resampled to 48 kHz. There are no reference inputs when operating in the dual 1 IN, 4 Out mode.

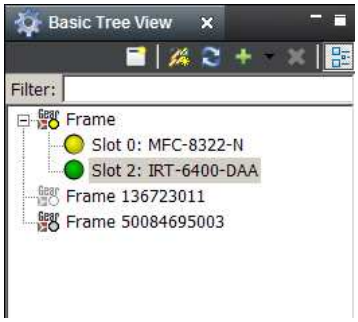
Configuration of the IRT-6400-DAA is by either on board DIP switch settings, via DashBoard™ control, or via SNMP (Simple Network Management Protocol).

DashBoard™ SOFTWARE CONTROL

The DashBoard™ Control and Monitoring System is a free application designed for remote control and monitoring of the openGear® platform. This is a free application downloadable from the openGear® website (www.opengear.tv). As such, configuration of the DashBoard™ program will not be described here. The DashBoard™ manual is also downloadable from the openGear® website.

IRT-6400-DAA DashBoard™ Screenshots:

Basic Tree View:



On the left the basic tree view shows the frame. With the tree structure expanded a list of cards within the frame is shown. In this example, slot position 2 is highlighted. All sections and tabs to the right of the basic tree view now relate to the card in slot position 2, in this case the IRT-6010-DDA. The name (or Alias) of the DA, in this case IRT-6400-DAA, can be set under the Configuration TAB setting.

Product TAB:

Self explanatory. Note that the Product Alias field can be set under the Configuration TAB setting.

Config TAB:

Under the Configuration TAB parameters such as Product Alias (name) and configuration settings can be set. In order for the Mode type and Sample Rate Converter settings to be set via DashBoard™, DIP switch SW2-8 must be set to ON.

Note also that the active Mode settings are highlighted in white, whereas the non active Mode settings are highlighted in yellow.

SNMP SOFTWARE CONTROL

Control via SNMP (Simple Network Management Protocol) is possible via a third party Network Management System (NMS) provided the openGear® frame is fitted with a relevant Network Management card. In the case of the OG3-FR frame the MFC-8322-NS network management card is required for SNMP control. In the case of either the DFR-8310 or DFR-8321 frames either the MFC-8310-NS or MFC-8320-NS cards are required for SNMP control. Relevant frame MIBs and card MIB required to interface to NMS software - see IRT Electronics website (www.irtelectronics.com) for MIB download.

IRT-6400-DAA SNMP Functions:

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

irt6400DAACardObjects:

- irt6400DAANumberOfCards - An indication of the quantity of IRT-6400-DAA cards fitted in the openGear® frame.

- irt6400DAAProductTable: - A table containing product information for all IRT-6400-DAA cards at this node.
  - productAlias - An indication and control of the Alias (Name) of this card.
  - boardRev - An indication of the revision of board.
  - softwareRev - An indication of the revision of software.

- irt6400DAAOutputsTable: - A table containing output status for all IRT-6400-DAA cards at this node.
  - rearAssembly - An indication of Rear Assembly Match/Mismatch status for the card.
    (1) match – card fitted to correct rear assembly within the frame;
    (2) mismatch – card fitted to wrong rear assembly within the frame.

- irt6400DAAStatusTable: - A table containing output status for all IRT-6400-DAA cards at this node.
  - controlMode - An indication of how the control of the settings of the card are made.
    (1) dashboard – configuration settings are made via DashBoard™ or SNMP;
    (2) pcbSwitches – configuration settings are made via on-board DIP switch settings.
  - snmpTrapEnable - Enabling or disabling of SNMP Traps.
    (1) snmpTrapDisable – SNMP Traps are disabled;
    (2) snmpTrapEnable – SNMP Traps are enabled.
  - mode - An indication and control of the mode of operation of the IRT-6400-DDA.
    (1) dual1x4Mode – IRT-6400-DAA set up as a dual 1x4 DA;
    (2) single1x8Mode – IRT-6400-DAA set up as a single 1x8 DA.
  - single1x8InputSelect - An indication and control of the Main and Reference inputs when in 1x8 mode.
    (1) inputA – Input A is the main input, Input B is the Reference input;
    (2) inputB – Input B is the main input, Input A is the Reference input.
    (**NOTE:** Reference input activation is dependent upon Sample Rate Converter setting)
  - single1x8SampleRateConverter - When in the 1x8 mode, an indication and control of the Sample Rate Converter.
    (1) disable – Sample Rate Converter not enabled (Output rate = Input rate);
    (2) enable – Sample Rate converter enabled (as per Resampling Rate setting).
  - single1x8ResamplingRate - If Sample Rate Converter enabled, an indication and control of the resampling rate.
    (1) referenceRate – Main input signal resampled to that of Reference input rate;
    (2) 48kHz – Main input signal resampled to 48 kHz rate.
    (**NOTE:** if set to referenceRate and no Reference input is present = no resampling)
  - dual1x4SampleRateConverterA - When in the dual 1x4 mode, an indication and control of Output A Sample Rate Converter.
    (1) disable – Sample Rate Converter not enabled (Output A rate = Input A rate);
    (2) enable – Sample Rate converter enabled (Output A resampled to 48 kHz).
  - dual1x4SampleRateConverterB - When in the dual 1x4 mode, an indication and control of Output B Sample Rate Converter.
    (1) disable – Sample Rate Converter not enabled (Output B rate = Input B rate);
    (2) enable – Sample Rate converter enabled (Output B resampled to 48 kHz).

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 directly. Details of IRT's direct address can be found at IRT Electronics' website.

Web address: www.irtelectronics.com

Email: sales@irtelectronics.com