IRT-6900-DVG

3G/HD/SD-SDI & Composite/Component Test Pattern Generator with Audio Tone Generator

User Manual

Revision History:

Revision	Date	By	Change Description	Applicable to:
00	30/04/2015	AL	Original Issue.	Firmware ≥ Revision 1.1

Table of Contents:

This instruction book applies to units fitted with firmware ≥ Revision 1.1.

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.

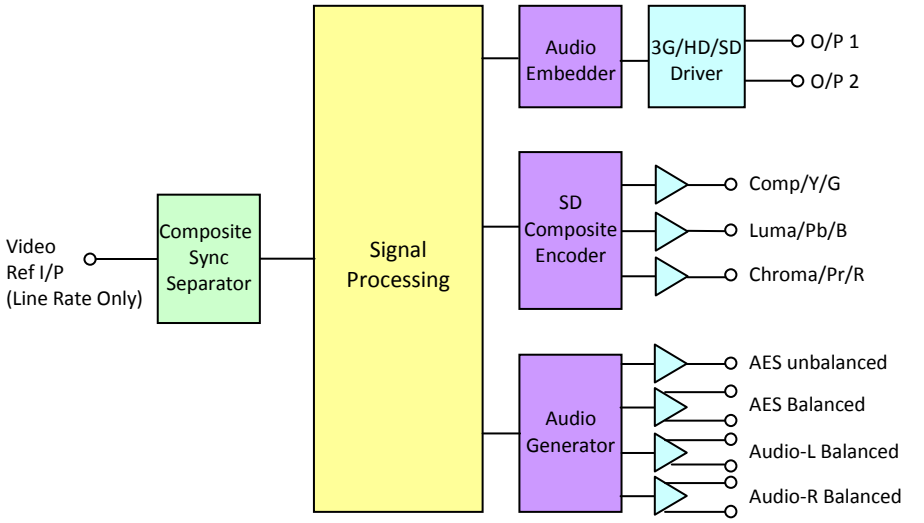
A simple to use monitoring and control software called DashBoard™ is a free program downloadable from the openGear® website (www.opengear.tv) that allows the user to remotely monitor and control an openGear® type card fitted within an openGear® frame that meets the openGear® standard for DashBoard™ control.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

I.R.T. Communications' 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-6900-DVG SIGNAL PATH



The IRT-6900-DVG acts as an analogue / digital test pattern generator with audio tone generator.

There are 32 preset test patterns are DIP switch settable in 16:9 format as 3G-SDI, HD-SDI or SD-SDI signal formats, as well as composite or component analogue format.

Multi-frequency audio test tones in both AES and analogue formats are also available and can be inserted within the digital video test patterns.

The IRT-6900-DVG 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.

Standard features:

- **3G/HD/SD-SDI test patterns with embedded audio.**
- **Composite CVBS, Luma, Chroma, RGB, YPrPb (SD only).**
- **AES audio test tones.**
- **Analogue Audio test tones.**
- **Composite reference input[1].**

NOTE: 1 Composite reference input referenced to video line rate – not frame rate.

TECHNICAL SPECIFICATIONS

Outputs – Digital Video:

Number	2 x complementary 3G, HD or SD-SDI.
Connectors	75Ω BNC.
Signal level	800 mV ±10%.

Outputs – Digital Audio:

Number	1 x AES unbalanced and 1 x AES balanced.
Connectors	75Ω BNC (unbalanced) & 110Ω Phoenix (balanced).
Format	24-bit 48Khz AES-3.

Outputs – SD Analogue Video:

Type	Composite/Y/C; RGB + Sync; or YPrPb + Sync.
Connectors	75Ω BNC.

Outputs – Analogue Audio:

Number	2 x Balanced (Left & Right).
Connectors	3-Pin Phoenix.
Format	24-bit, 0dBFS = +24dBu.

Power Requirements:

Voltage	+ 12 Vdc.
Power consumption	TBD 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	Rear connector assembly.
Ordering	IRT-6900-DVG.

CONFIGURATION

DIP Switch settings:

VIDEO:

Video Format:

		DIP Switch		
Video Format		**SW1-1**	**SW1-2**	**SW1-3**
SDI	720x625:50i	OFF	OFF	OFF
SDI	720x525:60i	ON	OFF	OFF
HD-F	1920x1080:50i	OFF	ON	OFF
HD-D	1920x1080:60i	ON	ON	OFF
HD-I	1920x1080:25p	OFF	OFF	ON
HD-G	1920x1080:30p	ON	OFF	ON
3G-A	1920x1080:50p	OFF	ON	ON
3G-A	1920x1080:60p	ON	ON	ON

Video Test Patterns:

		DIP Switch				
SD Test Pattern	**HD & 3G Test Pattern**	**SW1-4**	**SW1-5**	**SW1-6**	**SW1-7**	**SW1-8**
Black	Black	OFF	OFF	OFF	OFF	OFF
Colour Bars 75%	Colour Bars 75%	ON	OFF	OFF	OFF	OFF
Colour Bars 100%	Colour Bars 100%	OFF	ON	OFF	OFF	OFF
Reverse Colour Bars 75%	Reverse Colour Bars 75%	ON	ON	OFF	OFF	OFF
Reverse Colour Bars 100%	Reverse Colour Bars 100%	OFF	OFF	ON	OFF	OFF
50% Flat Field	50% Flat Field	ON	OFF	ON	OFF	OFF
75% Flat Field	75% Flat Field	OFF	ON	ON	OFF	OFF
White 100%	White 100%	ON	ON	ON	OFF	OFF
Red 75%	Red 75%	OFF	OFF	OFF	ON	OFF
Red 100%	Red 100%	ON	OFF	OFF	ON	OFF
Blue 75%	Blue 75%	OFF	ON	OFF	ON	OFF
Blue 100%	Blue 100%	ON	ON	OFF	ON	OFF
Green 75%	Green 75%	OFF	OFF	ON	ON	OFF
Green 100%	Green 100%	ON	OFF	ON	ON	OFF
Equalizer Pathological	Equalizer Pathological	OFF	ON	ON	ON	OFF
PLL Pathological	PLL Pathological	ON	ON	ON	ON	OFF
5-Step Y	5-Step Y	OFF	OFF	OFF	OFF	ON
10-Step Y	10-Step Y	ON	OFF	OFF	OFF	ON
5-Step YC	5-Step YC	OFF	ON	OFF	OFF	ON
10-Step YC	10-Step YC	ON	ON	OFF	OFF	ON
Oversize Ramp YC	Oversize Ramp YC	OFF	OFF	ON	OFF	ON
Valid Ramp	Valid Ramp	ON	OFF	ON	OFF	ON
Shallow Ramp	Shallow Ramp	OFF	ON	ON	OFF	ON
Reverse Ramp	Reverse Ramp	ON	ON	ON	OFF	ON
500 kHz Bowtie	Ramp Chroma	OFF	OFF	OFF	ON	ON
2.5 MHz Bowtie	Limited Ramp Chroma	ON	OFF	OFF	ON	ON
Y Multiburst 60	Shallow Ramp Chroma	OFF	ON	OFF	ON	ON
YC Multiburst 60	Luma Multiburst	ON	ON	OFF	ON	ON
Multiburst NTSC	Chroma Multiburst	OFF	OFF	ON	ON	ON
Gamut Test	Luma Sweep 1-30	ON	OFF	ON	ON	ON
Modulated Ramp	Bowtie	OFF	ON	ON	ON	ON
2T 4T 20T Bar	Pulse Bar	ON	ON	ON	ON	ON

Moving Picture Element:

SW3-1 **OFF** On-screen Moving Picture Element disabled.
ON On-screen Moving Picture Element enabled.

SW3-2 Not Used.

SD Analogue Video:

	DIP Switch	
SD Analogue Video O/P	**SW3-3**	**SW3-4**
Composite/Y/C	OFF	OFF
Composite/Y/C	OFF	ON
YPrPb + sync	ON	OFF
RGB + sync	ON	ON

AUDIO:

Audio Frequency:

	DIP Switch			
Frequency	**SW2-1**	**SW2-2**	**SW2-3**	**SW2-4**
200 Hz	OFF	OFF	OFF	OFF
250 Hz	ON	OFF	OFF	OFF
400 Hz	OFF	ON	OFF	OFF
500 Hz	ON	ON	OFF	OFF
800 Hz	OFF	OFF	ON	OFF
1000 Hz	ON	OFF	ON	OFF
1200 Hz	OFF	ON	ON	OFF
1600 Hz	ON	ON	ON	OFF
2000 Hz	OFF	OFF	OFF	ON
2400 Hz	ON	OFF	OFF	ON
3200 Hz	OFF	ON	OFF	ON
4000 Hz	ON	ON	OFF	ON
4800 Hz	OFF	OFF	ON	ON
8000 Hz	ON	OFF	ON	ON
9600 Hz	OFF	ON	ON	ON
16000 Hz	ON	ON	ON	ON

Audio Level:

	DIP Switch	
AES Audio Level	**SW2-5**	**SW2-6**
0 dBFS (+24 dBu)	OFF	OFF
-6 dBFS (+18 dBu)	ON	OFF
-12 dBFS (+12 dBu)	OFF	ON
-18 dBFS (+6 dBu)	ON	ON

Audio Embedding:

	DIP Switch	
Audio Group Embedding	**SW2-7**	**SW2-8**
No embedding	OFF	OFF
Group 2 only	ON	OFF
Group 1 only	OFF	ON
Both Group 1 and Group 2	ON	ON

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 Connections:

Digital Video Outputs:

Two complementary serial digital outputs settable for either 3G-SDI, HD-SDI or SD-SDI are via the two top 75Ω BNC connectors on the rear panel. It is recommended that the signal outputs are made via high quality coaxial cable suitable for the chosen output data rate, such as Belden 1694A for the 3G-SDI and HD-SDI rates or Belden 8281 for the SD SDI rate.

Digital Audio Outputs:

An AES digital audio output is available on the rear panel in both a balanced and unbalanced format. The balanced AES is via a 110Ω 3-pin Phoenix style connector and the unbalanced via a 75Ω BNC connector.

Analogue Video Outputs:

An analogue video output, corresponding to the SD-SDI test pattern setting, is available on the rear panel via three 75Ω BNC connectors. On board DIP switches select between Composite (CVBS) + Luma + Chroma, RGB or YPbPr outputs.

Analogue Video Reference Input:

An analogue video reference input is available on the rear panel via a 75Ω BNC connector. The output analogue video output will lock to the line rate of this video reference.

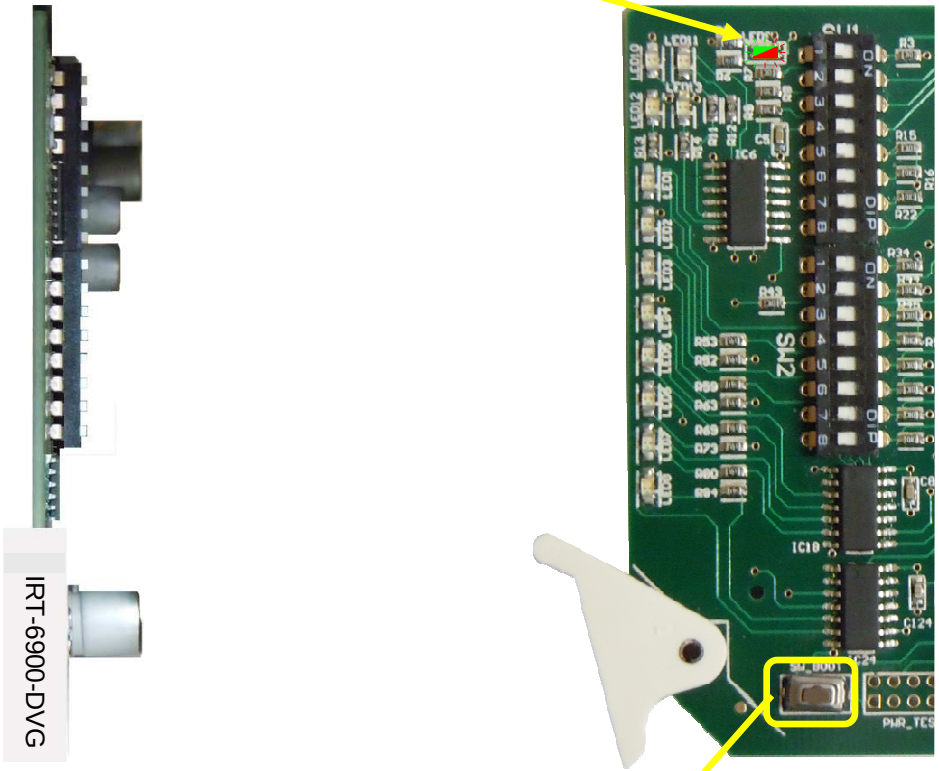
> **Note:** line rate, not frame rate.

Analogue Audio Outputs:

A stereo analogue audio pair is available on the rear panel in a balanced format via a pair of low impedance 3-pin Phoenix style connectors.

Front Edge LED and Switches Locations

Green/Red LED[2]: GREEN – Communication with frame's Network card.
RED - No communication with Network card / No Network card.

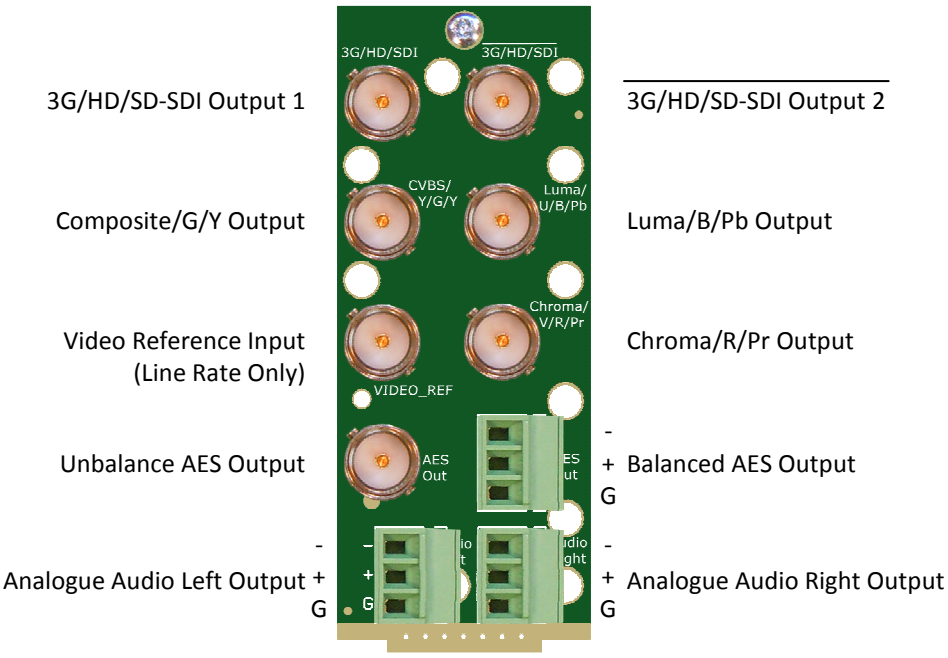


SW_boot switch: Default Reset Switch.
User set names and switch position are stored within memory so that in the event of a loss of power this information is restored on resumption of power.

If the default Reset Switch is pressed whilst powering or inserting the card, the card will default to factory preset settings.

NOTE: 2 At the time of writing this manual, DashBoard™ control had not yet been implemented. For firmware revision ≤1.1, this LED will always indicate RED.

Rear Assembly Layout



IRT-6900-DVG
Rear Assembly

OPERATION

Two complementary (180^{o} out of phase) digital outputs provide a range of preset video test patterns.

As described in the *Configuration* section of this manual, DIP switches SW1-1, SW1-2 and SW1-3 select the format and frame rate of the digital serial data outputs and DIP switches SW1-4 to SW1-8 select the test pattern.

Digital outputs may be set for either SD-SDI (at 50 or 60 frames per second), HD-SDI (interlaced at 50 or 60 frames per second or progressive at 25 or 30 frames per second), or 3G-SDI (progressive at 50 or 60 frames per second).

Analogue outputs are also provided. These correspond to either PAL or NTSC composite formats or RGB and YPbPr component interlaced formats at 25 or 30 frames per second. Selection between Composite/Y/C, component RGB + Sync, and component YPbPr + Sync is made via DIP switch SW3-3 and SW3-4 selection. The frame rate varies between 25 and 30 frames per second depending on the position of DIP switch SW1-1:

SW1-1 = OFF corresponds to a frame rate of 25 fps;
SW1-1 = ON corresponds to a frame rate of 30 fps.

Analogue test patterns follow that of the SD-SDI test patterns as per DIP switches SW1-4 to SW1-8 regardless of the digital output type.

For situations where a moving picture element is required, such as to distinguish whether a freeze frame has happened within a system, DIP switch SW3-1 enables or disables the moving image. When enabled the top sixth of the selected test pattern is reversed and moves from side to side. This gives a contrast between the moving element and the main part of the test pattern.

Both digital AES and analogue audio test tones between 200Hz and 16kHz can be selected via DIP switches SW2-1 to SW2-4, with set levels between 0dBFS (+24dBu) and -18dBFS (+6dBu) via DIP switches SW2-5 & SW2-6 to a balanced and unbalanced AES output and a balanced stereo pair.

Audio embedding of the selected test tone to Audio Groups 1 & 2 of the digital video outputs can also be set via DIP switches SW2-7 & SW2-8.

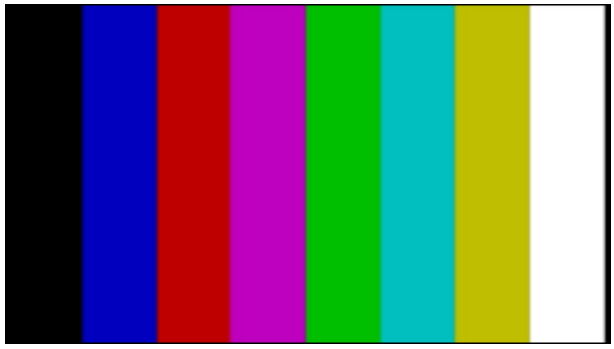
TEST PATTERNS

Colour Black (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	OFF	OFF	OFF	OFF

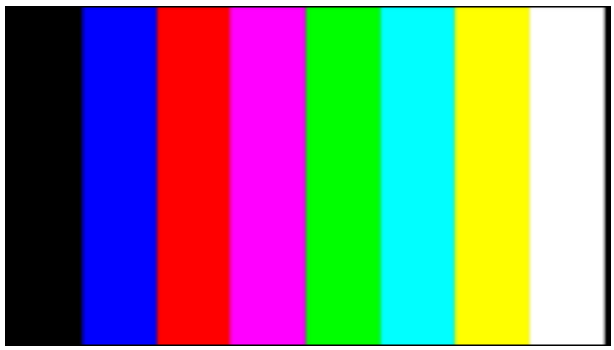
Colour Bars 75% (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	OFF	OFF	OFF	OFF



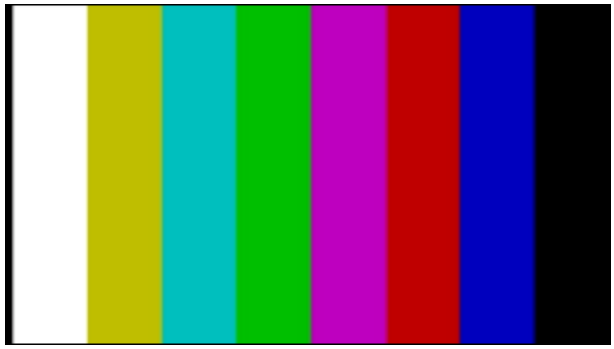
Colour Bars 100% (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	ON	OFF	OFF	OFF



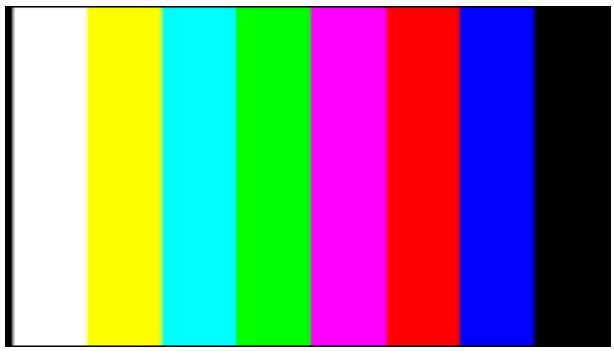
Reverse Colour Bars 75% (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	ON	OFF	OFF	OFF



Reverse Colour Bars 100% (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	OFF	ON	OFF	OFF



50% Flat Field (3G/HD/SD-SDI & Analogue)

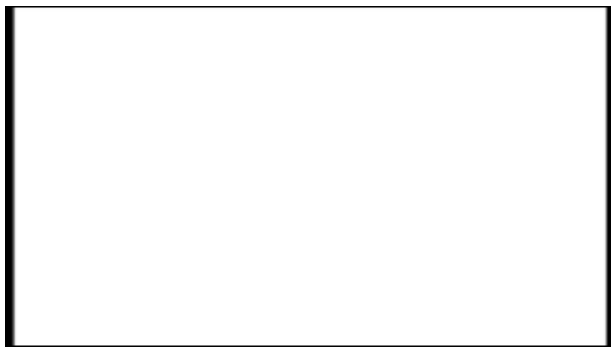
SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	OFF	ON	OFF	OFF

75% Flat Field (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	ON	ON	OFF	OFF

White 100% (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	ON	ON	OFF	OFF

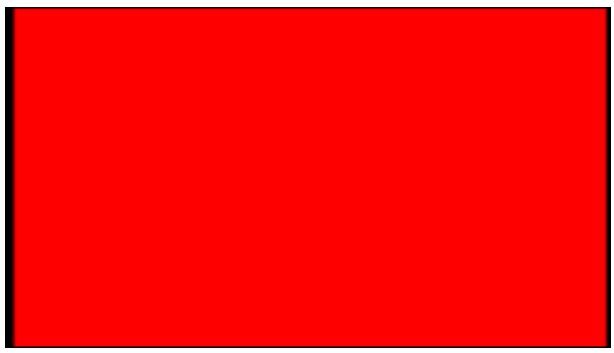


Red 75% (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	OFF	OFF	ON	OFF

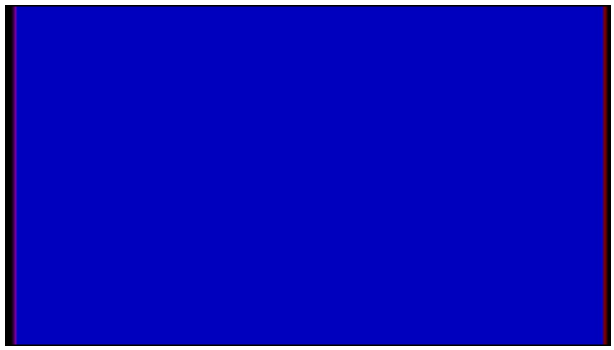
Red 100% (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	OFF	OFF	ON	OFF



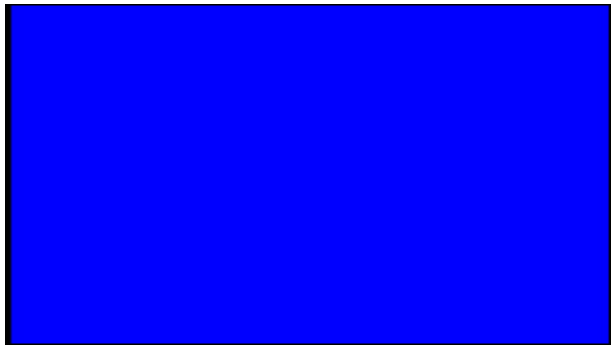
Blue 75% (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	ON	OFF	ON	OFF



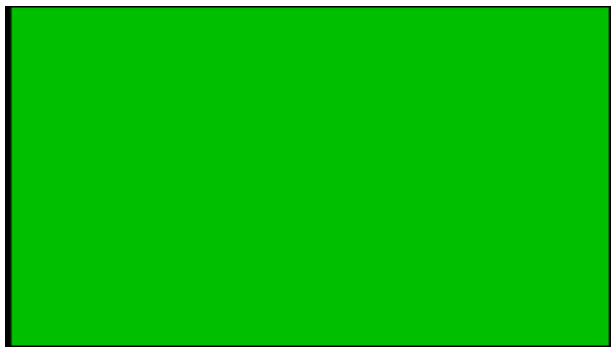
Blue 100% (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	ON	OFF	ON	OFF



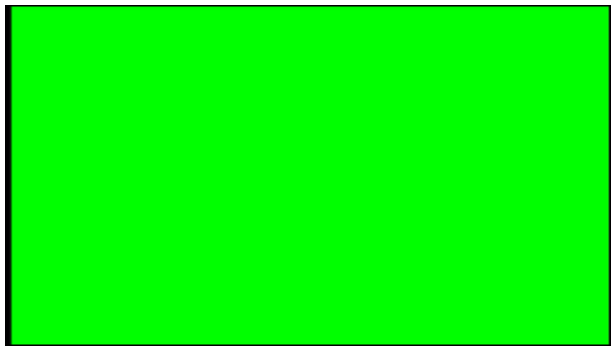
Green 75% (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	OFF	ON	ON	OFF



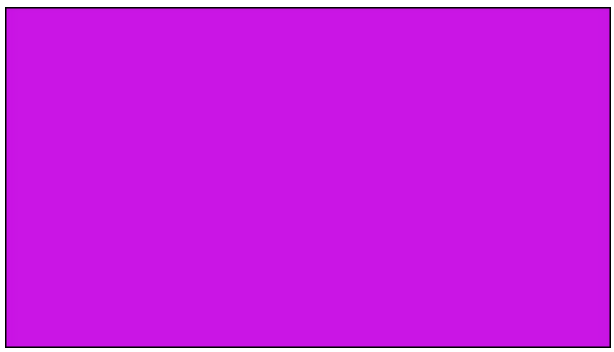
Green 100% (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	OFF	ON	ON	OFF



Equalizer Pathological (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	ON	ON	ON	OFF



PLL Pathological (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	ON	ON	ON	OFF

5-Step Y (3G/HD/SD-SDI & Analogue)

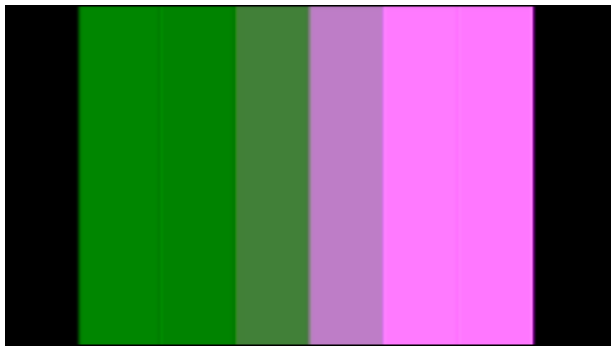
SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	OFF	OFF	OFF	ON

10-Step Y (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	OFF	OFF	OFF	ON

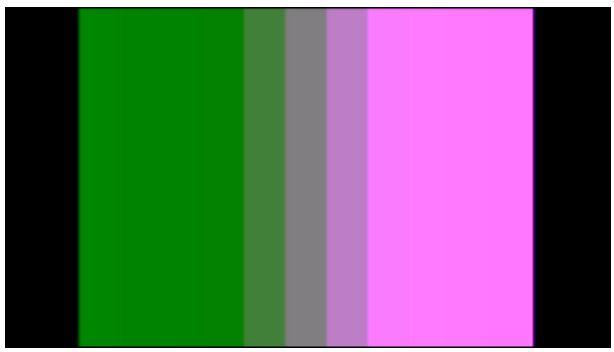
5-Step YC (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	ON	OFF	OFF	ON



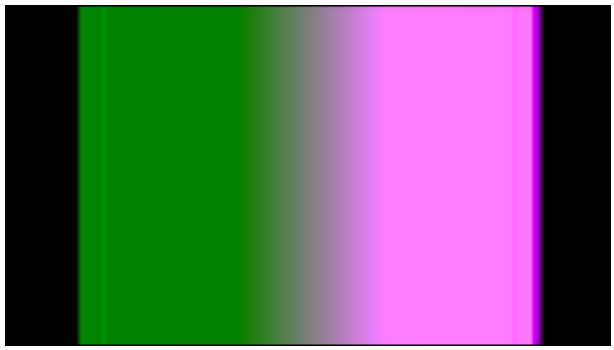
10-Step YC (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	ON	OFF	OFF	ON



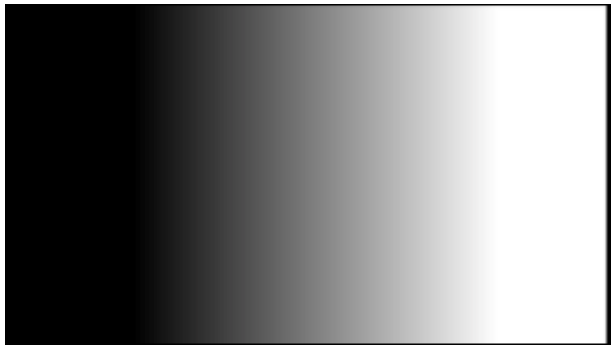
Oversize Ramp YC (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	OFF	ON	OFF	ON



Valid Ramp (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	OFF	ON	OFF	ON

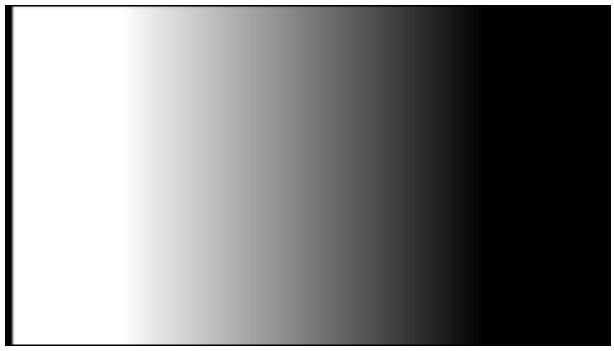


Shallow Ramp (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	ON	ON	OFF	ON

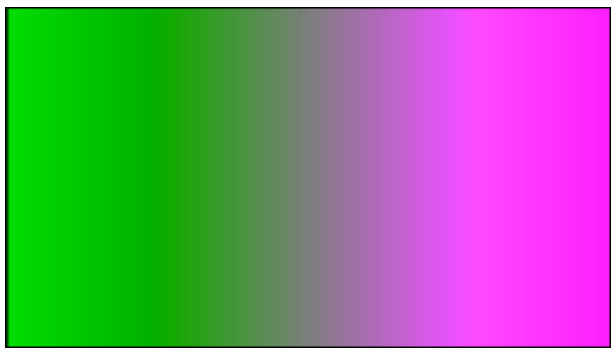
Reverse Ramp (3G/HD/SD-SDI & Analogue)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	ON	ON	OFF	ON



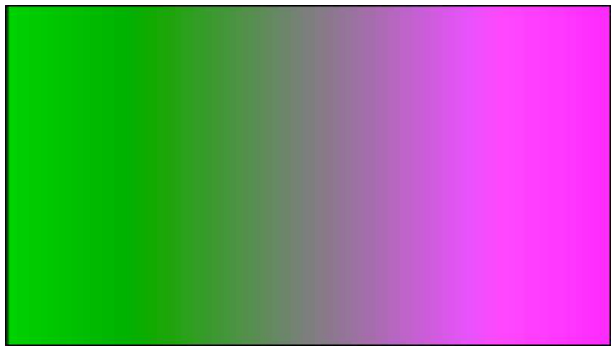
Ramp Chroma (3G/HD-SDI only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	OFF	OFF	ON	ON



Limited Ramp Chroma (3G/HD-SDI only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	OFF	OFF	ON	ON

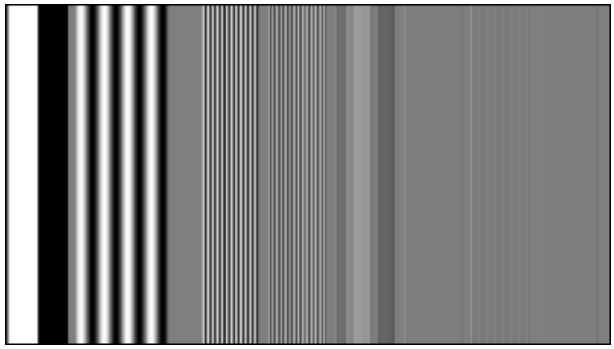


Shallow Ramp Chroma (3G/HD-SDI only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	ON	OFF	ON	ON

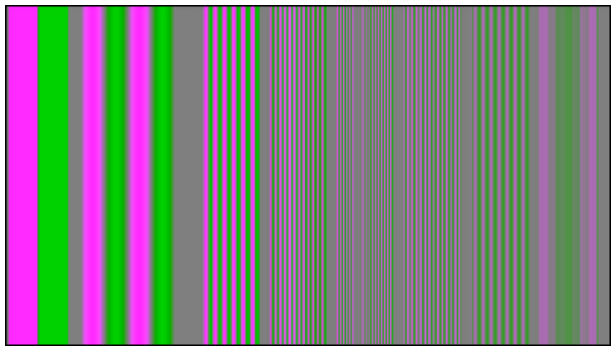
Luma Multiburst (3G/HD-SDI only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	ON	OFF	ON	ON



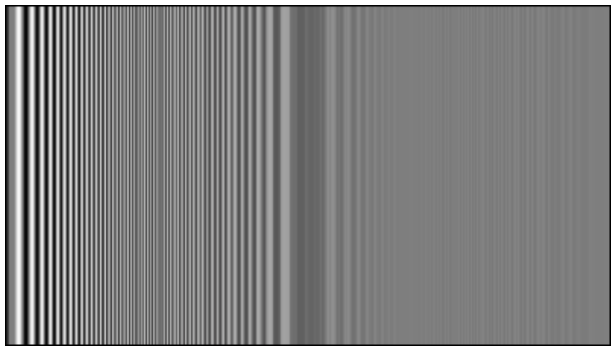
Chroma Multiburst (3G/HD-SDI only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	OFF	ON	ON	ON



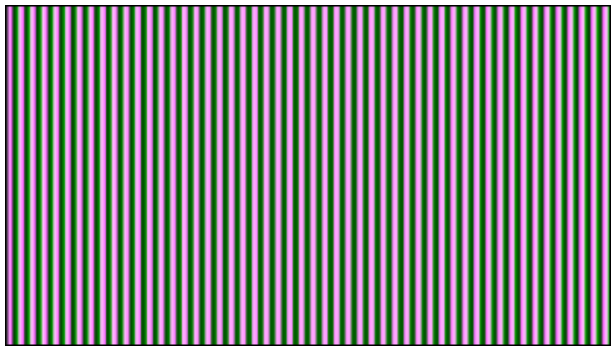
Luma Sweep 1-30 (3G/HD-SDI only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	OFF	ON	ON	ON



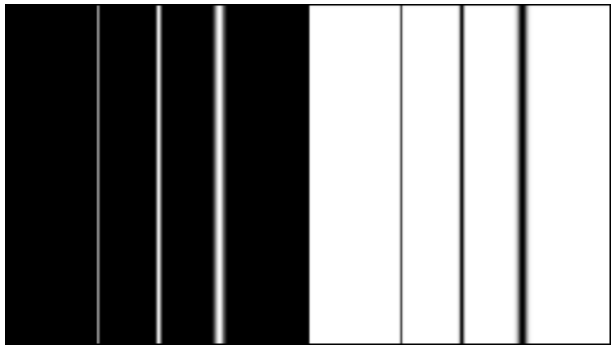
Bowtie (3G/HD-SDI only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	ON	ON	ON	ON



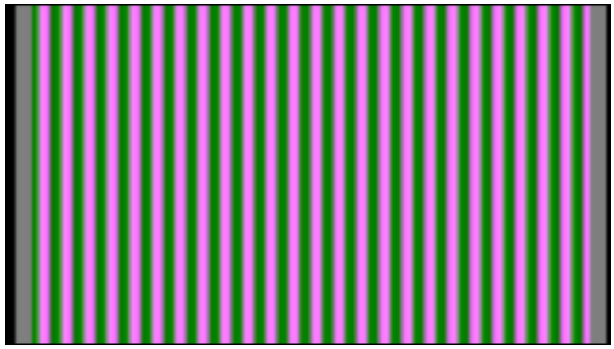
Pulse Bar (3G/HD-SDI only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	ON	ON	ON	ON



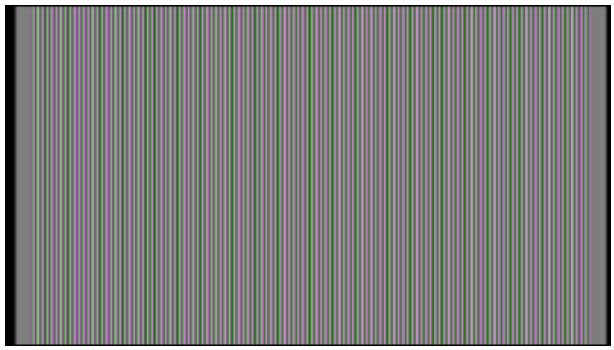
500 kHz Bowtie (SD-SDI & Analogue only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	OFF	OFF	ON	ON



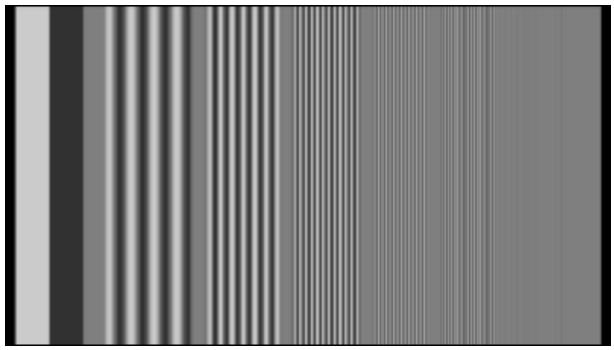
2.5 MHz Bowtie (SD-SDI & Analogue only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	OFF	OFF	ON	ON



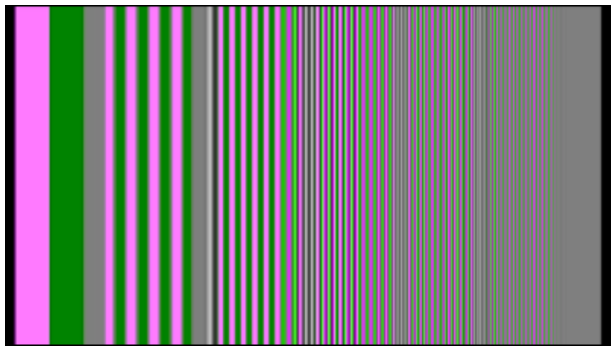
Y Multiburst 60 (SD-SDI & Analogue only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	ON	OFF	ON	ON



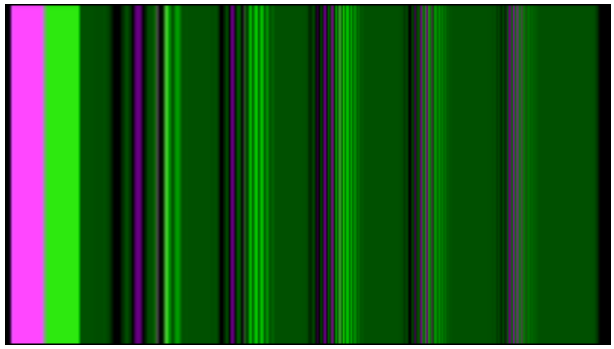
YC Multiburst 60 (SD-SDI & Analogue only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	ON	OFF	ON	ON



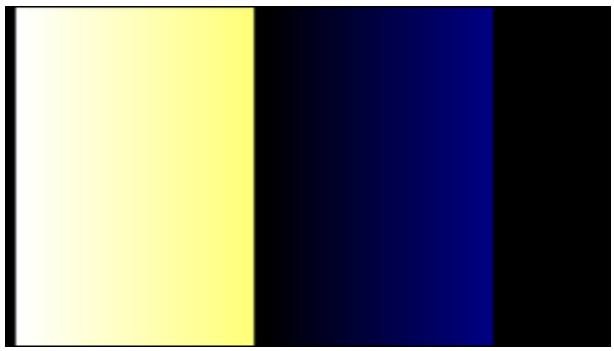
Multiburst NTSC (SD-SDI & Analogue only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	OFF	ON	ON	ON



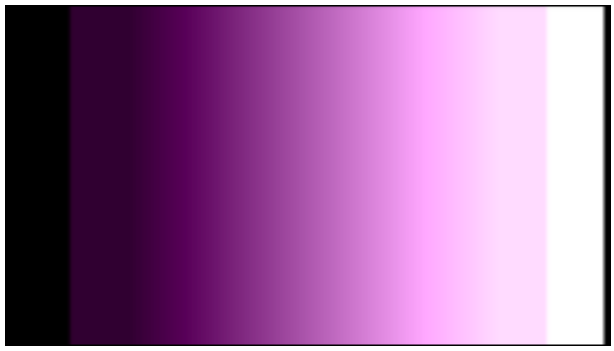
Gamut Test (SD-SDI & Analogue only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	OFF	ON	ON	ON



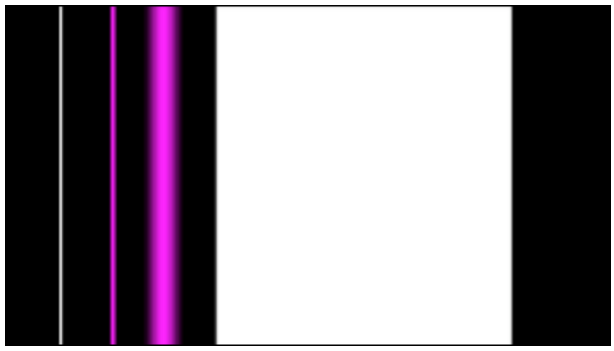
Modulated Ramp (SD-SDI & Analogue only)

SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
OFF	ON	ON	ON	ON



2T 4T 20T Bar (SD-SDI & Analogue only)

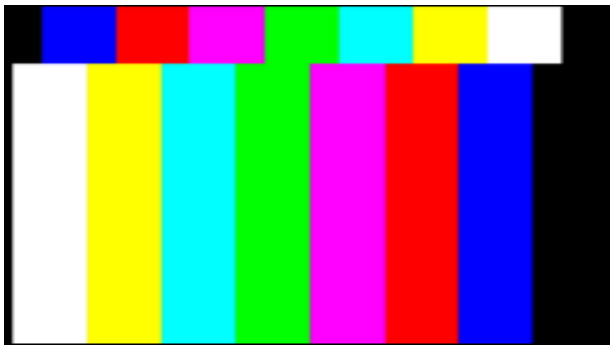
SW1-4	SW1-5	SW1-6	SW1-7	SW1-8
ON	ON	ON	ON	ON



Moving Picture Element:

With the Moving Picture Element enabled (SW3-1 = ON) the top sixth of the selected test pattern is reversed and moves from side to side.

The below example shows a Reverse Colour Bars 100% test pattern with its Moving Picture Element enabled.



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 I.R.T.'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 I.R.T. 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 I.R.T. 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 I.R.T. 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 I.R.T. directly. Details of I.R.T.'s direct address can be found at I.R.T. Communications' website.

Web address: www.irtcommunications.com

Email: sales@irtcommunications.com