PHABRIX Rx Operation Manual

Software Release 0.07.0015

Manual Revision 5

About this Manual

Notice

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Revision

This manual is a revision controlled document. Any changes to any page content will be reflected in the overall revision status of the whole manual.

Revision	Date	Software Version	Comment
1	08/08/2012	0.03.0012	First release of manual
2	29/08/2012	0.03.0015	
3	20/11/2012	0.03.0039	
4	05/12/2012	0.03.0046	Release of Version 6
5	18/04/2013	0.07.0015	Release of Version 7

Getting Started

Package Contents

The shipping box should contain the following

> PHABRIX Rx unit
>
> Power Supply Unit
>
> Mains lead
>
> CD Manual
>
> Allen Key

The shipping box will also contain this Manual on a CD, note that the Web Site always contains the latest version of the manual. The version of software that this manual supports is on the front page.

General Safety

Avoiding Personal Injury

⚠️ *This instrument is designed for use by qualified personnel only.*

No user serviceable parts are provided. Units should be returned to your local PHABRIX agent for servicing.

The Operator should NOT remove the case from the unit.

Do not spill any liquid onto the unit or its power adaptor.

Power Supply

Make sure that the unit is connected to the correct power supply voltage. A power supply adaptor is supplied with the unit which may be connected to any AC power supply between 100 and 240VAC at 50-60Hz. Only the supplied power adaptor should be used with the unit. Do not use a damaged AC cable with the unit as it may cause a shock or fire hazard. Replacement AC cables are available from your local PHABRIX agent.

Installation Environment

Operating Temperature

⚠️ *The unit should only be operated between 0 and 40 °Centigrade. If the unit is operated at a higher temperature there is a possibility of a fire hazard. If the temperature is changed rapidly from a cold environment to a hot environment, moisture can be created internally which can cause malfunction or damage the unit. Allow the unit to sit for 30 minutes without power applied to reduce any possibility of condensation. If the temperature rises above 60°Centigrade a warning dialog will be given. If the temperature rises above 65°Centigrade the unit will be turned OFF. Under both conditions, an event will be added to the event log to show what happened.*

Input/Output Terminals

Do not connect the input or output BNC connectors to external power as this can damage the internal circuitry and cause the unit to work incorrectly.

When Not In Use

Disconnect the unit from the power supply and AC power source when not in use.

Maintenance

Wipe the case, and knobs gently with a soft cloth, lightly dampened with a neutral cleaning agent. A screen cleaning cloth may be used to clean the LCD. Do not apply force to the LCD when cleaning or it may be damaged.

⚠️ *Remove the power supply from the unit and turn OFF before cleaning. Do not allow any water or other liquid to enter the unit while cleaning.*

RoHS Compliance

PHABRIX products are designed and manufactured using only RoHS compliant components and materials. Therefore based on information provided by our suppliers, PHABRIX certifies that ALL products that it manufactures are "RoHS-5" compliant and that they do not exceed the designated levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether flame retardants (PBDE) legislated under the provisions of the "European Parliament and Council Directive" on the "Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (2011/65/EC)" and associated regulations collective known as the "RoHS Regulations".

Disposal of Equipment

This product is subject to the European WEEE (Waste Electrical and Electronic Equipment) directive and should be disposed of according to the regulations of each country.

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Rx Platform

Overview

The 'Rx platform' has been designed to serve the varied test and measurement needs of the broadcast industry. PHABRIX has developed not a single product in the traditional sense but a modular system from which specific broadcast client requirements can be satisfied.

The Rx platform allows a flexible approach to test and measurement on a new technological platform designed for longevity. The system has been created to allow broadcast engineers to specify features according to the complexity of the required test and measurement application by simply adding additional modules and software licenses to their chosen core chassis.

Adding modules is like adding independent new instruments, each module providing a dedicated set of instruments for the task required.

The Rx Platform is available in a choice of chassis types:

Rx2000 – a unique audio video monitoring solution combining front panel instrumentation, via dual TFT screens, and integrated full range stereo speakers. Unique 2U tapered 'tilt-in-bay' engineering with four Rx module bays.

Rx1000 rasterizer – a compact 1U 19" rack-mount chassis with OLED display interface with four Rx module bays.

Rx500 rasterizer – a compact 1U ½ rack width chassis with OLED display interface with two Rx module bays.

Rx2000

Description

The Rx2000 is a 2U rack mounted instrument that provides the following:

Two front panel TFT screens, one to display the selected input image and the other to display the generator and analyzer menus and selected analyzer instrument panels such as Waveform monitor, Vectorscope and Eye Pattern display.

Rasterised HDMI/SDI outputs to allow up to 16 individual instrument panels (windows) to be displayed on a single DVI 1920 x 1080 resolution monitor. Ideal for outside broadcast facilities and engineering bays where space is at a premium.

Individual input selection, for instant confidence and monitoring of feeds, using dedicated source selection buttons.

Control via front panel controls, for in-bay use and remotely via a network connection using a web browser.

Front panel audio monitoring, provided by high quality speakers and/or a head phone socket, to allow the monitoring of the selected Audio channel.

4 Module slots allowing the installation of Analyzer and Generator modules.

Front Panel

The front panel provides access to the Video Confidence Display, the Instrument Display and menu system.

Rear Panel

The rear panel provides the Rx instrument's connections via the CPU module and the installed Analyzer or Generator modules. See the "Modules" section for details of the different module types.

The power for the Rx instrument is provided by a separate PSU unit that connects to the 4-pin male XLR connector at the left of the instrument.

Specifications

See Appendix B for specifications

Rx1000 Rasteriser

Description

The Rx1000 is a 1U rack mounted instrument that provides the following:

> OLED display to allow the monitoring inputs and the selection of Monitor display, Analyzer and Generator presets.

> Rasterised HDMI/SDI outputs to allow up to 16 individual instrument panels (windows) to be displayed on a single DVI 1920 x 1080 resolution monitor. Ideal for outside broadcast facilities and engineering bays where space is at a premium.

> Control via front panel controls, for in-bay use and remotely via a network connection using a web browser.

> Front panel audio monitoring, provided by high quality speakers and/or a head phone socket, to allow the monitoring of the selected Audio channel.

> 4 Module slots allowing the installation of Analyzer and Generator modules.

Front Panel

The front panel provides access to the OLED Display and menu system to allow the instrument to be configured and preset Monitor display, Analyzer and Generator settings to be recalled.

Rear Panel

The rear panel provides the Rx instrument's connections via the CPU module and the installed Analyzer or Generator modules. See the "Modules" section for details of the different module types.

The power for the Rx instrument is provided by a separate PSU unit that connects to the 4-pin male XLR connector at the left of the instrument.

Specifications

See Appendix B for specifications

Rx500 Rasteriser

Description

The Rx500 is a 1U, half rack width instrument (available with optional rack mount kit) that provides the following:

OLED display to allow the monitoring inputs and the selection of Monitor display, Analyzer and Generator presets.

Rasterised HDMI/SDI outputs to allow up to 16 individual instrument panels (windows) to be displayed on a single DVI 1920 x 1080 resolution monitor. Ideal for outside broadcast facilities and engineering bays where space is at a premium.

Control via front panel controls, for in-bay use and remotely via a network connection using a web browser.

Front panel head phone socket to allow the monitoring of the selected Audio channel.

2 Module slots allowing the installation of Analyzer and Generator modules.

Front Panel

The front panel provides access to the OLED Display and menu system to allow the instrument to be configured and preset Monitor display, Analyzer and Generator settings to be recalled.

Rear Panel

The rear panel provides the Rx instrument's connections via the CPU module and the installed Analyzer or Generator modules. See the "Modules" section for details of the different module types.

The power for the Rx instrument is provided by a separate PSU unit that connects to the 4-pin male XLR connector at the left of the instrument.

Specifications

See Appendix B for specifications

Rx Modules

Overview

The Rx range can be configured with a range of plug-in modules (printed circuit boards with dedicated hardware for specific functions) that enable functionality in the software an allow different menus to be selected on the front panel (Rx2000) and allow different Instrument panels (windows) to be created on the Monitor output.

Note that the Monitor Output - "System Status" menu can be used to inspect which Modules have been installed in the Rx instrument. See the "Monitor Output" section for details.

CPU Module

At the heart of every Rx product is the CPU module. Here signals from each installed instrument module are processed to provide a variety of instrument displays. Unhindered by stacked processing restraints, the CPU board creates an output display at an industry leading 1920 x 1080 pixels with perfect scaling via simultaneous HDMI and/or SDI outputs. In practice the Rx acts like a Test & Measurement multi-viewer providing scaled instruments from any selected video/audio input.
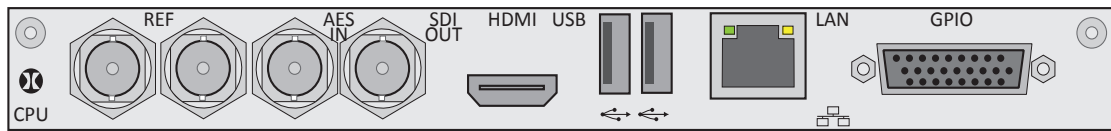
The CPU board also provides AES input, Bi/Tri level looping reference, 8 channel GPI, LTC input and stereo analogue audio output to meet 'competitive tender' requirements. Dual USB ports are provided for mouse and keyboard control. Ethernet provides remote access via web browser and is also the method for updating firmware and software from PHABRIX's dedicated server.

REF   [75 Ω BNC] Is an SD-SDI or HD-SDI locking reference signal, high impeadance loop through that allows the Rx instrument to be locked to a studio reference.

AES IN   [75 Ω BNC] Is an AES audio input conforming to AES3-2003 and SMPTE-276M

SDI OUT   [75 Ω BNC] Is an SD-SDI or HD-SDI signal generator output that provides test signals generated by the on-board Generator module on the CPU board. This output can also be used to provide an SDI monitor output tied to the HDMI® monitor output.

HDMI   [HDMI® Type A] Is a DVI 1920 x 1080 resolution monitor output that allows up to 16 individual instrument panels (or windows) to be displayed.

            Note that on some HDMI® monitors this output may appear too sharp causing ringing on the edges of text and menus. This can be resolved by reducing the monitor's image sharpness setting.

USB   [USB Series A] Are standard USB 2 connections provided for connection of a keyboard and mouse to control the HDMI® monitor output.

LAN   [RJ-45] Is a 10/100-base-T connection allowing the Rx instrument to be connected into a network and accessed via TCP/IP so that it can be controlled remotely.

GPIO [26-way D-type] provides a GPI (general purpose input), LTC control and analogue audio connections.

```
 ⑨  ⑧  ⑦  ⑥  ⑤  ④  ③  ②  ①
   ⑱  ⑰  ⑯  ⑮  ⑭  ⑬  ⑫  ⑪  ⑩
     ㉖  ㉕  ㉔  ㉓  ㉒  ㉑  ⑳  ⑲
```
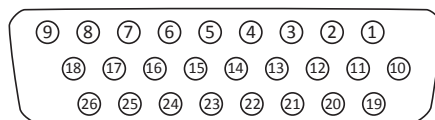
1   Data Terminal Equipment - Transmit (TX) (RS-232 compatible)
2   Data Terminal Equipment - Receive (RX) (RS-232 compatible)
3   Data Terminal Equipment - Request to Send (RTS)
4   Data Terminal Equipment - Clear to Send (CTS)

5   Longitudinal Timecode (LTC) - Receive (RX) P (RS-422 compatible)
6   Longitudinal Timecode (LTC) - Receive (RX) N (RS-422 compatible)
7   Audio Line Out - Right (1V peak-to-peak analogue audio, full scale 0dBFS)
8   Audio Line Out - Left (1V peak-to-peak analogue audio, full scale 0dBFS)
9   5 Volt, current-limited GPIO supply for 'open drain' input/outputs.
10-18   Signal ground / 0 Volt
19   GPIO - 0 (open drain with 10K ohm pull-up to +5 Volts)
20   GPIO - 1 (open drain with 10K ohm pull-up to +5 Volts)
21   GPIO - 2 (open drain with 10K ohm pull-up to +5 Volts)
22   GPIO - 3 (open drain with 10K ohm pull-up to +5 Volts)
23   GPIO - 4 (open drain with 10K ohm pull-up to +5 Volts)
24   GPIO - 5 (open drain with 10K ohm pull-up to +5 Volts)
25   GPIO - 6 (open drain with 10K ohm pull-up to +5 Volts)
26   GPIO - 7 (open drain with 10K ohm pull-up to +5 Volts)

Single Analyzer, Dual Input

The PHRXM-A module allows 2 connected SDI or Optical video signals to be present continuously and switched for analysis or display by the single analyzer channel as required.

The PHRXM-A module provides the following connections:

IN1 - LP1   [75 Ω BNC] Is an SD-SDI or HD-SDI signal, high impedance loop through that allows the Rx instrument to analyse the connected input.

IN2 - LP2   [75 Ω BNC] Is a second SD-SDI or HD-SDI signal, high impedance loop through that allows the Rx instrument to analyse the connected input.

OPTICAL   Allows a Video Transceiver (SFP Optical) module to be installed. Only single transmitter, single receiver modules that are compliant to SMPTE 424M, SMPTE 292M, and SMPTE 259M are supported.

Note that for Dual Link analysis the Link 1 signal must be connected to "IN1" BNC connector and the Link 2 signal must be connected to "IN2" BNC connector on the same Anayzer module. Likewise if Fibre is being used Link 1 should connect to "OPTICAL A" and Link 2 should connect to "OPTICAL B".

Single Analyzer, Dual Input, Physical Layer Measurement

The PHRXM-AE module allows 2 connected SDI or Optical video signals to be present continuously and selected for analysis or display as required.

The PHRXM-AE module provides the following connections:

IN1 - LP1   [75 Ω BNC] Is an SD-SDI or HD-SDI signal, high impedance loop through that allows the Rx instrument to analyse the connected input.

IN2 - LP2   [75 Ω BNC] Is a second SD-SDI or HD-SDI signal, high impedance loop through that allows the Rx instrument to analyse the connected input.

OPTICAL   Allows a Video Transceiver (SFP Optical) module to be installed. Only single transmitter, single receiver modules that are compliant to SMPTE 424M, SMPTE 292M, and SMPTE 259M are supported.

Note that for Dual Link analysis the Link 1 signal must be connected to "IN1" BNC connector and the Link 2 signal must be connected to "IN2" BNC connector on the same Anayzer module. Likewise if Fibre is being used Link 1 should connect to "OPTICAL A" and Link 2 should connect to "OPTICAL B"

Single Analyzer, Single Generator

The PHRXM-AG module allows a single connected SDI or Optical video signal to be monitored continuously and allows the generation of a single SDI or Optical video test signal.

SDI ANA IN   [75 Ω BNC] Is an SD-SDI or HD-SDI signal, high impedance loop through to "SDI ANA OUT" that allows the Rx instrument to analyse the input.

SDI GEN OUT   [75 Ω BNC] Are 2 identical SD-SDI or HD-SDI generator output that provide a test signal generated by the PHRXM-AG module.

OPTICAL   Allows a Video Transceiver (SFP Optical) module to be installed. Only single transmitter, single receiver modules that are compliant to SMPTE 424M, SMPTE 292M, and SMPTE 259M are supported.

GEN - provides a test signal generated by the PHRXM-AG module.

ANA - allows the Rx instrument to analyse the connected input.

AES Digital Audio Input / Output
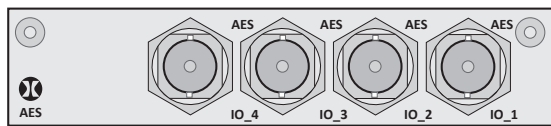
The PHRXM-4AGE module allows 4 x AES digital audio pairs to be routed to the Audio Meter and Loudness instruments.

AES IO_1   [75 Ω BNC] Is an AES digital audio pair input/output, compliant with AES3-4-2009 Annex D "Coaxial transmission", that can be monitored.

AES IO_2   [75 Ω BNC] Is an AES digital audio pair input/output, compliant with AES3-4-2009 Annex D "Coaxial transmission", that can be monitored.

AES IO_3   [75 Ω BNC] Is an AES digital audio pair input/output, compliant with AES3-4-2009 Annex D "Coaxial transmission", that can be monitored.

AES IO_4   [75 Ω BNC] Is an AES digital audio pair input/output, compliant with AES3-4-2009 Annex D "Coaxial transmission", that can be monitored.

Single Analyzer, Single Generator, Physical Layer Measurement

The PHRXM-AGE module allows a single connected SDI or Optical video signal to be monitored continuously and allows the generation of a single SDI or Optical video test signal.

SDI ANA IN   [75 Ω BNC] Is an SD-SDI or HD-SDI signal, high impedance loop through to "SDI ANA OUT" that allows the Rx instrument to analyse the input.

SDI GEN OUT   [75 Ω BNC] Are 2 identical SD-SDI or HD-SDI generator output that provide a test signal generated by the PHRXM-AG module.

OPTICAL   Allows a Video Transceiver (SFP Optical) module to be installed.
              Only single transmitter, single receiver modules that are compliant to SMPTE 424M, SMPTE 292M, and SMPTE 259M are supported.

              GEN - provides a test signal generated by the PHRXM-AG module.

              ANA - allows the Rx instrument to analyse the connected input.

Dual Output Generator Module
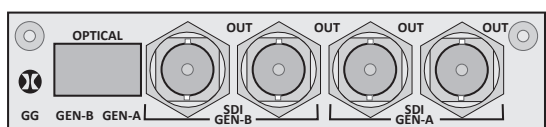
The PHRXM-GG module allows the generation of a two independent SDI or Optical video test signals with the same video format, colour space and frame rate for Dual link use.

SDI GEN-A OUT   [75 Ω BNC] Are 2 identical SD-SDI or HD-SDI generator output that provide a test signal generated by the PHRXM-GG module.

SDI GEN-B OUT   [75 Ω BNC] Are 2 identical SD-SDI or HD-SDI generator output that provide a test signal generated by the PHRXM-GG module.

OPTICAL   Allows a Video Transceiver (SFP Optical) module to be installed.
                Only a dual transmitter modules that is compliant to SMPTE 424M, SMPTE 292M, and SMPTE 259M are supported.

                GEN-A - provides a test signal generated by the PHRXM-GG module.

                GEN-B - provides a test signal generated by the PHRXM-GG module.

Note that for Dual Link test pattern generation both Output 1 and Output 2 must be enabled on the Generator. The Link 1 signal is produced on the module's "GEN A" output and the Link 2 signal is produced on the module's "GEN B" output. Likewise if a Fibre connection is being used the Link 1 signal is produced on "OPTICAL GEN A" and the Link 2 signal is produced on "OPTICAL GEN B".

Rx Software Options

Overview

The Rx range has a range of software options that can enhance the Rx functionality for specific applications.

3G-SDI and advanced formats upgrade for Rx chassis
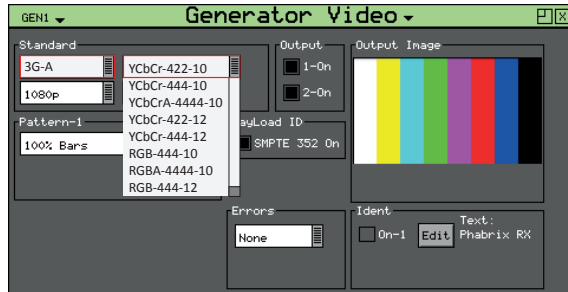
This option (PHRXO-3G) provides advanced formats include 4:2:2 YUV, 4:4:4 RGB and 4:4:4 YUV at 10/12 bit and 3G level A and B. For broadcast manufacturers this option allows rigorous testing of many more formats beyond the standard signals used in traditional broadcasting.

Among the support for 3G level B is the ability to analyse signals such as SMPTE 425-B carrying 1 x SMPTE 372M Dual-Link payload. Generation of these signals is activated if the generator is present.

HD/SD-SDI Data Analyzer and Ancillary Packet analyzer
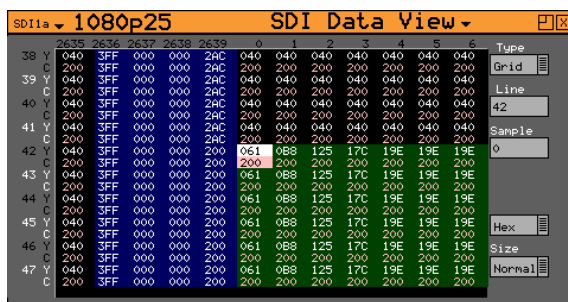
The SDI analysis option (PHSXO-SD) provides the engineer with a detailed view of the data words contained within the SDI stream. This allows the analysis of complex faults and is particularly useful when determining compatibility issues between equipment and when debugging new product developments particularly in a R&D environment.

Detail within the active SDI stream can be viewed with continuous update.

The SDI Analysis option provides the following functional areas:

Grid	displays the SDI data in the form of an array.
Stream	allows the SDI continuous data stream to be viewed.
Component	allows the video components to be displayed in separate columns.
Splt	allows the video components to be display individually.
Ancillary Data	allows the user to capture whole Ancillary data packets identified by their data id (DID).
Ancillary Status	allows additional 'user defined' selections with the appropriate DID or SDID code.

Access to the SDI analysis functionality is via the Analyzer - Signal Data menu. See the "Analyzer - Signal Data" section in chapter 2 for full details.

Dolby - E analysis
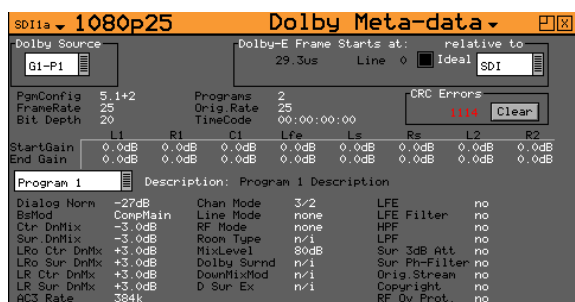
The Dolby-E analysis option (PHBRO-BDA) displays meta data present in a selected audio stream and determines whether the Dolby-E packet is timed correctly on the SDI video stream. The Dolby-E may be monitored from any of the SDI input embedded audio channel pairs or the AES input. Peak audio levels metering is also displayed.

Dual analyzer for SDI input modules

The chassis option (PHBXO-AA) provides an additional separate analyzer to the standard single analyzer board. This allows simultaneous instrumentation for dual SDI input modules. This applies to the PHRXM-AG and PHRXM-AGE modules.

Advanced physical layer analysis
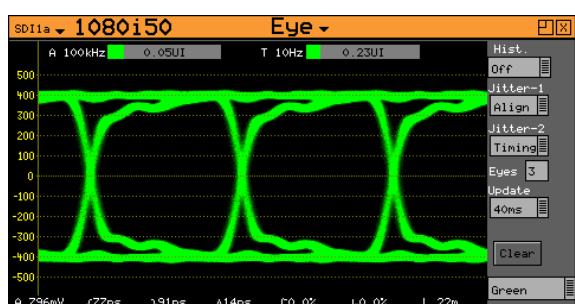
The analysis option (PHRXO-EA) for the Rx range adds an additional jitter screen, plus enhancements to the eye display. The extra features added to the eye and jitter module are focussed toward broadcast manufacturers who have a need for high end analysis tools. Histograms, decade filters, multiple eye display, full screen jitter display and alignment and timing thermometers are all available with comprehensive logging.

The Advanced physical layer analysis option provides the following functional areas:

Multi eye display — enables analysis when serialiser jitter is present: Products process video in either a 10 or 20 bit parallel data domain which is subsequently transmitted as a single bit serial data stream. By triggering every 10 or 20 eyes you can reveal repetitive parallel/serial clock domain jitter in equipment being analysed.

Histograms — give statistical information which can be used to accurately measure rise time, fall time and amplitude. These automatic accurate measurements can then be logged for extended periods of time. Measurements like rise time and fall time are notoriously difficult to make with SDI signals.

In addition to the standard timing and alignment jitter filters, decade filters are provided allowing an engineer to analyse the frequency content of any jitter present. The number of eyes displayed is adjustable from one eye up to one frame of eyes.

Decade filters — are provided allowing an engineer to analyse the frequency content of any jitter present. The number of eyes displayed is adjustable from one eye up to one frame of eyes.

Jitter display — the separate full screen jitter analysis display incorporated into the advanced option enables the engineer to analyse the nature of jitter present using a graph of jitter versus time. Again, the decade filters are present and the time base can be adjusted from 1 line through to 1 frame. By analysing jitter in this detailed way an engineer can determine if a signal is in or out of specification and also get a feel for where any problems lie.

Enhanced remote control
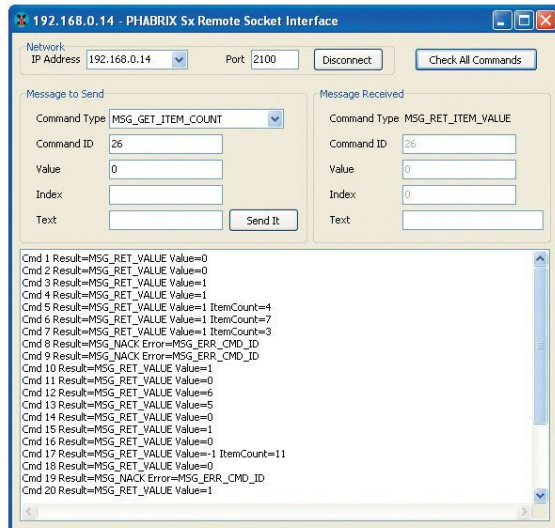
The Enhanced remote control option gives users full remote control of the unit via TCP/IP Sockets to allow any aspect of the unit to be modified or queried.

This allows complex applications to be created to perform test and measurement functions such as automated testing of routers or other broadcast equipment.

The Rx instrument can act as a server and listen on a port waiting for incoming requests from clients such as a PC. Using this method of communication the Rx range can provide a variety of information to the control device it is connected to and be controlled in specified areas of the product using the command details included. All visual controls on the product have an associated command.

Messages may be sent to 'set' or 'get' data from a command ie if you 'set' a value the unit will be configured accordingly and a reply returned and if you 'get' a value from the PHABRIX unit it will reply with that value. All messages are acknowledged to increase the security of the interface ie closed loop communication.

The control structure can be selected as Passive or Active. Passive control allows simple remote control where the host PC is in control and sends commands when it wants to change data or get information. It is this method which is the most popular use for remote control.

Active control is when the Rx unit synchronizes with the host PC. Any changes on the Rx unit will result in a message being sent to the host PC. This method is useful for controlling a Rx unit from another unit or via the PC simulator software. It requires more complex software on the host to respond to the returned messages.

The option provides a programming guide with command information and examples on a CD. A Windows™ application for testing the interface is also provided as part of this option.

See the Remote Control Guide for details

SDI-2K Formats
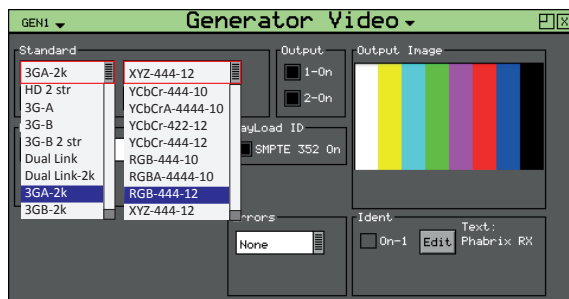
This option (PHRXO-2K) supports the new SDI practice for HD and 3G Level A and Level B signal transfer of 2K advanced formats including 4:2:2 Y'C'bC'r, 4:4:4 R'G'B' and 4:4:4 Y'C'bC'r at 10/12 bit as well as 4:4:4 X'Y'Z' at 12-bit.

Front Panel Control

Rx2000

Turning on and off the instrument

To turn on your PHABRIX Rx2000 press the red button at the top right hand corner of the front panel.

Volume   Power

Confidence Display

Input Selection Buttons   Menu Selection Buttons   Navigation Buttons

Once the system has started, pressing the button again will turn it off. If for some reason the instrument stops responding, pressing and holding the button for a few seconds will turn it off.

Front Panel Versus HDMI® Monitor Output Control

The Rx2000 can be controlled from either the HDMI® monitor output or from the front panel. The right-hand front panel display provides menu access to the Analyser, Generator, Logging and System menus and the left-hand display allows the select Analyser Input to be displayed for confidence (HDMI® output needs to be disabled in the "System" - "HDMI/SDI Output" menu first").

Note that the use of the Rx2000 front panel will take president over the HDMI® monitor output. If the front panel is to be used regularly it is advisable to use Memory presets to return the HDMI® monitor output to its normal state. Memory presets can be saved and recalled from the HDMI® monitor output task bar or from the front panel "System" - "Memories" menu. The HDMI Layout check box must be enabled.

Confidence Display

The left-hand LED screen is controlled by the 8 buttons beneath it that allow the inputs to all analyser modules to be selected.

> Top - (First Button) takes you to the top level of the simple menu.

> Input Bank 1 (Second Button) gives access to "SDI1a", "FIB1a", "SDI1b", "FIB1b", "SDI2a", "FIB2a", "SDI2b", "FIB2b".

> Input Bank 2 (Third Button) gives access to "SDI3a", "FIB3a", "SDI3b", "FIB3b", "SDI4a", "FIB4a", "SDI4b", "FIB4b".

Selecting the button beneath the displayed input will select that input for display on the front panel. This will use the anaylzer module resource for that chosen input and re-assign anaylzer resources on the HDMI® monitor output accordingly.

Main Menu

The Main menu, displayed on the right-hand LED screen gives access to the software modules available on the Rx2000 instrument.
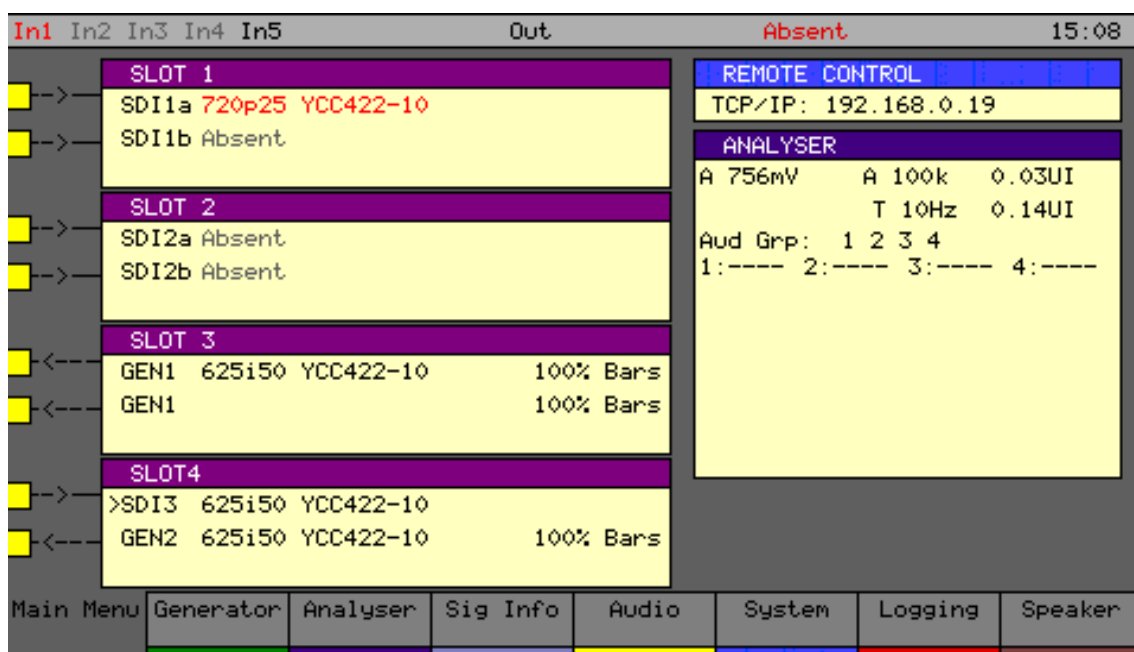
The buttons beneath the screen correspond to the menu areas. Pressing on any of these buttons will display the corresponding menu.

See chapter 2 : "Menu Reference for full details of these menus.

Instrument Status

The top line of the menus shows the instrument status and includes the Input Video status, Genlock status and current time.

A red "Log" is shown on the status line if there are any events in the event log.

If a 3G video standard is selected the video standard display will be shown as 3GA if it is a 3G-Level A standard, 3GB if it is a 3G-Level B dual link standard, 3G2 if it is a 3G-level B dual stream (two patterns) standard or DL if it is a dual link output.

The input video standard will be shown in red if the input signal has errors, but only if the analyzer is connected to the input. If the analyzer is set to monitor the output, the input standard will be shown in brown.

The output standard will be shown in red if the instrument is generating errors. The output standard will show OFF if the generator output is Off.

The Jitter values will be shown in red if the jitter values are greater than the values specified on the Log Setup page for the relevant jitter meter.

Using the Menus

The Menu buttons select which instrument is in use as well as selecting the options for the instrument. The bottom of the LCD display shows the function of each Menu button.

When in a specific function eg Generator, Analyzer etc, the cursor controls (⇦ ⇨ ⇧ ⇩) on the right hand of the instrument select a field to edit. The current field has a red box around it. Pressing the OK button starts or ends editing of that field. Check boxes are always in edit mode and pressing the OK button inverts the current state.

When editing some types of fields, the menu buttons at the bottom take on different functionality to allow cancelling edit mode or setting the value for the field. When lists of options are displayed the menu buttons allow selection of the first/last item in the list as well as paging through the available options. If the list of items is small, the available items may be displayed on the menu buttons for instant access.

The buttons along the bottom of the LCD display change the currently displayed page when not editing a data field. The left hand button always selects the top level menu and system overview page. So for example pressing the first button will select the "Main Menu", selecting the second button will select the "Generator" menu, etc.

The Main menu is the top level menu from which all other menus are selected on the Rx2000 instrument. The main menus are:

Generator	(only present if a Generator module is fitted) allows video test pattern selection to be made and audio test tones to be selected.
Analyzer	allows the selected input signal to be analysed in the form of a Picture, Waveform monitor, Vectorscope and Eye Pattern display (option).
Sig Info	allows detailed signal information about the video and audio status for the analyzer source to be displayed.
Audio	gives access to the Audio Meters and Audio Status displays.
System	allows the setup of system wide settings including memories, date/time and software.
Logging	selects the logging page to view and setup the error logging system.
Speaker	selects the speaker/headphone setup page.

Generator Menus
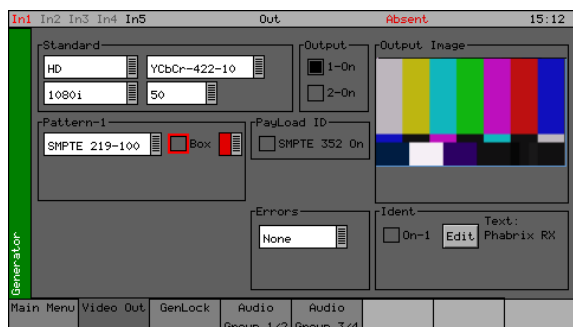
The Video Out menu is used to setup video test signals for all supported SD, HD and 3G SDI output standards.

The Video Out menu can be displayed by selecting the corresponding "Generator" button.
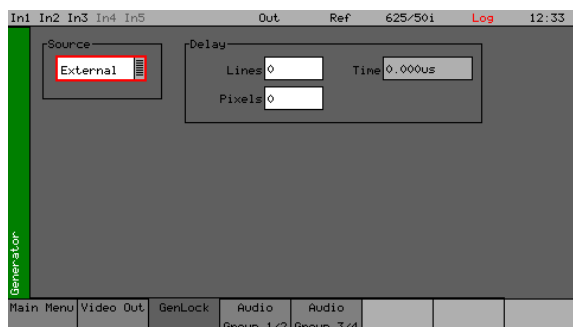
The Genlock menu is used to select an external locking reference or set the instrument to free run.

The Genlock menu can be displayed by selecting the corresponding "Generator" button.
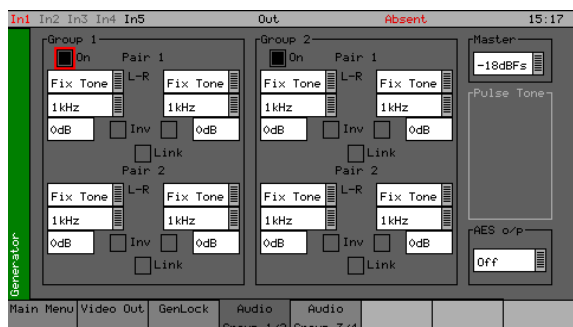
The Audio Group menu controls which audio channels, pairs or groups have test tones applied and the type of tone.

The Audio Group 1/2 menu can be displayed by selecting the corresponding "Generator" button.

Analyser Menus

With Picture selected, the video picture is displayed in a window as a down-converted display. The picture will automatically view the horizontal or vertical blanking areas if the line or sample values are in the blanking area.

The Picture menu can be displayed by selecting the corresponding "Anayser" button.
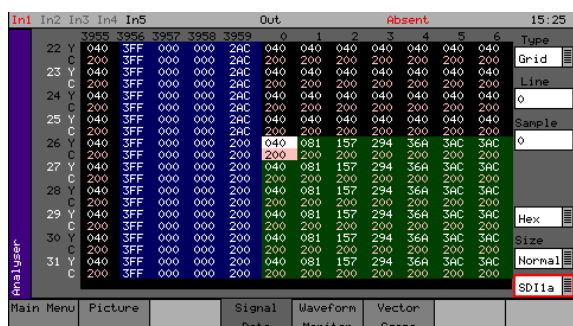
The Signal Data menu shows the video signal as a data stream.

The Signal Data menu can be displayed by selecting the corresponding "Anayser" button.
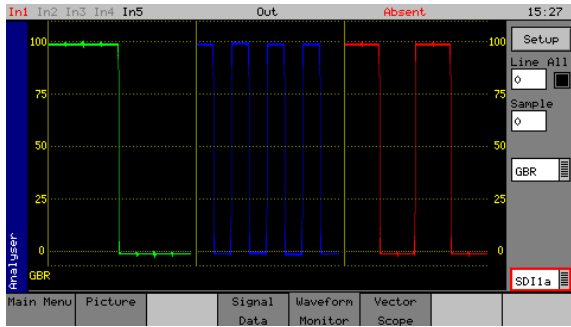
The Waveform menu displays the selected input in the form of a waveform monitor.

The Waveform menu can be displayed by selecting the corresponding "Anayser" button.
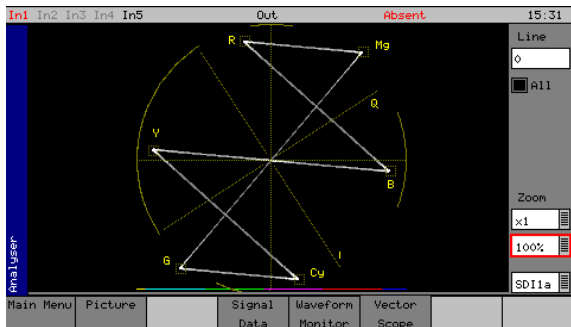
The Vectorscope menu displays the selected input in the form of a vectorscope.

The Vectorscope menu can be displayed by selecting the corresponding "Anayser" button.
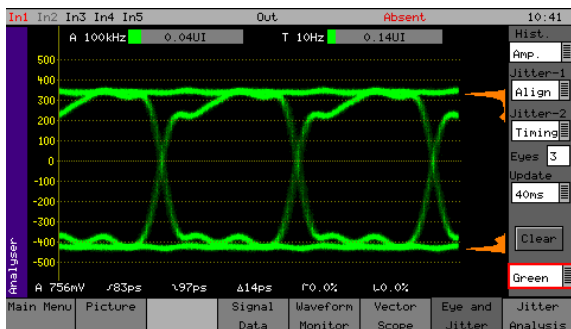
The Eye menu displays the selected input in the form of an Eye Pattern Display.

The Eye menu can be displayed by selecting the corresponding "Anayser" button.
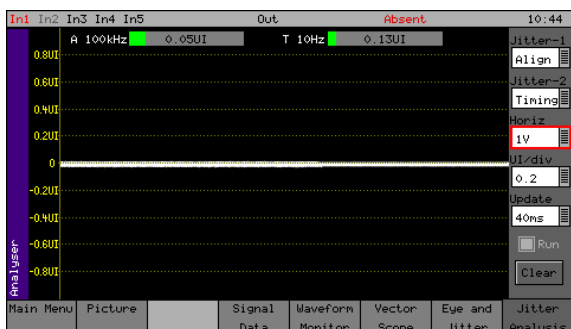
The Advanced Analysis package provides a jitter display. This screen shows a trace of jitter amplitude versus time along with two jitter thermometers.

The Jitter menu can be displayed by selecting the corresponding "Anayser" button.

Sig Info Menus
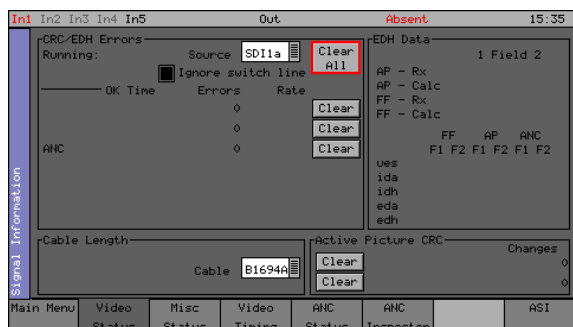
The Video Status menu display the status of the selected video input and displays any errors that have been found in the data stream.

The Video Status menu can be displayed by selecting the corresponding "Sig Info" button.
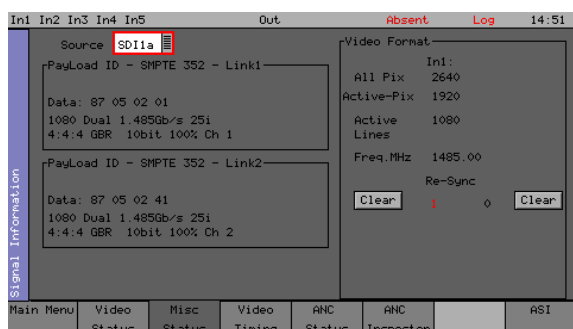
The Misc Status menu display the status the SMPTE 352 packets embedded in the selected video input and displays any errors that have been found.

The Misc Status menu can be displayed by selecting the corresponding "Sig Info" button.
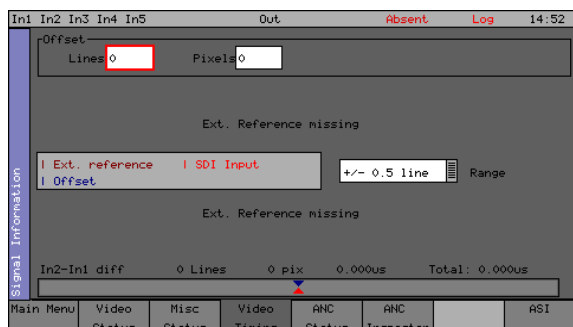
The Video Timing menu displays the relationship between the selected video input with respect to the locking reference input.

The Video Timing menu can be displayed by selecting the corresponding "Sig Info" button.
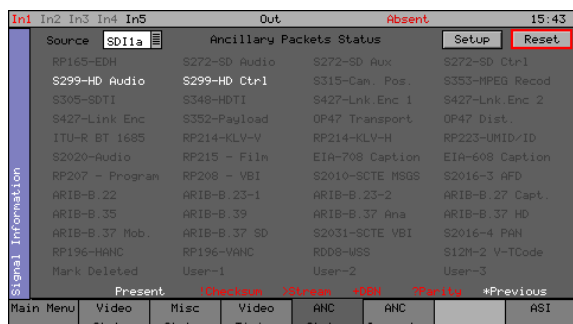
The ANC Status menu shows which ANC packets are present on the SDI input and whether they have any errors.

The ANC Status menu can be displayed by selecting the corresponding "Sig Info" button.
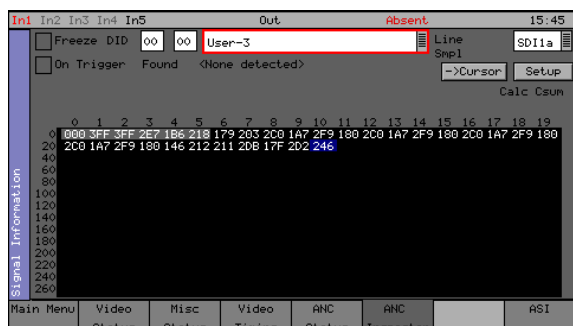
The SDI Data Option allows Ancillary data packets to be detected and checked for errors. The ANC Inspector menu displays details of the ANC packets.

The ANC Inspector menu can be displayed by selecting the corresponding "Sig Info" button.

Audio Menus
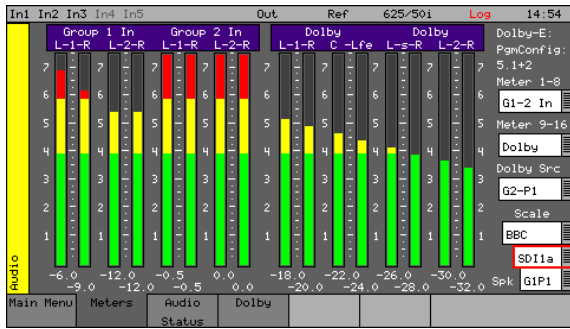
The Audio Meters menu displays up to 16 audio channels. The source for each block of 8 meters may be independently set to allow simultaneous metering of 8 inputs and 8 outputs or all 16 channels in an embedded SDI stream.

The Audio Meters menu can be displayed by selecting the corresponding "Audio" button.
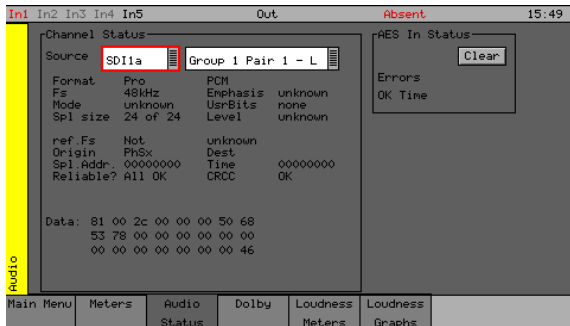
The Audio Status menu shows the Channel Status for the selected audio channel is displayed in decoded form as well as a hexadecimal dump of the bytes.

The Audio Status menu can be displayed by selecting the corresponding "Audio" button.
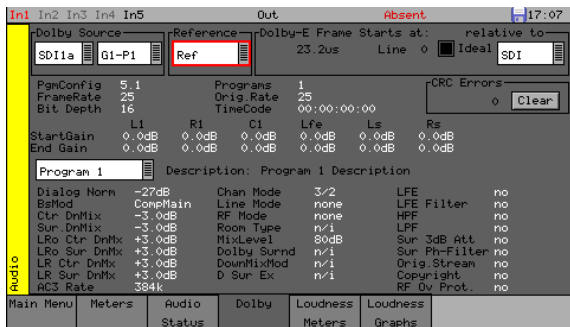
The Dolby-E status option allows display of the Dolby-E meta-data present in the selected audio stream and determines whether the Dolby-E packet is timed correctly on the SDI video stream.

The Dolby menu can be displayed by selecting the corresponding "Audio" button.

System Menus
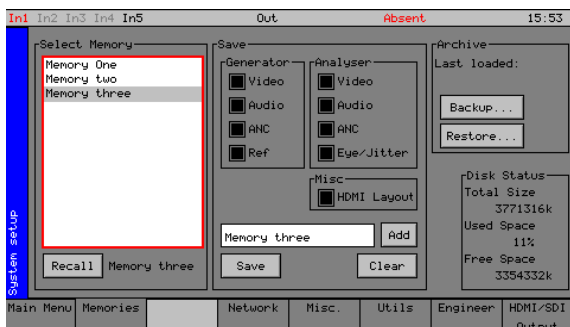
The Memories menu displays the current settings in the Rx instrument may be saved for future recall.

The Memories menu can be displayed by selecting the corresponding "System" button.
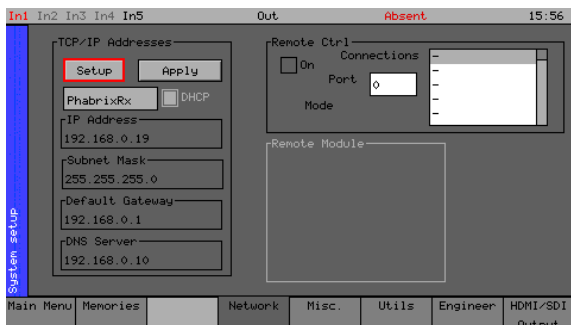
The Network menu allows the Rx instrument to be configured as part of a network.

The Network menu can be displayed by selecting the corresponding "System" button.
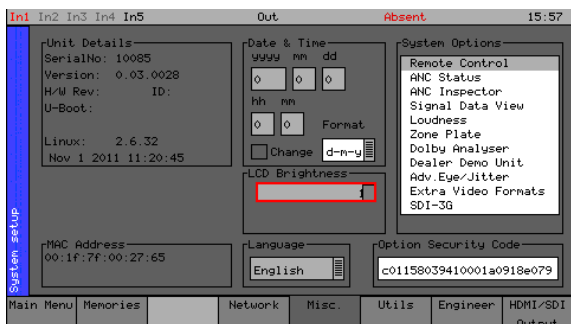
The Misc menu shows serial numbers, Rx instrument MAC address, version information and battery state.

The Misc menu can be displayed by selecting the corresponding "System" button.
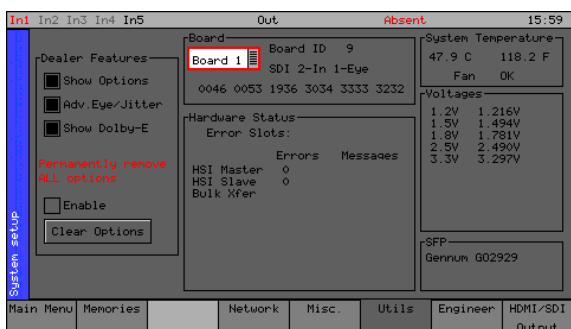
The Utils menu displays details of the Rx instrument's module (board) operating status and details the system temperature and individual board voltages. This menu also allows you to disable selected options.

The Utils menu can be displayed by selecting the corresponding "System" button.
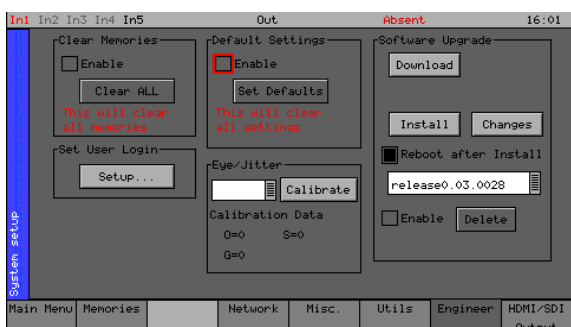
The Engineer menu is used to manage the Rx instrument and allows user access to be setup and the installation of new versions of software.

The Engineers menu can be displayed by selecting the corresponding "System" button.
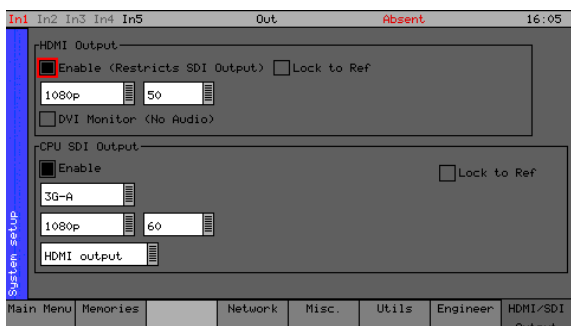
The HDMI/SDI Outputs menu controls the use of the HDMI® monitor output and the SDI output on the CPU module.

The HDMI/SDI Output menu can be displayed by selecting the corresponding "System" button.

Logging Menu
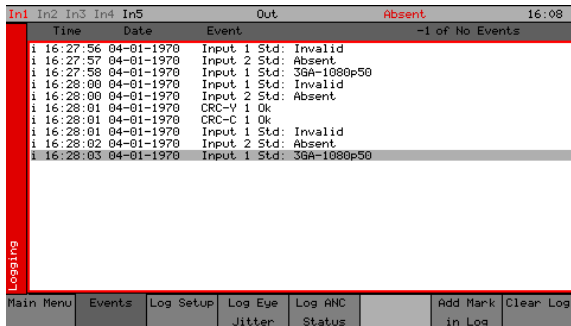
The Event Log menu displays a list of events with a time stamp showing when they occurred.

The Event Log menu can be displayed by selecting the corresponding "Logging" button.
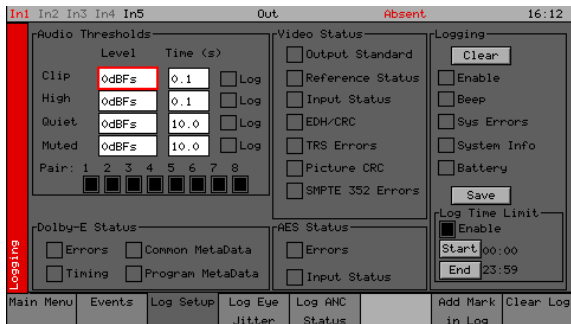
The Log Setup menu allows specific events to be tracked by the Rx instrument.

The Log Setup menu can be displayed by selecting the corresponding "Logging" button.
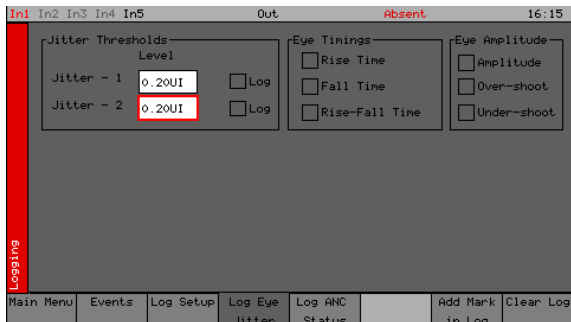
The Log Eye Jitter menu allows Eye Jitter events to be logged.

The Log Eye Jitter menu can be displayed by selecting the corresponding "Logging" button.
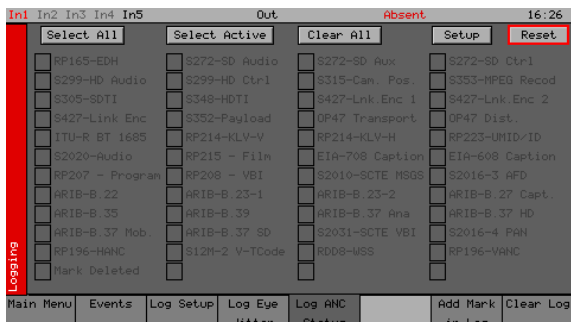
The Log ANC Status menu allows selected ANC packets to be tracked lor changes in status (e.g. Present, Checksum Error, Missing, Parity Error).

The Log ANC Status menu can be displayed by selecting the corresponding "Logging" button.

Speaker Menu
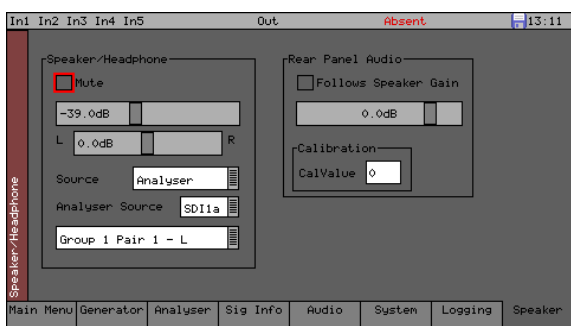
The Speaker menu controls which audio pair that can be heard on the loud speakers and headphone output of the Rx instrument.

Multiple Analyzers

The Analyzer module resource used by the Rx2000 front panel is directly linked to the selected input source. If for example the "SDI1a" input is selected this will use Analyzer 1 (ie the first analyzer channel found in the first occupied Module slot). If "SDI2a" is selected it will use Analyser 2 (ie the second analyser channel).

Selection of inputs using the Rx2000 front panel (left-hand bank of buttons) will automatically re-assign the analyser resource used by the HDMI® monitor output affecting its use. Note that Bank 1 on the left hand screen gives access to input "SDI1a" through to "FIB2b" and Bank 2 gives access to inputs "SDI3a through to "FIB4b".
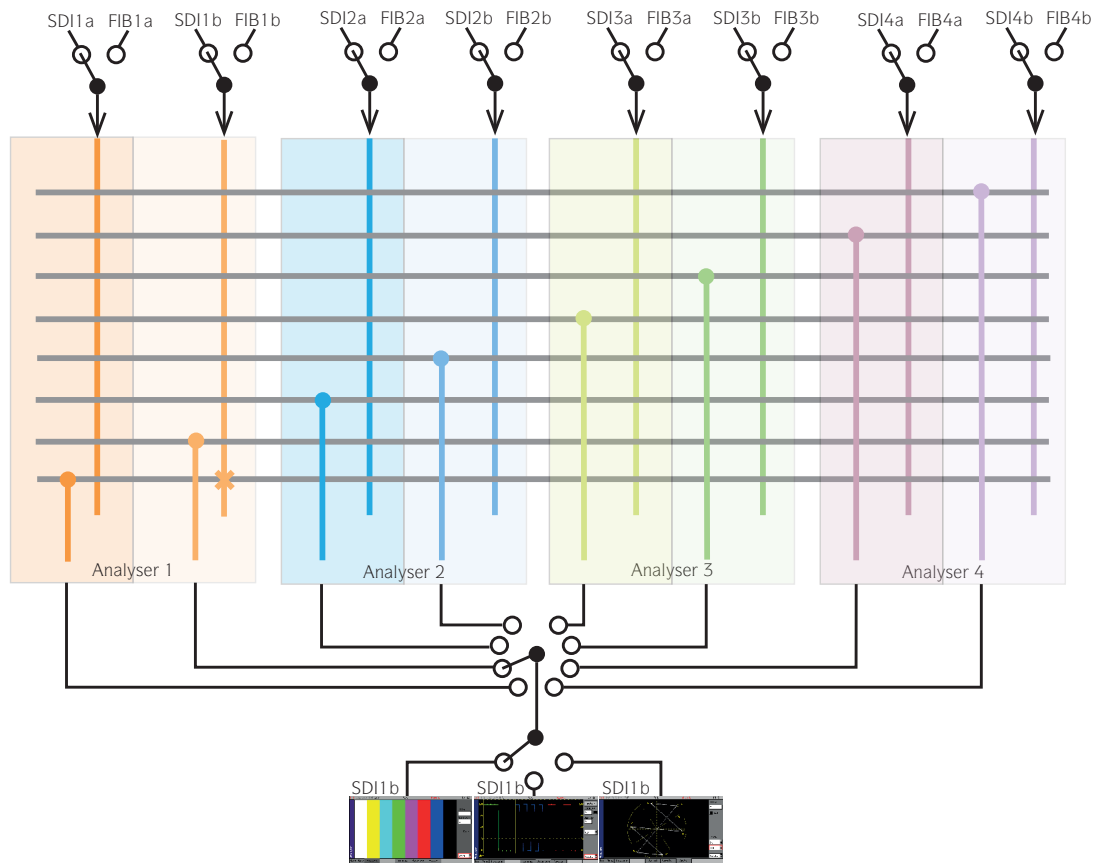
All of the different Instrument displays (Picture, Waveform Monitor, Vectorscope, etc) on the Rx2000 front panel will use the same analyzer resource. The front panel buttons will just switch the instrument being displayed.

Note that for Dual Link analysis the Link 1 signal must be connected to "IN1" BNC connector and the Link 2 signal must be connected to "IN2" BNC connector on the same Anayzer module. Likewise if Fibre is being used Link 1 should connect to "OPTICAL A" and Link 2 should connect to "OPTICAL B"

Rx1000 & Rx500

Turning on and off the instrument

To turn on your PHABRIX Rx1000 or Rx500 instrument, press the button at the top right hand corner of the front panel.

Once the system has started, pressing the button again will turn it off. If for some reason the instrument stops responding, pressing and holding the button for a few seconds will turn it off.

Navigation

The left and right cursor buttons can be used to move through the main menus. The currently selected menu being the one in the centre of the display between the left and right arrow symbols.

The down cursor button can be used to edit numeric fields and the up cursor button can be used to save the changes made.

The six buttons below the OLED display control the selection of the options within the currently selected menu.

The "Input" button to the left of the screen selects the Inputs menu and the "Preset" button selects the Presets menu.

Preset Menu

The Preset menu can be selected either using the "Preset" button or by using the left and right cursor buttons to scroll through the menus.

The Presets menu allows pre-defined system presets to be loaded. The buttons below the LED screen can be used to select the presets (for example "Memory 1", "Memory 2", etc) currently stored on the Rx instrument.

See the "Monitor Output" section for details about to create presets.

Inputs Menu

The Input menu can be selected either using the "Preset" button or by using the left and right cursor buttons to scroll through the menus.

Preset	◄ Input ►	DHCP Mode
Vol:-30dB	Group 1	Next/Prev

| SDI1a | SDI1b | SDI2a | SDI2b | SDI3a | SDI3b |
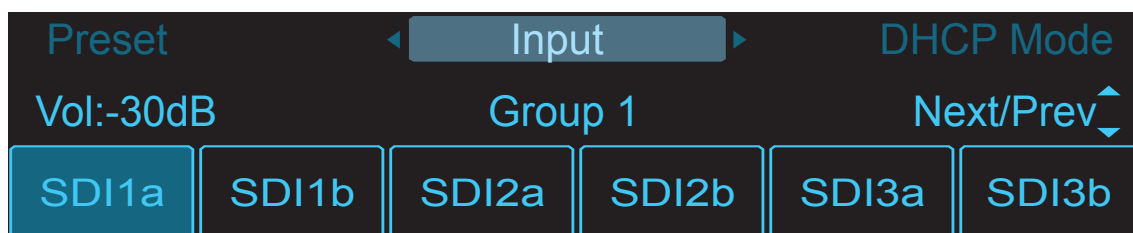
The Inputs menu allows the video signals connected to the Rx instrument to be selected for analysis. The buttons below the LED screen can be used to select the inputs such as "SDI1a", "SDI1b", "SDI2a", "FIB2a", etc. The options that are displayed here depend on the number and type of Rx modules that are installed.

DHCP Mode Menu

The DHCP Mode menu is use to turn on and of the unit's network Dynamic Host Configuration Protocol mode.

Input	◄ DHCP Mode ►	Network Name
Vol:-30dB	ON	Turn Off
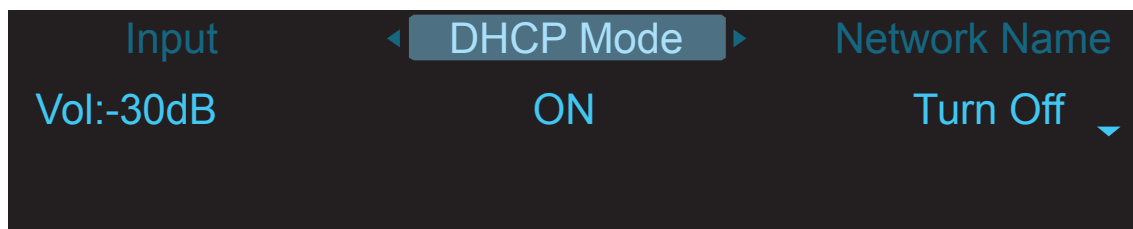
When DHCP is turned on, then the Rx instrument will automatically attempt to obtain an IP address for the instrument from you organisation's DHCP server. In this mode it will not be possible to manually change the IP Address, Subnet mask, etc

To turn off the DHCP mode use the down cursor button. With DHCP turned off the unit's IP address, subnet mask and gateway details will have to be entered manually.

Network Name

Network Name is a read-only menu that displays the host name given to the Rx instrument, ie "PhabrixRx". This Network name can be setup on the Network Setup menu of the HDMI® monitor output.

DHCP Mode	◄ Network Name ►	IP Address
Vol:-30dB	PhabrixRX	
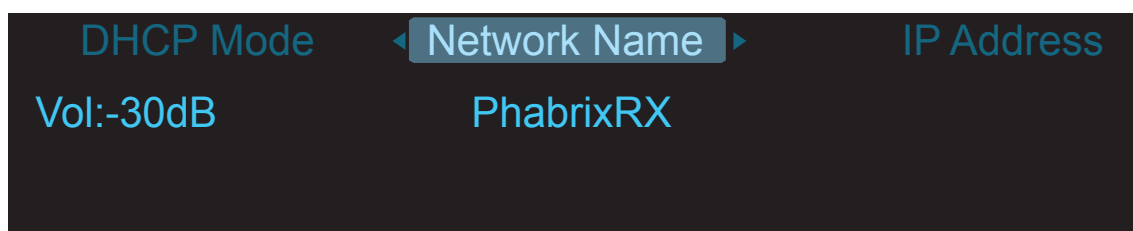
IP Address Menu

The IP Address menu allows the IP address for the Rx instrument to be viewed and setup. Note that if DHCP mode is turned on, then the address will be populated automatically and this will be read-only.

Network Name	◄ IP Address ►	Gateway
Vol:-30dB	192.168.000.038	Edit Off ⌄

To enter or change the address press the down cursor button to enter edit mode :

Network Name	◄ IP Address ►	Gateway
Vol:-30dB	192.168.000.038	Edit On ⌃
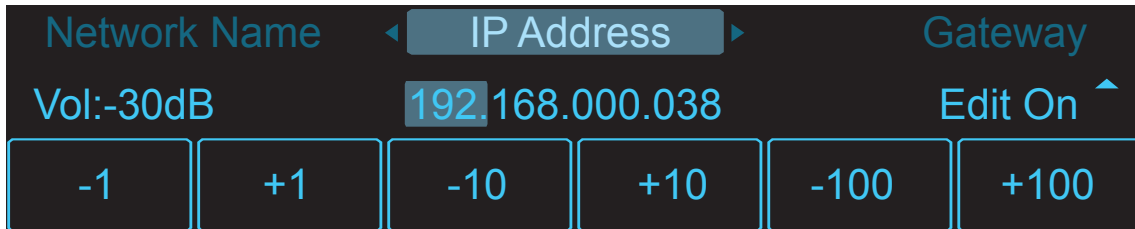
-1	+1	-10	+10	-100	+100

The first number bank will be selected automatically. Use the buttons below the screen to change the number or select any of the buttons below the LED screen (-1, +1, -10, +10, -100, +100) to increment the value accordingly.

Select the right-hand cursor button to move to the next number bank

Repeat this process until the required address has been entered then select the up cursor button to exit edit mode.

Gateway Menu

The Gateway menu allows the network gateway address to be setup. To enter or change the address:

Press the down cursor button to enter edit mode and to select the first number bank.

Use the buttons below the screen to change the number or select any of the buttons below the LED screen (-1, +1, -10, +10, -100, +100) to increment the value accordingly.

Select the right-hand cursor button to move to the next number bank

Repeat this process until the required address has been entered then select the up cursor button to exit edit mode.

Note that if DHCP mode is turned on, then the address will be populated automatically and this will be read-only.

Sub Net Mask Menu

The Sub Net Mask menu allows the network Subnet mask address to be setup. To enter or change the address:

> Press the down cursor button to enter edit mode and to select the first number bank.

> Use the buttons below the screen to change the number or select any of the buttons below the LED screen (-1, +1, -10, +10, -100, +100) to increment the value accordingly.

> Select the right-hand cursor button to move to the next number bank

> Repeat this process until the required address has been entered then select the up cursor button to exit edit mode.

Note that if DHCP mode is turned on, then the address will be populated automatically and this will be read-only.

DNS Server Menu

The DNS Server menu allows the address of your organisation's DNS (Domain Name Service) server to be entered. To enter or change the address:

> Press the down cursor button to enter edit mode and to select the first number bank.

> Use the buttons below the screen to change the number or select any of the buttons below the LED screen (-1, +1, -10, +10, -100, +100) to increment or decrement the value accordingly.

> Select the right-hand cursor button to move to the next number bank

> Repeat this process until the required address has been entered then select the up cursor button to exit edit mode.

Note that if DHCP mode is turned on, then the address will be populated automatically and this will be read-only.

GEN Type Menu

The GEN Type menu allows the SD-SDI format for the CPU generator output to be selected. The buttons below the LED screen allow the SDI output to be turned on.
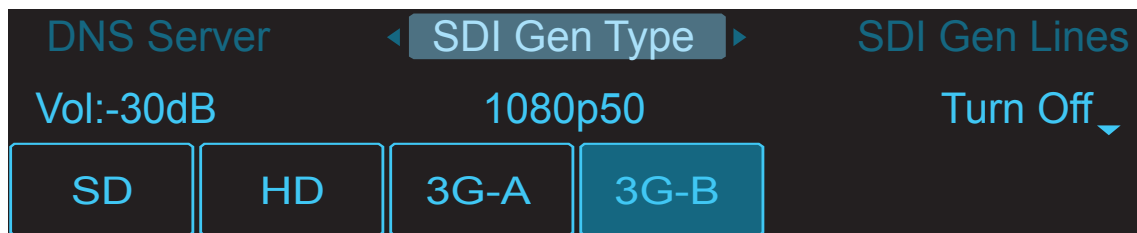
GEN Lines Menu

The GEN Lines menu allows the line standard of the test pattern to be selected. To select a line standard, press the button beneath the screen for the standard you require.

GEN Rate Menu

The GEN Rate menu allows the frame rate of the test pattern to be selected. To select a frame rate, press the button beneath the screen for the frame rate you require.

GEN Pattern Menu

The GEN Pattern menu allows the test pattern on the CPU generator output to be selected. To select a pattern, press the button beneath the screen for the pattern you require.

SDI Gen Rate	◄	SDI Pattern	►	HDMI Output

Vol:-30dB   1080p50

100% Bars	75% Bars	Check Field
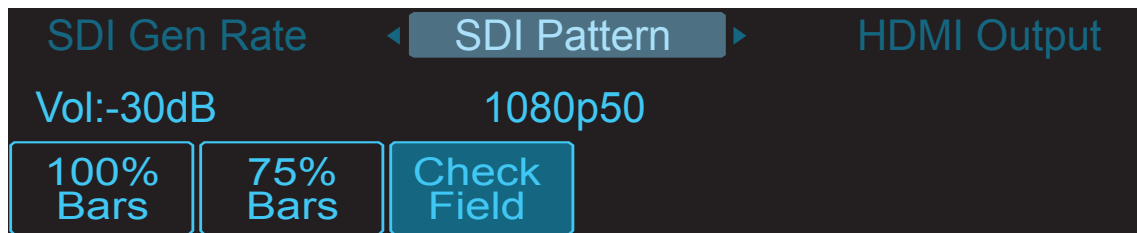
HDMI Output Menu

The HDMI Output menu allows the HDMI® monitor to be turned on and off. Use the up and down cursor buttons to turn on and off the HDMI® monitor output.

HDMI Rate Menu

The HDMI Rate menu allows the frame rate of the HDMI® monitor to be selected. To select a frame rate, press the button beneath the screen for the frame rate you require.

Brightness Menu

The Brightness menu allows the OLED screen brightness to be setup. The buttons below the screen can be used to increment or decrement the value.

Screensaver Menu

The Screensaver menu allows the OLED screen saver to be turned on or off and allows the wait time to be setup. The buttons below the screen can be used to select the value.

Software Version Menu

The Sw Version displays the current version of software that is installed on the Rx1000 or Rx500 instrument.

Remote Control Menu

The Remote Control menu allows the Rx remote control to be turned on or off. Use the up and down cursor buttons to turn on and off the remote control mode.

Monitor Output

Overview

The Rx range of products provide a Monitor output in the form of an HDMI output that can display up to 16 instrument windows at 1920 x 1080 resolution. This Monitor output display can display the pre-sets selected by the "Pre-set Buttons" and can be controlled by a USB mouse and keyboard connected to the Rx instrument.
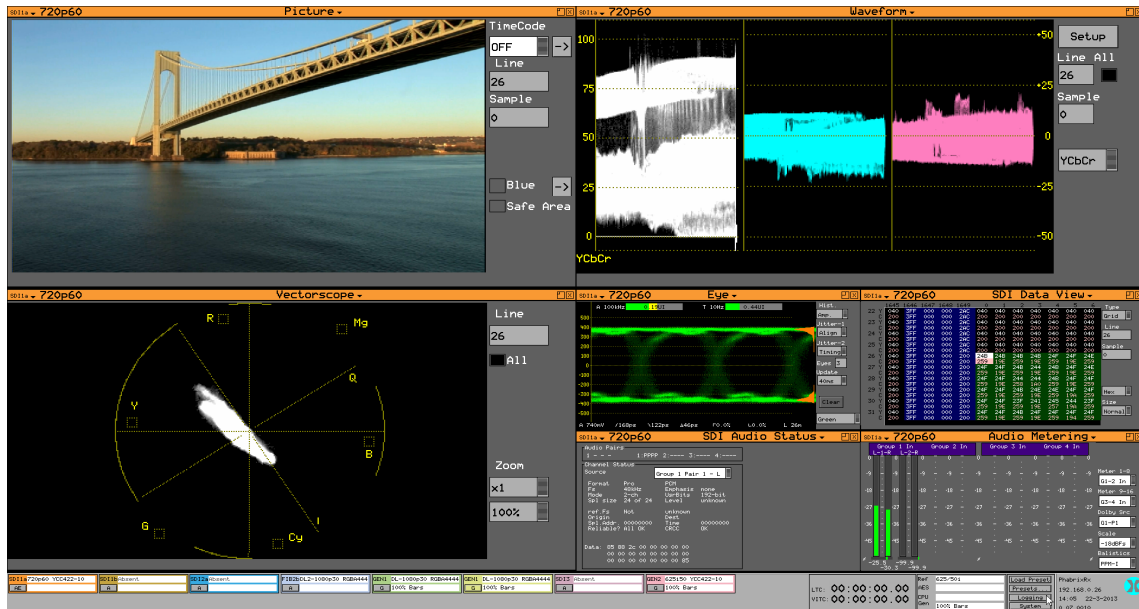
Note that on the Rx 500 and Rx 1000 instruments, the Monitor Output is always enabled. But on the Rx 2000 instrument, however, the Monitor output can be enable/disabled in the "HDMI/ SDI Output" menu that is available from the Instrument Display on the front of the instrument.

When an HDMI or SDI monitor is connected to the Rx instrument, it will display a Task Bar along the bottom of the screen that shows the currently installed Analyzer and Generator modules. These are colour coded to match the instrument panels allocated to the selected input/output and module. All of the instruments that share the same Analyzer or Generator resource have the same colour coding.
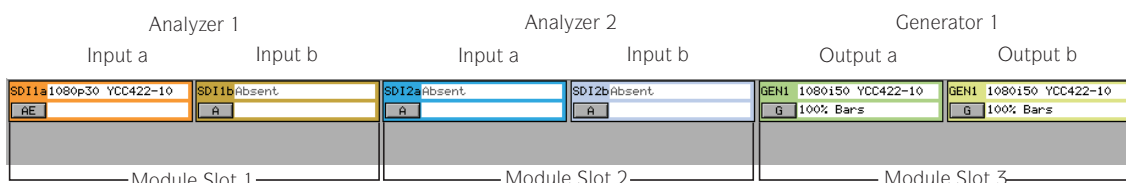
Clicking on the Input of an Analyser module will allow different analyser instruments windows to be selected for that input. Clicking on the Output of a Generator module will allow different generator windows to be displayed for that output. Clicking on the System, Logging and Presets menus will corresponding windows to be displayed.

Display Area

The display area above the "Task Bar" can display any of the instrument panels that are available with the installed hardware modules and software options. The instrument panels that are display can be selected from pre-configured, already saved and/or New instrument panels (or windows) created by right-clicking using the mouse.

Locking Reference VITC and LTC

Vertical Interval Timecode (VITC) and Longitudinal Timecode (LTC) present on the analogue (625i/50 and 525i/59.94) locking reference signal connected to the "REF" connection on the rear of the Rx unit can be displayed on the Task Bar of the HDMI® monitor output.
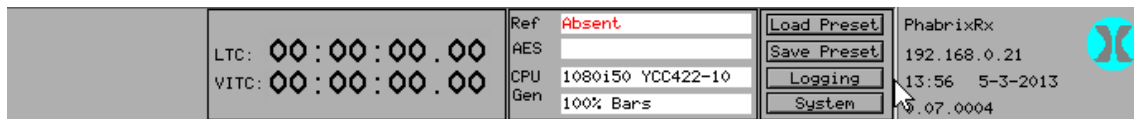
The "System" - "Time Code Setup" menu allows the system's locking reference input LTC and VITC to be displayed on the HDMI® monitor output. The line number where the VITC is located on the analogue locking reference signal can be selected using the "Line Number" field.

Instrument Panel Re-sizing

Instrument panels are created and displayed at sixteenth screen size by default. Specific instruments such as Picture, Waveform, Vectorscope and Eye waveform can be displayed at quarter screen size.
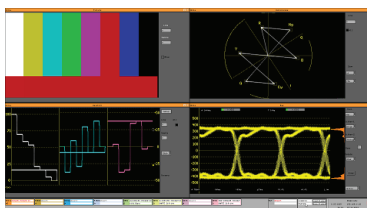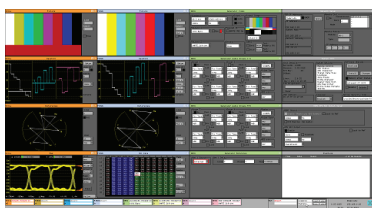
Instrument panels of different sizes can be assembled on screen in any combination and these can be saved as memory presets.
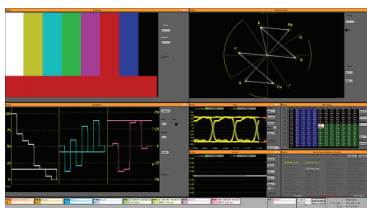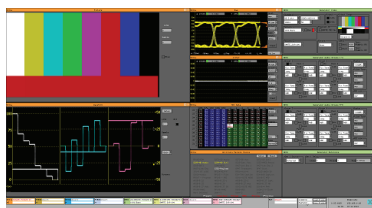
The icon buttons in the top right corner of the instrument panel control the size of the panel:

 1/16th size panel

 1/4 size panel

 Close panel

Analyzer Panels

Clicking on the Input of an Analyser module on the task bar will allow different analyser instruments windows to be selected for that input.
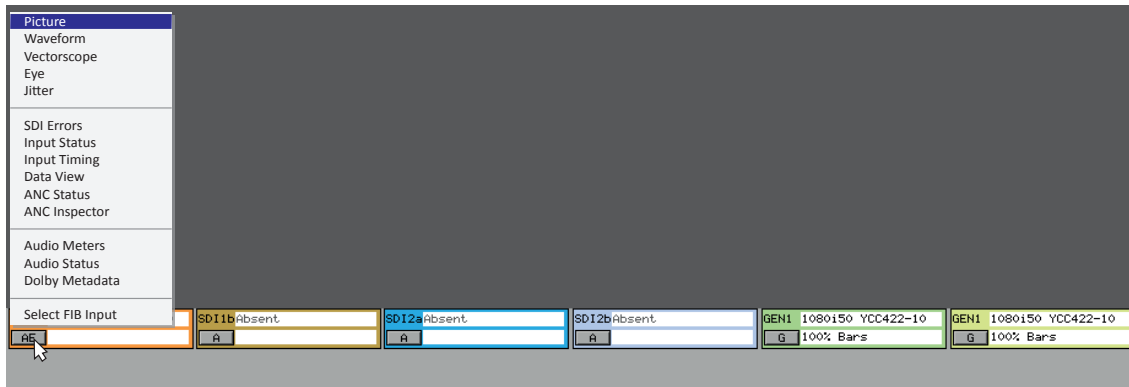
Clicking on instrument type title (Picture, Waveform. Vectorscope etc) allows the waveform type to be changed. Clicking on the input allows the input to the analyzer to be changed.

The types of instrument panels that are available include:

Picture
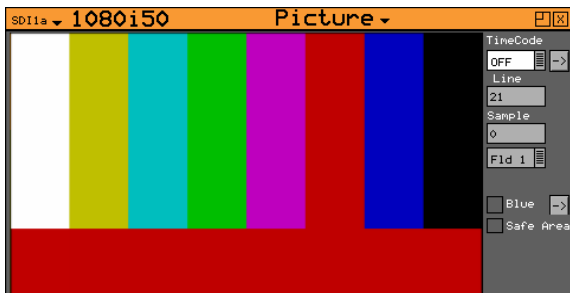
The Picture window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Picture". This will create a new window panel for the selected input.

See the "Analyzer" - "Picture" section in chapter 2 for details

Waveform
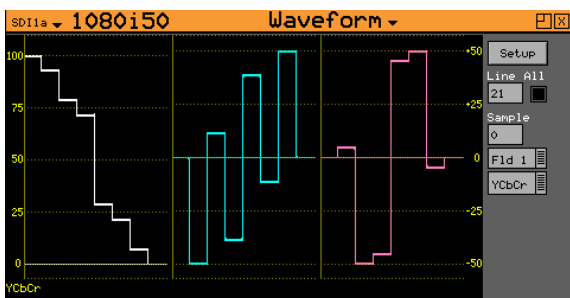
The Waveform window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Waveform". This will create a new window panel for the selected input.

See the Analyzer - "Waveform Monitor" section in chapter 2 for details.

Vectorscope
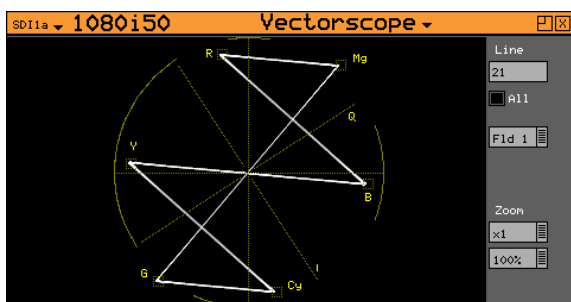
The Vectorscope window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Waveform". This will create a new window panel for the selected input.

See the "Analyzer" - "Vectorscope" section in chapter 2 or details
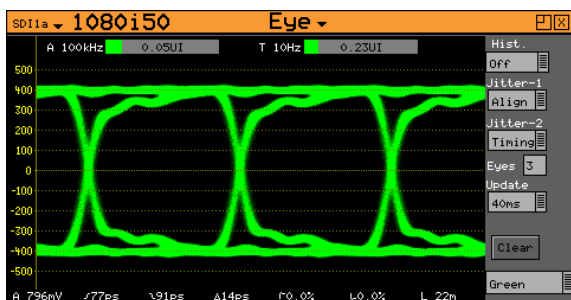
Eye

The Eye window is accessed by clicking on an Analyzer Eye slot on the monitor output task bar and selecting "Eye". This will create a new window panel for the selected input.

This allows the jitter of the selected input video signal to be monitored using an Eye Pattern display.

See the Analyzer - "Eye and Jitter" section in chapter 2 for details.

Jitter
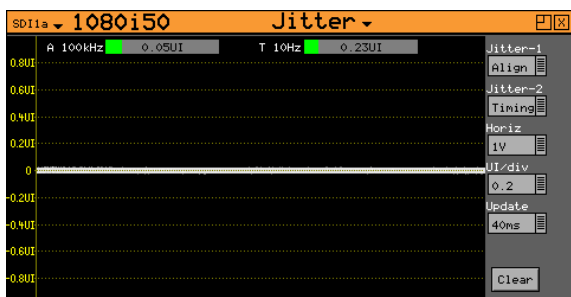
The Jitter window is accessed by clicking on an Analyzer Eye slot on the monitor output task bar and selecting "Jitter". This will create a new window panel for the selected input.

This allows the jitter of the selected input video signal to be monitored against time.

See the "Analyzer" - "Jitter" section in chapter 2 for details.

SDI Errors
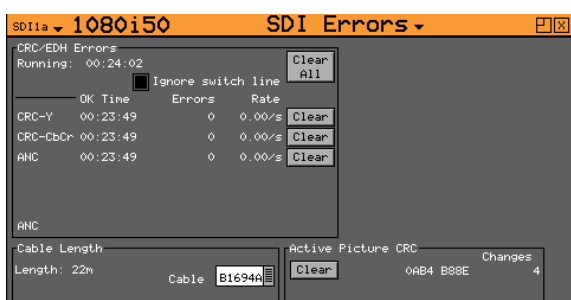
The SDI Error window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "SDI Errors". This will create a new window panel for the selected input displaying the EDH or CRC status as appropriate for the video standard being monitored.

See the "System Information Menus" - "Video Status" in chapter 2 for details.

Input Status
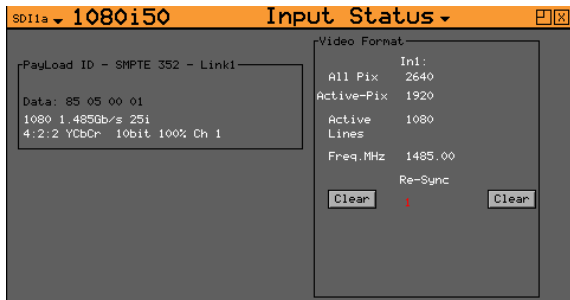
With an Analyzer Module installed the content of any SMPTE 352 packets can be displayed.

The Input Status & SMPTE 352 Status window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Input Status". This will create a new window panel for the selected input.

See the "System Information Menus" - "Misc Status" section in chapter 2 for details.

Input Timing
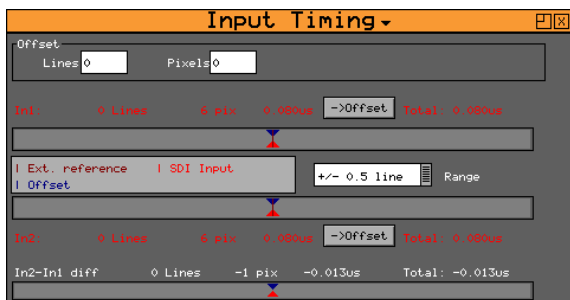
With an Analyzer Module installed the timing with respect to the locking reference can be monitored.

The Input Timing window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Input Timing". This will create a new window panel for the selected input.

See the "System Information Menus" - "Video Timing" section in chapter 2 for details.

Data View
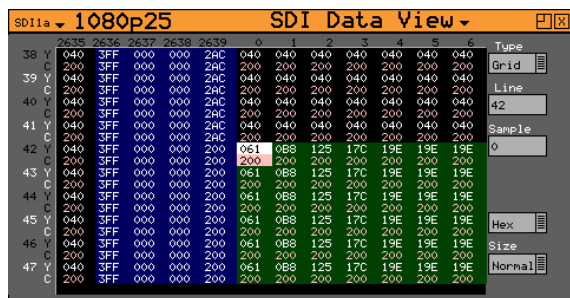
The SDI Data window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Data View". This will create a new window panel for the selected input.

See the "Analyzer" - "Signal Data" section in chapter 2 for details.

ANC Status
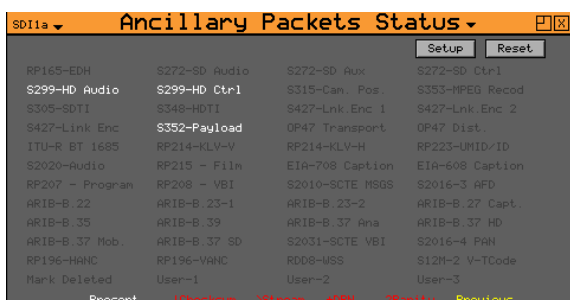
With the SDI analysis option, details of Ancillary packets of the selected input can be displayed.

The Ancillary Packet Status window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "ANC Status". This will create a new window panel for the selected input.

See the "System Information Menus" - "ANC Status" section in chapter 2 for details.

ANC Inspector
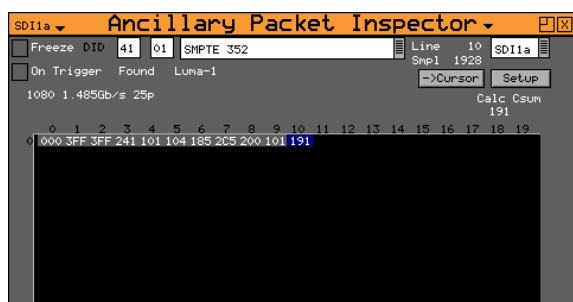
With the SDI analysis option the content of selected Ancillary packets can be displayed.

The Ancillary Inspector window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "ANC Inspector". This will create a new window panel for the selected input.

See the "System Information Menus" -"Ancillary Inspector" section in chapter 2 for information.

Audio Meters
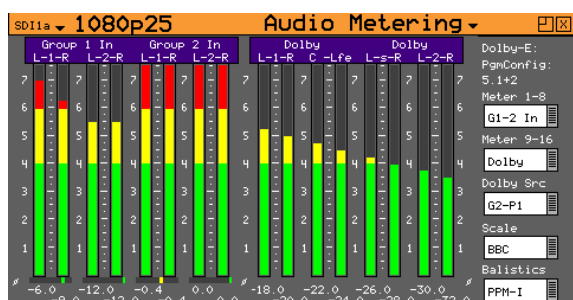
With an Analyzer Module installed the selected input audio level can be displayed graphically.

The Audio Metering window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Audio Meters". This will create a new window panel for the selected input.

See the "Audio" - "Audio Meters" section in chapter 2 for details.

Audio Status
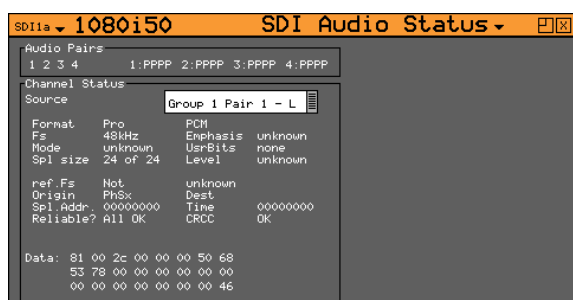
With an Analyzer Module installed the selected input audio encoding details can be displayed.

The SDI Audio Status window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Audio Satus". This will create a new window panel for the selected input.

See the "Audio" - "Audio Status" section in chapter 2 for details.

Dolby Meta-data
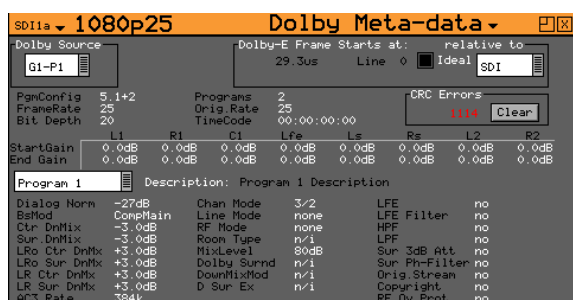
With the Dolby E Analyzer Option the selected input Dolby E audio encoding details can be displayed.

The Dolby Meta-data window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Dolby MetaData". This will create a new window panel for the selected input.

See the "Audio" - "Dolby" section in chapter 2 for details.

Generator Panels

Clicking on the Output of a Generator module will allow different generator windows to be displayed for that output.
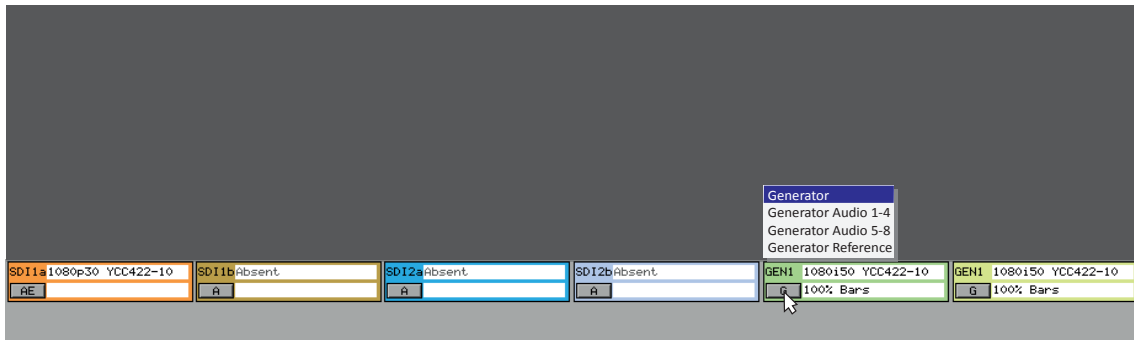
Clicking on instrument type title (Generator, Generator Audio 1-4, Generator Audion 5-8, Generator Reference) allows the generator type to be changed.
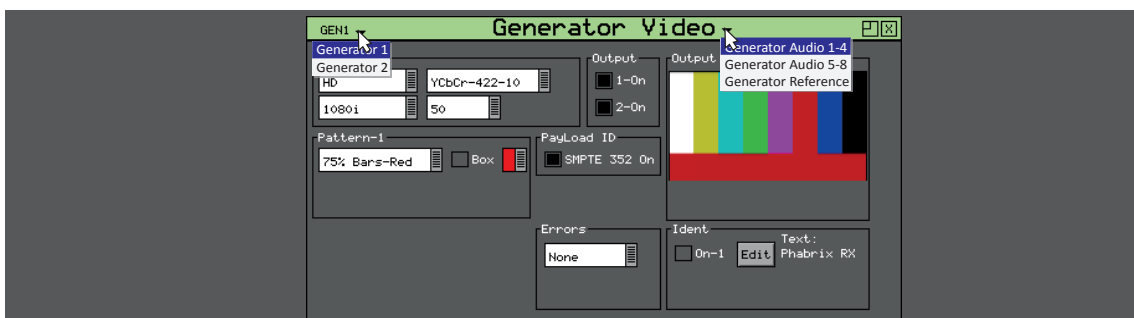
Generator
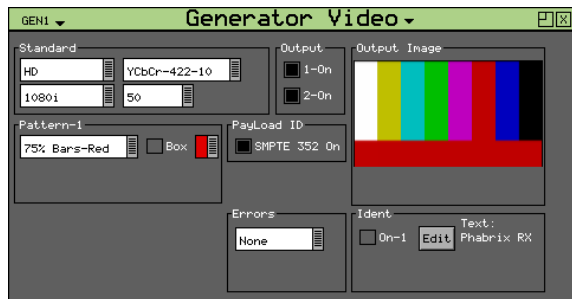
With a Generator Module installed video test signals for SD, HD and 3G SDI standards can be created

The Generator Video window is accessed by clicking on a Generator slot on the monitor output task bar and selecting "Generator". This will create a new window panel for the selected output.

See the "Generator" - "Video Out" section in chapter 2 for details.

Generator Audio 1-4
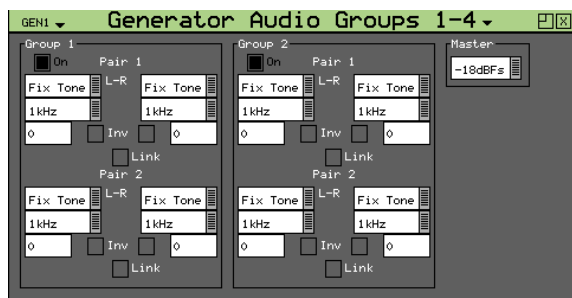
With a Generator Module installed can embed 16 channels of audio.

The Generator Audio 1-4 window is accessed by clicking on a Generator slot on the monitor output task bar and selecting "Generator Audio 1-4". This will create a new window panel for the selected output.

See the "Generator" - "Audio Group 1/2" section in chapter 2 for details.

Generator Audio 5-8
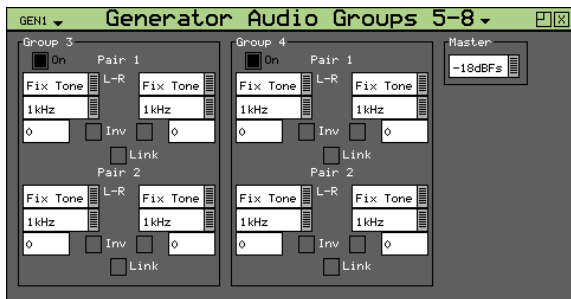
The Generator Audio 5-8 window is accessed by clicking on a Generator slot on the monitor output task bar and selecting "Generator Audio 5-8". This will create a new window panel for the selected output.

See the "Generator" - "Audio Group 3/4" section in chapter 2 for details.

Generator Reference
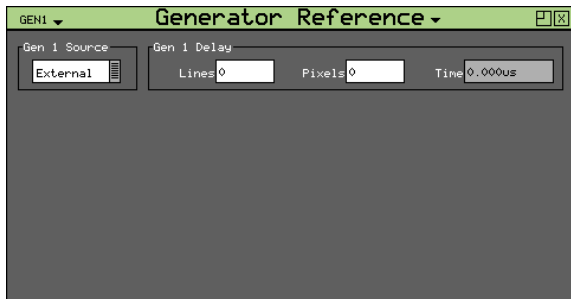
With a Generator Module installed video test signals that are either free-running or locked to a studio reference can be created.

The Generator Reference window is accessed by clicking on a Generator slot on the monitor output task bar and selecting "Generator Reference". This will create a new window for the selected output.

See the "Generator" - "Gen Lock" section in chapter 2 for details.

Logging Panels

Clicking on the Logging menu will allow the following window panels to be displayed.
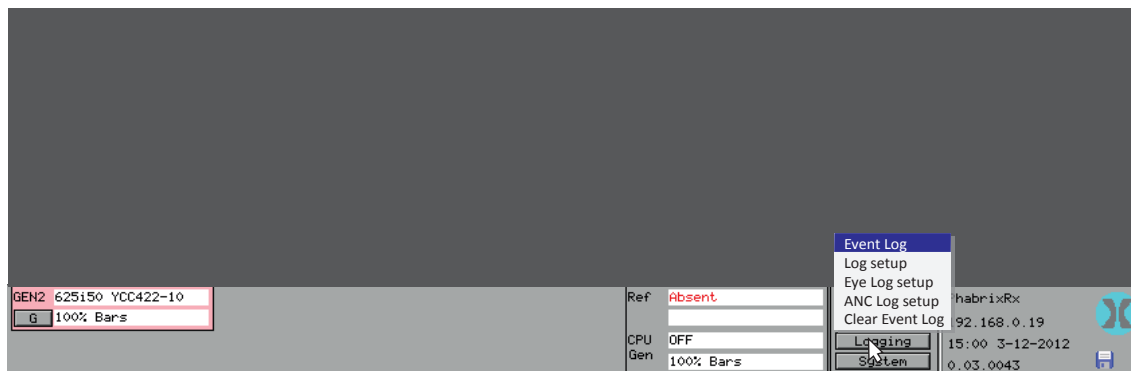
Event Log
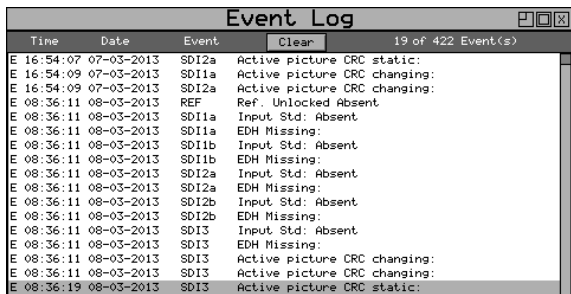
Logging allows events to be detected and recorded for future examination.

The Event Log window is accessed by clicking on the Logging menu on the monitor output task bar and selecting "Event Log".

See the "logging"-"Event" section in chapter 2 for details.

Log setup
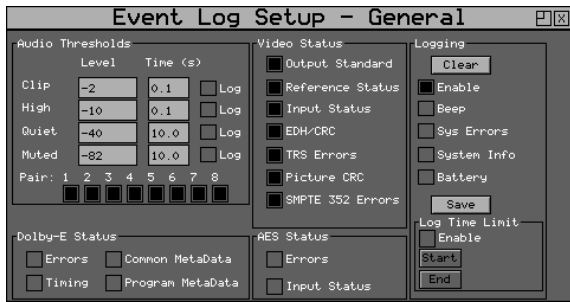
The Log Setup menu allows specific events to be tracked by the Rx instrument.

The Log Setup window is accessed by clicking on the Logging menu on the monitor output task bar and selecting "Log Setup".

See the "logging"-"Log Setup" section in chapter 2 for details.

Eye Log setup
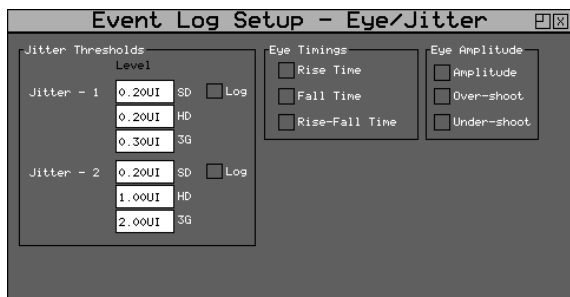
The Eye Log Setup menu allows specific Eye and Jitter events to be tracked by the Rx instrument.

The Eye/Jitter Logging window is accessed by clicking on the Logging menu on the monitor output task bar and selecting "Eye Log Setup".

See the "logging"-"Eye Log Setup" section in chapter 2 for details.

ANC Log setup
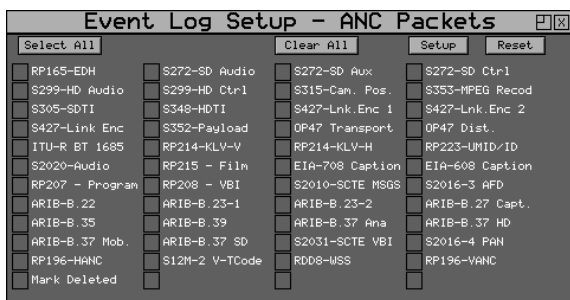
The Log ANC Status menu allows specific ANC data events to be tracked by the Rx instrument.

The ANC Packet Logging window is accessed by clicking on the Logging menu on the monitor output task bar and selecting "ANC Log Setup".

See the "logging"-"ANC Log Setup" section in chapter 2 for details.

System Panels

Clicking on the System menu will allow the following window panels to be displayed.
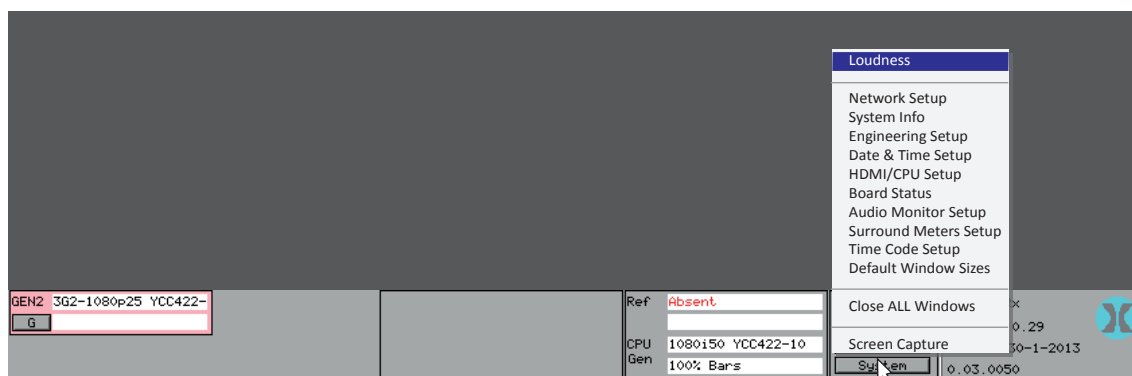
Network Setup
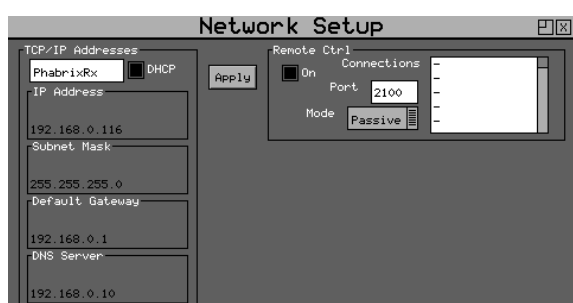
The Rx Instrument is fully network compatible and has a complete network interface to allow control of any Rx instrument from any other unit.

The Network Setup window is accessed by clicking on the System menu on the monitor output task bar and selecting "Network Setup".

See the "System" - "Network" section in chapter 2 for details.

System Info
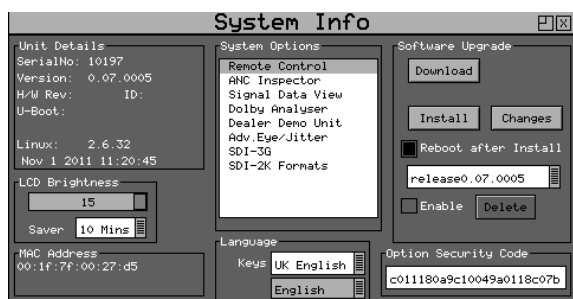
The System Info window displays the system software status and options that are installed on the HDMI® monitor output.

The System Info window is accessed by clicking on the System menu on the monitor output task bar and selecting "System Info".

See the "System" - "Misc" section in chapter 2 for details.

Engineer Setup
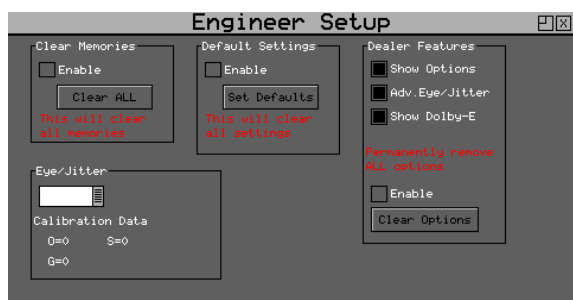
The Engineer menu is used to manage the Rx instrument and allows user access to be setup and the installation of new versions of software.

The Engineer Setup window is accessed by clicking on the System menu on the monitor output task bar and selecting "Engineer Setup".

See the "System"-"Engineer" section in chapter 2 for details.

Date/Time Setup

The Date/Time Setup window displays the current status of the hardware modules on the HDMI® monitor output.

The Date/Time Setup window is accessed by clicking on the System menu on the monitor output task bar and selecting "Date & Time Setup".

See the "System" - "Date / Time Setup" section in chapter 2 for details

HDMI/CPU SDI Setup
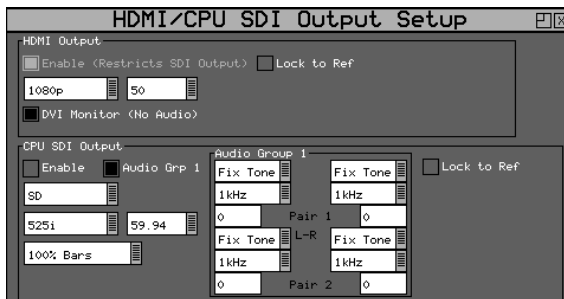
The Rx provides a Monitor output in the form of an HDMI output that can display up to 16 instrument windows.

The HDMI/CPU SDI Output Setup window is accessed by clicking on the System menu on the monitor output task bar and selecting "HDMI/CPU SDI Output Setup".

Board Status
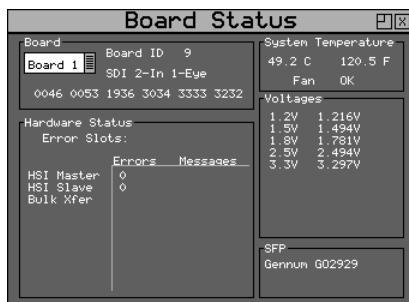
The Board Status window displays the current status of the hardware modules on the HDMI® monitor output.

The Board Status window is accessed by clicking on the System menu on the monitor output task bar and selecting "Board Status".

See the "System" - "System Status" section in chapter 2 for details.

Audio Monitoring Setup
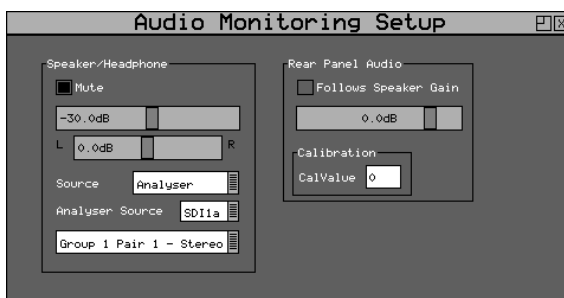
The Audio Monitoring Setup window is accessed by clicking on the System menu on the monitor output task bar and selecting "Audio Monitor Setup".

See the "System" - "Audio Monitoring" section in chapter 2 for details.

Surround Meter Setup
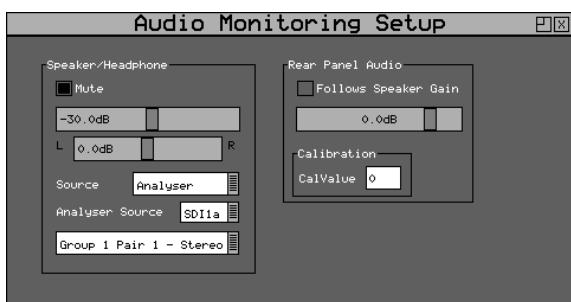
The Surround Meter Setup window allows the individual audio channels from the selected SDI input(s) to be mapped to the L, R, C, Lfe, Ls, Rs, Bsl and Bsr.

The window is accessed by clicking on the System menu on the monitor output task bar and selecting "Surround Meter Setup"

See the "System" - "Surround Meter" section in chapter 2 for details.

Time Code Setup
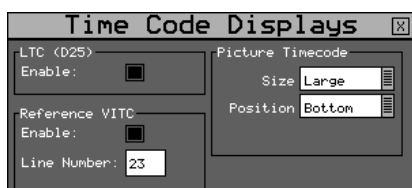
The Time Code Display window allows the system's locking reference input LTC and VITC to be displayed on the HDMI® monitor output.

This window also allows the ANC Timecode from the video input to be displayed in 3 different positions and 3 different sizes on the picture window.

See the "System" - "Time Code Setup" section in chapter 2 for details.

Default Window Sizes
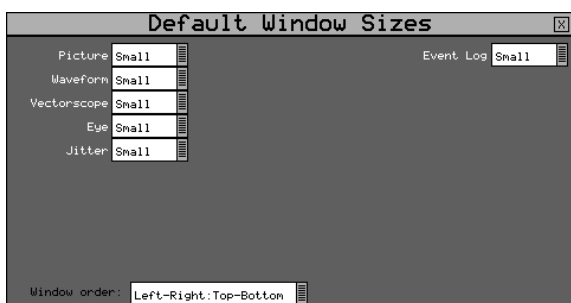
The Default Window Sizes window controls how instrument windows are added to the HDMI® monitor output and their starting size.

Instrument windows can be automatically assembled on screen either left to right or top to bottom.

See the "System" - "Default Window Sizes" section in chapter 2 for details.

Managing the Monitor Output

Closing Open Panels (Windows)

Any open panels can be closed using the "X" button in the top right corner of each panel. The currently selected panel (the one with the blue bar) can be closed by left-clicking the mouse on the System menu and selecting the "Close Window". The "Close ALL Windows" function will remove all of the instrument panels from the display area.

The functions within each Instrument panel on the Monitor Output display can be selected using the mouse rather than the "Navigation Buttons" used with the front panel Instrument Display.

Working with Multiple Analyzers

The analyzer channel that is used for the instrument panels is directly locked to the input of the Analyzer module itself. Clicking on the Input of an Analyser module on the task bar will allow different analyser instruments windows to be selected for that input. The input to be analyzed can also be selected from a drop-down list ("SDI1a","FIB1a", "SDI1b", "FIB1b", "SDI2a", etc).
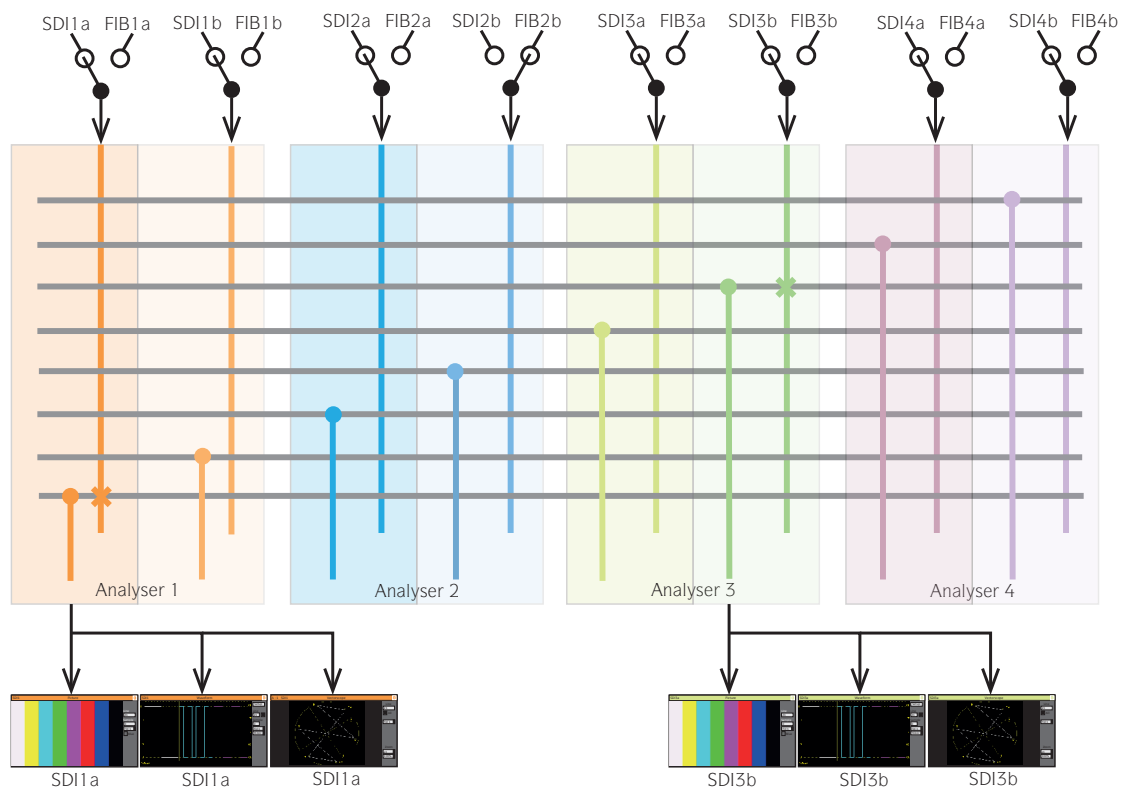
Note that Analyzer 1 is used by the Front Panel on the Rx2000 instrument so if the input to analyzer 1 is changed on the Front Panel it will also change the HDMI® monitor output.

Note that changing an input that has already be assigned to an analyzer will re-assigned the input to all of the instrument panels that share the same analyzer.

Note also that an input can only be monitored by one analyzer channel at a time.

Note that for Dual Link analysis the Link 1 signal must be connected to "IN1" BNC connector and the Link 2 signal must be connected to "IN2" BNC connector on the same Anayzer module. Likewise if Fibre is being used Link 1 should connect to "OPTICAL A" and Link 2 should connect to "OPTICAL B"

Working with Multiple Generators

When the Rx instrument contains multiple Generator modules, the generator to be controlled can be selected from the drop-down list in the corner of the panel (GEN1, GEN2, etc). Note that the PHRXM-GG module has 2 outputs (GEN-A and GEN-B) but this is treated as a single Generator as the outputs are locked together.

Saving Monitor Display Layouts
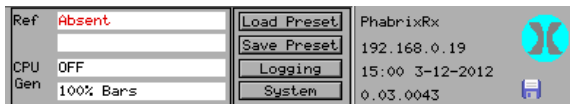
Elements of the currently displayed Instrument Panels can be saved as presets using the "Save" Preset" button on the Task Bar.
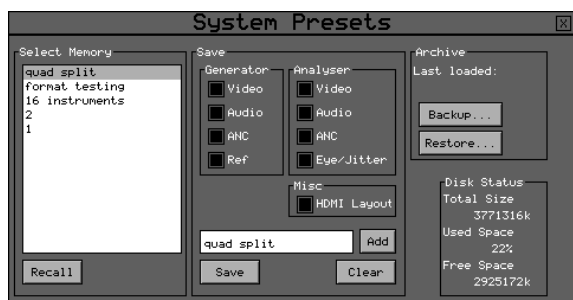
The "System Presets" panel then allows "HDMI Layout" check box to be chosen, a name given to the preset before it is saved. Stored presets can then be recalled at a later time either using the Load Preset menu or via the front panel controls of the Rx instrument.

See the "System" - "Preset Memories" section in chapter 2 for details.

Browser Control

Overview

The Rx2000 instrument can be controlled via a web browser that accesses the built-in web server. To connect to the Rx2000 instrument, find out the IP address (displayed in the bottom right corner of the Monitor output and in the System - Network menu from the front panel) and Enter it into the web browser.
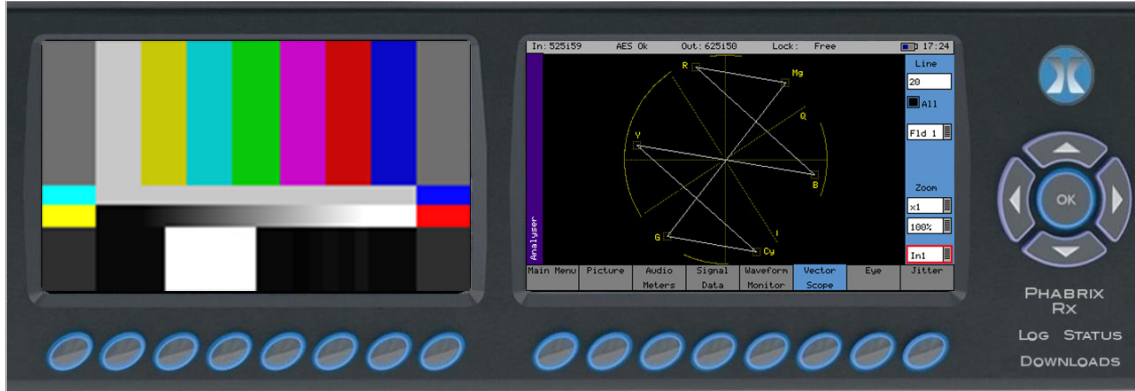
Browser operation has been tested using Firefox, Opera, Safari, Chrome and Internet Explorer but should work with any browser which allows JavaScript.

Clicking on the buttons works exactly like the instrument that you are connected to (note that auto-repeat doesn't work due to browser speed limitations). The menu screen on the browser image is updated every 10 seconds but may be refreshed manually by clicking the screen area on the browser.

The "Log" link on the right hand side may be selected to fetch the current Event Log from the Rx instrument.

The "Status" link on the right hand side may be selected to fetch the current instrument status in XML format. It can be saved to a local PC for further processing. The control IDs displayed in the XML file are determined by the file "/mnt/mmc/xmlformat.ini" which may be edited by the user although note that it should be backed up as it will be over-written when software updates take place.

The "Downloads" link displays a further page allowing screen dumps and report files (Command script option) to be viewed.
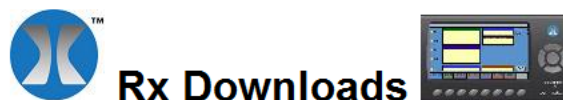
Screen Dumps

Screen dump images are stored here.

Press and hold OK button for 2 seconds to store current LCD image.

Report Files

Scripting reports and status files are stored here.

Using the Menus

The Menu buttons select which instrument is in use as well as selecting the options for the instrument. The bottom of the LCD display shows the function of each Menu button.

When in a specific function eg Generator, Analyzer etc, the cursor controls (⇦⇨⇧⇩) on the right hand of the instrument select a field to edit. The current field has a red box around it. Pressing the OK button starts or ends editing of that field. Check boxes are always in edit mode and pressing the OK button inverts the current state.

When editing some types of fields, the menu buttons at the bottom take on different functionality to allow cancelling edit mode or setting the value for the field. When lists of options are displayed the menu buttons allow selection of the first/last item in the list as well as paging through the available options. If the list of items is small, the available items may be displayed on the menu buttons for instant access.

The buttons along the bottom of the LCD display change the currently displayed page when not editing a data field. The left hand button always selects the top level menu and system overview page. So for example pressing the first button will select the "Main Menu", selecting the second button will select the "Generator" menu, etc.

The Main menu is the top level menu from which all other menus are selected on the Rx2000 instrument. The main menus are:

Generator	(only present if a Generator module is fitted) allows video test pattern selection to be made and audio test tones to be selected.
Analyzer	allows the selected input signal to be analysed in the form of a Picture, Waveform monitor, Vectorscope and Eye Pattern display (option).
Sig Info	allows detailed signal information about the video and audio status for the analyzer source to be displayed.
Audio	gives access to the Audio Meters and Audio Status displays.
System	allows the setup of system wide settings including memories, date/time and software.
Logging	selects the logging page to view and setup the error logging system.
Speaker	selects the speaker/headphone setup page.

See chapter 2 for full details of each of the menus.

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2   Menu Reference

Generator Menus

Generator Video / Video Out

The Rx instrument with a Generator Module installed can create video test signals for all supported SD and HD SDI output standards including the 3GHz standards at 1080p/50/59/60. It will support Y,Cr,Cb formats as well as RGB formats.
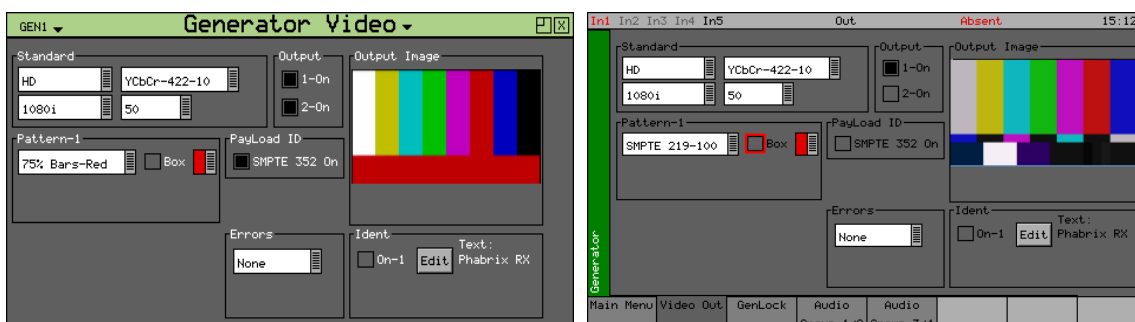
The Generator Video window is accessed by clicking on a Generator slot on the monitor output task bar and selecting "Generator".This will create a new window panel for the selected output.

Using the Rx2000 front panel, the Video Out menu can be displayed by selecting the corresponding "Generator" button.

Output On

The Output On function turns ON the output circuitry. On Rx instruments that have dual generator modules, there is the option to turn on output 1 and output 2 which correspond to the 2 generator outputs.

Note that for Dual Link test pattern generation both Output 1 and Output 2 must be enabled. The Link 1 signal is produced on the module's "GEN A" output and the Link 2 signal is produced on the module's "GEN B" output. Likewise if a Fibre connection is being used the Link 1 signal is produced on "OPTICAL GEN A" and the Link 2 signal is produced on "OPTICAL GEN B".

Standard

The menus in the Standard section are used to select the desire video output format. The top-left box selects the basic mode of the Rx instrument and determines whether it is generating normal SD/HD vide or 3G level A or level B video. Dual streams refer to the ability of the Rx instrument to generate two separate pictures when transmitting 3G-level B in some formats. Which mode is selected determines which formats are available. Only valid frame rates for the output standard may be selected.

Colour Format

Currently only YCbCr 4:2:2 10 bit picture formats are supported by the standard product but an Option may be purchased to enable other colour formats. The following colour modes may be selected dependent on line standard selected:

> YCbCr 422 10bit
> YCbCr 444 12bit
> YCbCr 444 10bit
> YCbCrA 4444 10bit
> YCbCr 422 12bit
> RGB 444 10bit
> RGBA 4444 10bit
> RGB 444 12bit

Pattern

This selects the video pattern that is output by the generator. Many standard patterns are provided by the Rx instrument. You may also upload your own test patterns to the Rx instrument into the 'Patterns' directory and then select them using the 'User File' option in this field. See the 'File Structure - Patterns' section for file formats supported. If a 'User File' has been selected, the 'i' button beside the file can be selected to get information on the file properties. Unsupported file types will be displayed as a black image. If the video standard is changed while a user file is loaded and there is no file for the new standard present, a black image will be loaded and the User File blanked.

A bouncing Box may be overlaid on the current test pattern by selecting the Box check box field.

Colour Bars test patterns are used to check that the colour gamut of the television system and to ensure the correct luminance and chrominance levels.
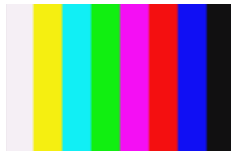
The "100% Colour bars" test pattern is produced by using combinations of the Red, Green and Blue primary colours:

> White (100% R, 100% G, 100% B)
> Yellow (100% R, 100% G, 0% B)
> Cyan (0% R, 100% G, 100% B)
> Green (0% R, 100G, 0% B)
> Magenta (100% R, 0%G, 100% B)
> Red (100% R, 0% G, 0%B)
> Blue (0% R, 0% G, 100% B)
> Black (0% R, 0% G, 0% B)

The "75% Colour bars" and "75% Colour bars + Red" test patterns are produced by using combinations of the Red, Green and Blue primary colours:

> White (100% R, 100% G, 100% B)
> Yellow (75% R, 75% G, 0% B)
> Cyan (0% R, 75% G, 75% B)
> Green (0% R, 75G, 0% B)
> Magenta (75% R, 0%G, 100% B)
> Red (75% R, 0% G, 0%B)
> Blue (0% R, 0% G, 75% B)
> Black (0% R, 0% G, 0% B)

Note that for consistency 75% colour bars should always be used when measuring or comparing jitter levels.
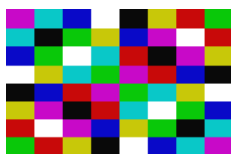
The "Tartan bars" test pattern is a chequerboard pattern of 75% colour bar colours that produces every combination of colour vector change.
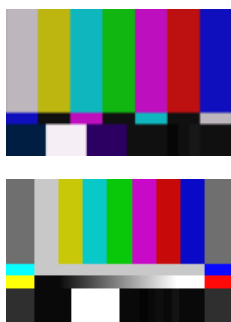
The "SMPTE Colour bars" test pattern was developed for the NTSC analogue video standard and produced by using the combinations of the Red, Green and Blue primary colours as used in 75% colour bars.

The "SMPTE ARIB STD-B28 Colour bars" test pattern is an updated version of SMPTE colour bars (developed by the Japanese Association of Radio Industry and Businesses) and standardized as SMPTE RP 219-2002 and is used to test both 4 × 3 standard definition and 16 × 9 high-definition video signals.
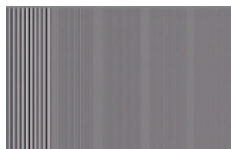
The "Multi-burst" test pattern is used to check the frequency response of the video path and check that it has not been affected by digital processing such as resizing, standards conversion or colour grading.
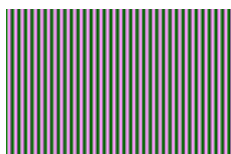
The "Bowtie" test pattern is used to check the alignment of the luminance and chrominance components through television equipment.

The Ramps and Steps test patterns are used to check the linearity of television equipment to ensure that there have been no digital bit level artefacts such as rounding errors introduced that may cause banding on the television pictures.

The "Luma Ramp" test pattern is used to check the linearity of the luminance component. This test pattern exercises all of the discrete digital video levels including illegal values below video black and above peak white.

The "Legal Ramp" test pattern is used to check the linearity of the luminance component. This test pattern exercises all of the discrete digital video levels from video black to video white, excluding illegal values.

The "Valid Ramp" test pattern is used to check the linearity of the Y (luminance), Cr (R-Y) and Cb (B-Y) components. This test pattern exercises all of the discrete digital video levels of these components, excluding illegal values.

The "Grey Bar - 5" test pattern is used to check for non linear distortion in the luminance component. The bars range from 100% white to 0% black in 20% steps. Typically non linearity will be seen as a loss of grey-scale distinction.

The "Grey Bar - 11" test pattern is used to check for non linear distortion in the luminance component. The bars range from 100% white to 0% black in 10% steps.

The "Grey Bar - 5 Vertical" test pattern is used to check for differential gain distortion in the luminance component line by line. The bars range from 100% white to 0% black in 20% steps. Typically non linearity will be seen as a loss of grey-scale distinction.

The "Grey Bar - 11 - Vertical" test pattern is used to check for differential gain distortion in the luminance component line by line. The bars range from 100% white to 0% black in 10% steps.
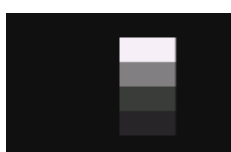
The "Pluge" (picture line-up generation equipment)test pattern is used to adjust the black level and contrast of a video monitor. The pattern consists of vertical luminance bars for white, mid grey, black and super black.

The Colour Field test patterns are used to provide primary colours (such as 100% red, green, blue, cyan, magenta and yellow) and monochrome luminance levels to check for calibration and banding effects caused by encoding/decoding processes.

Full Field White	Full Field 75% Grey	Full Field 50% Grey	Full Field 75% Grey	Full Field Black
Full Field Red	Full Field Green	Full Field Blue	Full Field Cyan	Full Field Magenta
Full Field Yellow				
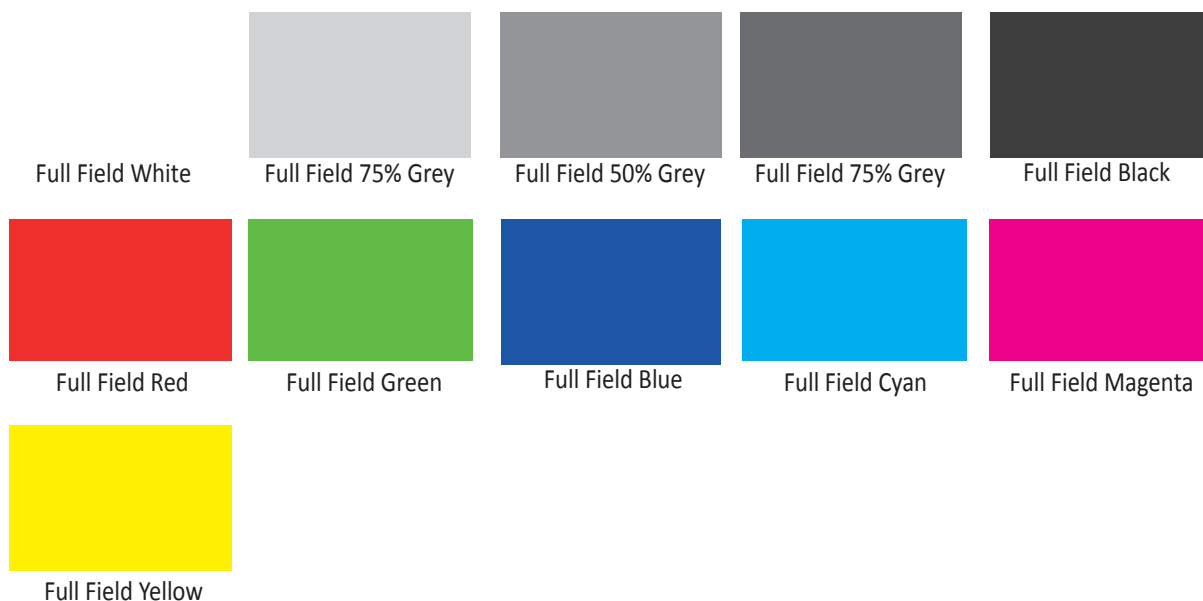
If colour field is the selected test pattern, another control selects which colour to generate. Three user definable custom colours may be defined using the "->" button. Custom colours are edited using the Red-Green-Blue sliders. When setting the colour using the RGB sliders, the YCbCr values will show the values for the current colour space. When setting the colour using the YCbCr sliders, the RGB values will show the values for the current colour space.

The Zone Plate is a 2 dimensional linear frequency sweep test pattern used to check the affect of filtering, sub-Nyquist, sampling, processing standards conversion and display. Whenever an image is re-sized or re-sampled there is a strong probability that the resultant image will suffer from one or more of the artefacts such as aliasing / moire, softening (caused by reduced frequency response) and ringing / halos.
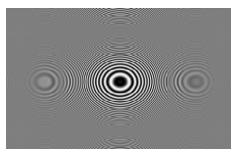
The "Zone Plate" test patterns are used to check that the horizontal and vertical frequency response of the video path is not affected by television equipment.

The zone plate selector will contain 3 user customisable zone plates as well as several pre-determined zone plates. The '->' button displays a dialogue which allow the parameters of the zone plate to be adjusted for the custom zone plates. Any of the preset zone plates may be copied to the custom zone plates to act as a starting point for a new zone plate. As the zone plate settings are stored in user memories a large number of custom zone plates are available:

Moving Zone-2H - A moving zone plate centred on the screen.

Static Zone-2H - A static zone plate centred on the screen from DC to the nyquist frequency at left/right edges.

Static Zone-2V - A static zone plate centred on the screen from DC to the nyquist frequency at top/bottom edges.

Sweep-Horiz - A horizontal sweep from DC to nyquist frequency horizontally.

Sweep-Vert - A vertical sweep from DC vertically.

Grating-50kHz - A 50kHz frequency sine wave when using an HD output.

Grating-1MHz@HD - A 1MHz frequency sine wave when using an HD output.

Grating-5MHz@HD - A 5MHz frequency sine wave when using an HD output

Custom allows editing of Custom zone plate settings. Three custom zone plates can be set up and can be copied from an existing presets using the 'Copy To' button.
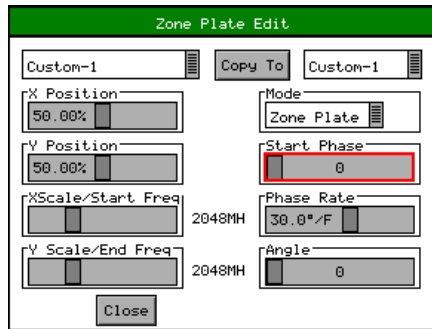
Mode - sets which type of Zone Plate is being produced. It may be Zone Plate (circular pattern) Grating (Linear horizontal or vertical grid) Sweep (Frequency sweeps from start to end Frequency)

Start Phase - sets the start phase of the sine wave generated by the zone plate generator and is set in degrees from 0-360

Phase Rate - is used to set the rate of change of phase of the sine wave and thus changes the speed that the zone plate moves at. It is specified in degrees per frame.

Angle - changes the angle of the zone plate and thus can change a horizontal sweep into a vertical sweep or rotate an elliptical zone plate pattern.

XScale/Start Freq - sets the horizontal scale of grating patterns or the start value of the zone plate sweep frequency.

YScale/End Freq - sets the vertical scale of grating patterns or the end value of the zone plate sweep frequency.

The Pathological test patterns are used to check that the phase locked loop circuitry used to decode SDI data can recover/regenerate the SDI sample clock under worst case conditions.

EQ Test is a pathological signal that generates long run-lengths of 1s or 0s (for example 19 samples of 0 followed by a single 1) to test the accuracy of phase lock loop circuitry that recovers/the sample clock from the SDI data.

PLL Test is a pathological signal that generates a pattern of 2 consecutive 1s followed by 2 consecutive 0s repeated for the whole pattern. This is the worst-case to test phase lock loop circuitry that recovers/regenerates the sample clock from the SDI data.

Check Field is a pathological signal that generates long run-lengths of 1s or 0s to test the accuracy of phase lock loop circuitry that recovers/ regenerates the sample clock from the SDI data. This is a combination of the EQ Test pattern and the PLL Test Pattern.

(i) If Check field/Pathological is selected when a dual stream format has been selected, BOTH outputs will be forced to check field due to internal hardware limitations. If another pattern is selected, the Check field pattern will be de-selected. The exceptions to this are when Colour Field or Zone Plate are selected as test patterns.

The Check field/Pathological/PLL Check/EQ Check patterns will only look like the picture above when a YCbCr 422 10 bit colour mode is selected. Other colour modes will have different pictures but still create the SDI data stream required by SMPTE.

EDH

If the output signal is SD (PAL-625 or NTSC-525) the insertion of EDH information may be turned on or off.

Errors

This field enables the insertion of CRC or EDH errors into the video signal. This allows checking of third party error detection circuitry. In SD there is one EDH ancillary packet per field. When errors are being inserted every EDH value gets deliberately corrupted. This creates one error count per field. (Actually one AP error and one FF error). In HD there is a CRC value calculated for each line. When errors are being inserted the CRC value on line number 1 gets deliberately corrupted. This creates one CRC error count per frame. There is also the option to generate CRC errors (not SD EDH errors) on only the switching line in field 1 which can be used to check that any downstream equipment ignores errors on switching lines.

SMPTE 352

This check box allows the SMPTE 352 Payload ID field to be inserted into the video output stream. The state of this check box is stored separately for SD, HD and HD-3G line standards. Note that for HD-3G line standards the Payload ID should be turned ON.

Ident

An picture or text 'Ident' may be set to identify an SDI source. This Ident can be turned on/off from this page but changing the text/font/bitmap is performed by selecting the Edit button to bring up the Ident Dialog. An overview of what the Ident is can be seen beside the Edit button. Note: If zone plate or colour field are selected, text cannot be overlaid over them. A smaller version of the video output signal is displayed on this page with any overlaid ident.
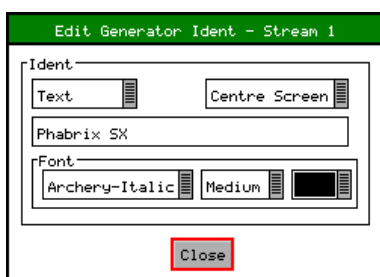
This dialogue allows selection of either a user defined bitmap picture which has been downloaded into the 'Idents' directory of the Rx instrument or user defined text.

For both types, the position of the ident can be set to one of Top-Left, Top-Centre, Top-Right, Left-Centre, Centre-Screen, Right Centre, Bottom-Left, Bottom-Centre, Bottom-Right. When text ident is used, the font, font size and colour can be specified. Several fonts are built in to the Rx instrument, other true-type (.ttf) fonts may be downloaded as required.
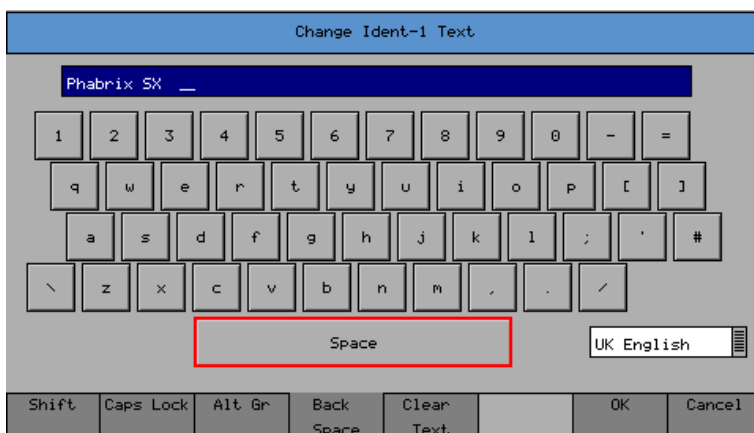
When editing text, the keyboard above is displayed to allow easy editing. Move the cursor to select the key to 'press' and then press 'Ok' to 'press' it. The Shift menu key causes the next keyboard to change to shift mode for the next key press.

The Caps Lock menu key locks the keyboard in all capitals mode. The Alt Gr. key shows any language dependent alternate keys that may be pressed. Several country keyboard styles are provided. Note that not all fonts support all non-English characters.

Generator Reference / Genlock Menu

The Rx instrument with a Generator Module installed can create video test signals that are either free-running or locked to a studio reference signal. The Genlock menu is used to select an external locking reference or set the instrument to free run.

The Generator Reference window is accessed by clicking on a Generator slot on the monitor output task bar and selecting "Generator Reference". This will create a new window panel for the selected output.

Using the Rx2000 front panel, the Genlock menu can be displayed by selecting the corresponding "Generator" button.

When using an external locking reference signal, the Rx system will provide the best possible locking regardless of the locking reference frame rate and the generated frame rate.

When the frame rate of the locking reference is exactly the same as the generated frame rate, there will be an exact lock vertical and horizontal between them.

When the frame rate of the locking reference and the generated frame rate are divisible (for example 50/25, 60/30, 59.94/23.98) there will be an exact lock vertical and horizontal between them.

When there is no relationship between the frame rate of the locking reference and that of the generated frame rate (for example a 625/50 locking reference and a 23.98 generated test pattern) then there will be a static lock between them but this will not be consistent.

Source

The generator may be locked to an input reference which may be either the reference input which is a Bi-Level/Tri-Level sync or may be locked to the video input. Alternatively, the generator may free run.

Delay

The test patterns generated by the Generator module can be delayed or advanced with respect to the locking reference input using the Lines and Pixel values.

Generator Audio / Audio Group Menu

The Rx instrument with a Generator Module installed can embed an audio signal on all 16 embedded audio outputs. The Audio Group 1-4 and 5-8 menus control which audio channels, pairs or groups have test tones applied and the type of tone.
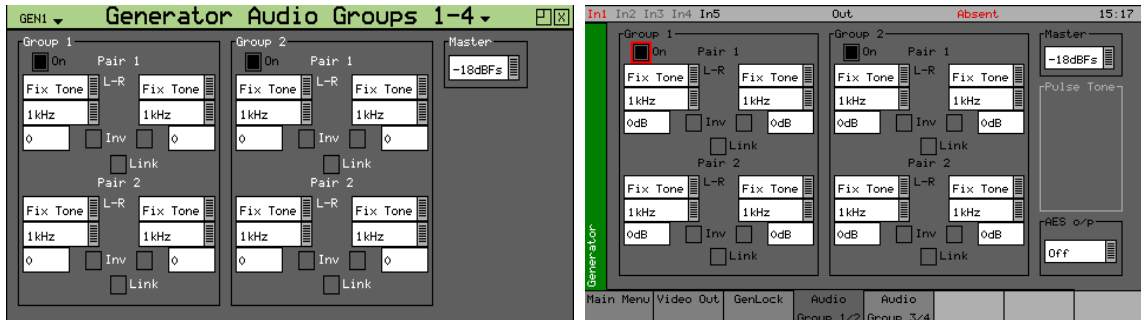
The Generator Audio 1-4 window is accessed by clicking on a Generator slot on the monitor output task bar and selecting "Generator Audio 1-4". This will create a new window panel for the selected output.

Using the Rx2000 front panel, the Audio Group 1/2 menu can be displayed by selecting the corresponding "Generator" button.

Group n

Each of the four groups may be separately enabled. When enabled, the source and level of each channel in a pair can be selected.

Source

The source for each channel may be Silence, Fixed tone (a range of fixed frequencies), variable tone (where the frequency can be set on 1Hz steps from 1Hz to 23.99kHz), white noise. The AES input may also be selected if present. If the Dolby Generation option has been purchased, the source may be set to 'Dolby' at which time the other channel in the audio pair is also set to 'Dolby' and gain control disabled.

Inv

This check-box phase-inverts the audio signal to allow checking of third-party audio mixing.

Link

This links the left and right channels of a pair so that changing the level on the left hand channel changes the level on the right hand channel.

Master

The master level sets the 0dB level for all the embedded audio channels. Thus if the Master level is set to -18dB and group 1 pair 1 output is set to -2dB, the actual level output on that pair is -20dB. This feature allows all embedded outputs to be adjusted together as well as giving a simple method to change from -18dB to -20dB based standard levels. The Master level will not adjust the level of an AES input signal selected for embedding on SDI output.

AES O/P

The AES o/p control selects the source for the AES output of the Rx instrument and can be:

The AES input (via the built-in sample rate converter) to allow easy conversion to 48kHz sample rate AES signals.

A mirrored output of the specified embedded AES stream contained within the SDI output to allow easy generation of audio tones or white noise.

One of the embedded input pairs on the SDI input to allow use as a de-embedder.

Off, if the output is not required.

Note that the AES output is always at a 48kHz sample rate. The AES input may be at any sample rate from 32kHz to 192kHz.

Analyzer Menu

Overview

The RX instrument signal analyzer displays the selected video input. On the HDMI® monitor output, the source input for the analyser is selected from the top right corner on the instrument panel. On the Rx2000 front panel, the source for the analyzer is set by the field at the bottom right of the page. The current line and sample are the same for all pages of the analyzer and therefore when selecting a sample on the Signal Data page, the cursor will show where that is on the 'Full Picture' page.

The different types of analyzer can be displayed on the front panel of the Rx2000 instrument and as window panels on the HDMI® monitor output.

Picture

The Rx Instrument with an Analyzer Module installed can display the selected input in the form of a picture monitor.
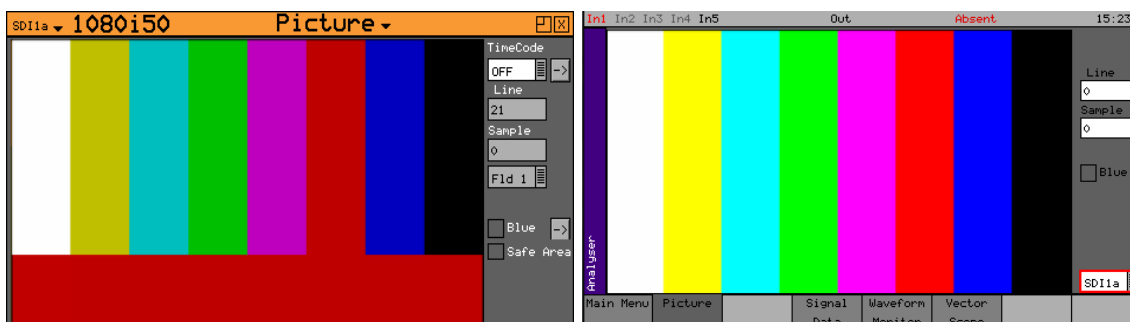
The Picture window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Picture". This will create a new window panel for the selected input.

Using the Rx2000 front panel, the Picture menu can be displayed by selecting the corresponding "Anayzer" button.

The picture displayed is down-converted from the video source. The picture will automatically view the horizontal or vertical blanking areas if the line or sample values are in the blanking.

From the Rx2000 front panel, if the focus cursor is moved to the picture window and OK pressed, the cursor may be used to scroll around the window. Press OK again to cancel this mode. When in zoom mode, the cursor is always in the centre of the window and the picture scrolls behind it. If the cursor is moved to an area of interest on the picture, the same area will be visible on the SDI data option (if purchased).

If the picture window is focussed and current tab button is pressed again to enter full-screen mode, the cursors may be moved by pressing the OK button again.

> (i) Note that the normal cursor menu keys may be used but are not visible. Press OK again to cancel cursor adjustment mode.

Line: Specify the current line for analysis.

Sample: Specify the current sample for analysis.

Field: (Only for interlaced formats) This control selects the field for analysis. If the current line is in Field 1, changing the field will change to the same line in field 2. The field number will change to show the correct field for the current line number.

Blue: Show only the Blue colour component of the picture.

Aspect Ratio: The aspect ratio of PAL (625 lines) may be set to be either 4:3 or 16:9 as required for the source signal. NTSC (525) signals are always 4:3 aspect ratio and HD signals are always 16:9.

Time Code ANC time code can be displayed in the active picture area when turned on. Selecting the arrow to the right of the Time Code field allows This window allows it to be displayed in 3 different positions and 3 different sizes.
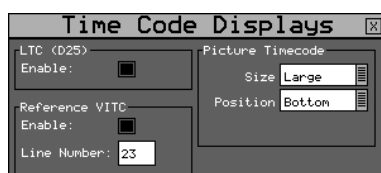
The Time Code Displays window also controls display of time code information on the HDMI® monitor output. Time code is available on the locking reference input an on each video input that is analysed.

Safe Area

The Picture instrument includes 4 independent safe area generators that can be selected for "Safe Action Area-1", "Safe Title Area-1", "Safe Action Area-2" and "Safe Title Area-2". Selecting the arrow to the right of the Safe Area check box allows the required safe areas to be setup and selected.
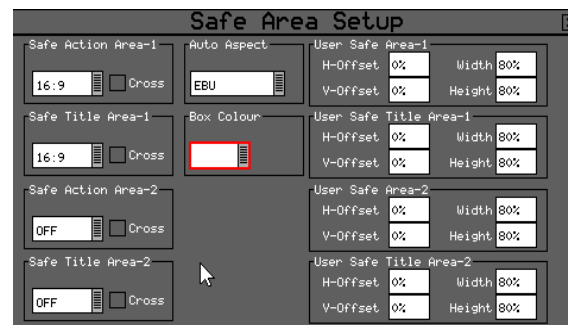
These can be selected from standard SMPTE, ARIB TR-B.4, EBU or ITU templates for 4:3, 14:9, 16:9 or aspect ratios or can be user-defined.

Data View / Signal Data

The Rx Instrument with an Analyzer Module installed and SDI analysis option can display the selected input in the form of a data array.
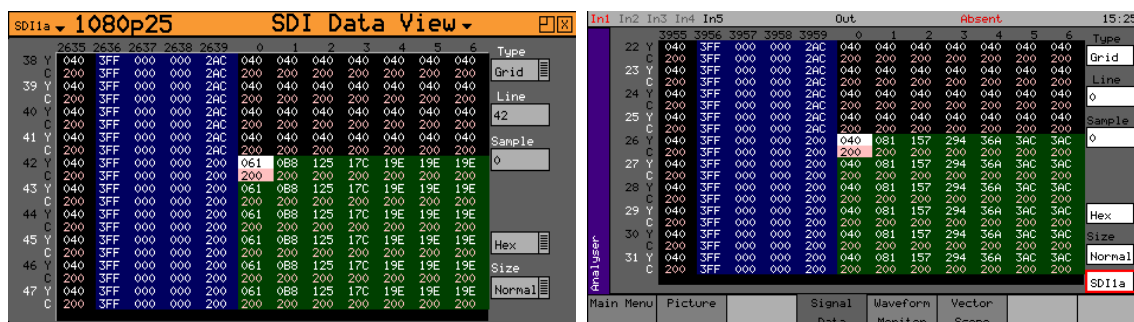
The SDI Data window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Data View". This will create a new window panel for the selected input.

Using the Rx2000 front panel, the Signal Data menu can be displayed by selecting the corresponding "Anayzer" button.

This page shows the video signal as a data stream in several formats as described below. In each mode, the data may be displayed in hexadecimal, decimal or binary formats. In each mode, the data may be displayed in hexadecimal, decimal or binary formats. The binary format is not available in grid mode. The data may also be displayed as 10-bit or 8-bit format.

To simplify scrolling around the SDI signal view, use the cursor keys to move the red focus rectangle to the data display and press OK. The focus rectangle should change to a blue colour and the cursor keys allow the display to be scrolled in any direction. The menu keys at the bottom allow the Line/Sample to be adjusted by 10 or 100 in any direction.

(i) Note that the line number of a line of video changes at the end of active video. This gives the strange side effect that the line number for pixels in horizontal blanking is the same as the line number for the active picture after that line.

Type

Grid: In this mode the data is shown in an X-Y format with lines and samples at the same time. Thus this is a representation of the picture but in data format. If the cursor keys are used to select the grid window and 'OK' pressed, the cursor keys will scroll around the window. The luma (Y) channel is shown in white whilst the Cr and Cb channels are shown in with a red or blue tint respectively.

Strm: This is one of 3 modes for displaying the samples on the current line only. The cursor keys may be used to scroll the sample number when 'OK' has been pressed. The 'info' column shows the type of data being displayed.

> AP - Active picture
> VBL - Vertical blanking
> HBL - Horizontal blanking

Comp: This is a similar to the Strm mode above but in a component mode with Cr and Cb in different columns. See Strm mode above for the info column description.

Split: This mode shows the 2 streams split into 4 parts to show Y, Y', Cr and Cb in separate columns. See Strm mode above for the info column description.

(i) Note that when in Colour modes other than YCbCr 422 10 bit, the pixel RGB or YCbCr values are packed into 10 bit values across the different streams and thus will give unfamiliar values. When the 'UnPack' check box is checked the values in the active picture are unpacked to RGB or YCbCr values.

Waveform Monitor

The Rx Instrument with an Analyzer Module installed can display the selected input in the form of a waveform monitor.
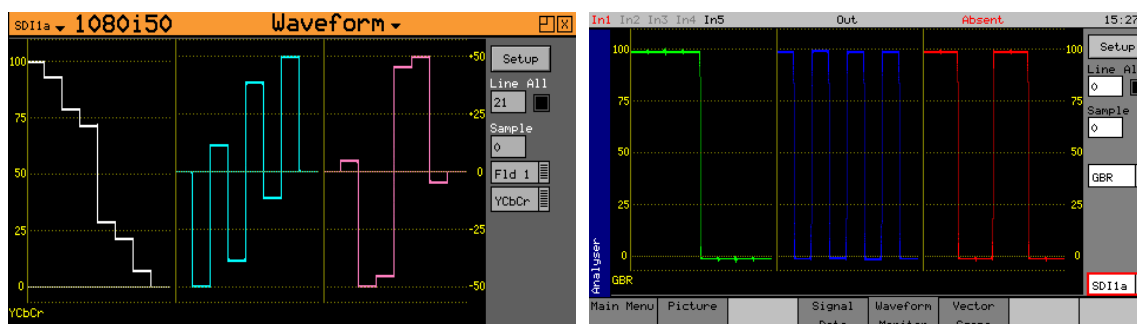
The Waveform window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Waveform". This will create a new window panel for the selected input.

Using the Rx2000 front panel, the Waveform Monitor menu can be displayed by selecting the corresponding "Anayzer" button.

The display may be restricted to a single line or all lines may be displayed at the same time. The display can be formatted as all streams (Luma and Chroma) or just a single stream.

The streams may be in YCbCr or GBR formats. The line, sample and field controls all track the related controls on other pages.

The 'All' check box forces the waveform monitor to display all lines, overlaid on each other. Otherwise the specified line is displayed.

The waveform display format is set using the 'Setup' button. The waveform monitor displays the selected signal in one of 5 formats as set by the Mode control:

YCbCr	The Y, Cr and Cb waveforms are shown as three separate waveforms in a Parade format
Y	Only the luminance channel is shown
Cb	Only the blue chroma channel is shown
Cr	Only the red chroma channel is shown
GBR	The Green, Blue and Red waveforms are shown as three separate waveforms in a Parade format
Red	Only the red channel is shown
Green	Only the blue chroma channel is shown
Blue	Only the red chroma channel is shown

The next 2 controls show the vertical and horizontal magnifications. If either value is set to a value other than x1, a vertical or horizontal offset will be shown on the bottom right edge of the waveform display. The offsets are set by moving the focus cursor to the waveform window and pressing OK. The menu keys can then be used to scroll around the window. The offset will be the same for all magnifications values so switching between x1 and x5 will not lose the offset used in x5 mode.

The vertical offset values are in signal level bits but displayed in the current scale units so switching between scales will keep the same offsets.

Cursors

Cursors may be displayed over the waveform to allow measurement of time or amplitude values. The cursor may be set to several modes:

Off: Cursors are hidden

Pict: The cursor is displayed at the current pixel point. If in YCbCr or RGB mode, three cursors are displayed. Otherwise a single cursor is displayed. The cursor position tracks across the picture monitor and Signal Data tabs.

Ampl: Two cursors are displayed to allow measurement of signal amplitudes.

Time: Two cursors are displayed to allow measurement of signal timing.

Both: Amplitude and time cursors are displayed.

To use the cursors, use the navigation keys to move the focus to the waveform display and press OK. You should then get a display similar to that below. Note that the menu keys shown depend on the display mode and cursor mode.

The navigation keys now move the selected cursor around the waveform display which will scroll if moved out of the visible area. The x10 and x100 buttons magnify the action of the navigation keys if held down.

The Select Window button is only available in YCbCr or RGB modes and selects the window that the cursor is displayed in.

The Amplitude Cursor and/or the Timing Cursor buttons switch the currently active cursor. In each direction two cursors are displayed. The currently active cursor is the one displayed as a full line (rather than the dotted cursor). The bottom of the waveform screen shows the cursor measurements in the current format which may be Decimal, Percentage or Hexadecimal for amplitude measurements or Pixels/uS for timing measurements. The difference between the two cursors is also displayed in absolute form.

The Cursor Mode button changes the current mode without having to leave the navigation window.

Setup Button Dialogue
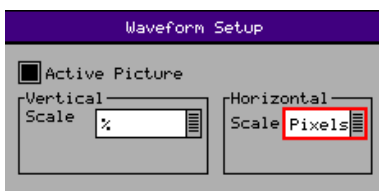
The Waveform Setup menu allows the vertical and horizontal scale of the waveform display to be setup.

Active Picture: If checked, only active picture is displayed for picture view and waveform monitor, all other VBI data such as TRS words ANC data and audio is blanked. This control tracks the state of the ActPix control on the Picture.

Vertical Scale: The axes and measurements for the waveform monitor can be displayed either in percentages or in hex or decimal values as required.

Horizontal Scale: The timing measurements may be set in either pixels or micro-seconds (us)

Vectorscope

The Rx Instrument with an Analyzer Module installed can display the selected input in the form of a vectorscope.
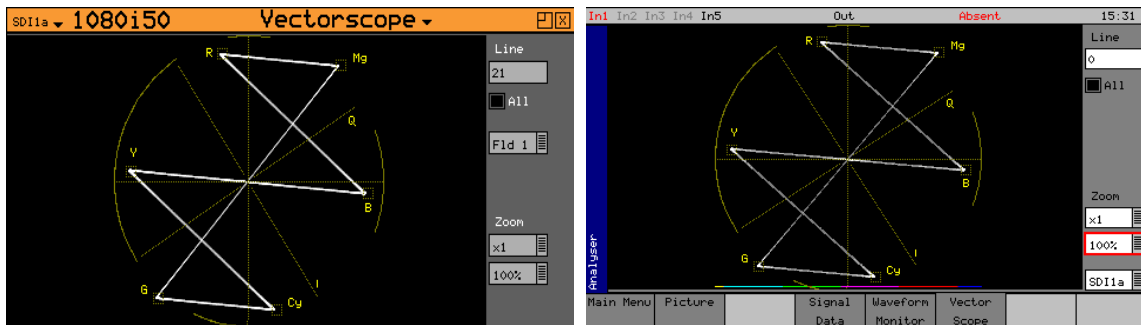
The Vectorscope window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Waveform". This will create a new window panel for the selected input.

Using the Rx2000 front panel, the Vectorscope menu can be displayed by selecting the corresponding "Anayzer" button.

The display graticule may be set to show either the 100% bar positions or 75% positions. The colour bar position boxes will change according to the colour space for the current input video standard.

Line	allows a specific video line to be displayed. This is useful when test patterns are transmitted as part of a programme on specific video lines.
All	the All check box forces the waveform monitor to display all lines, overlaid on each other. Otherwise the specified line is displayed.
Field	the Fld 1 and Fld 2 modes allow specific video fields to be displayed.
Zoom	allows the vector scope display to be zoomed-in to the Centre, Cyan, Yellow, Green, Magenta, Red or Blue positions at x1, x2, x5 or x10 magnifications.
100%/75%	selects the graticule scale to match the colour bars being analyzed.

Eye

The Rx Instrument with an Analyzer Eye Module installed can display the selected input in the form of an Eye Pattern. This allows the jitter of the selected input video signal to be monitored using an Eye Pattern display.

The Eye window is accessed by clicking on an Analyzer Eye slot on the monitor output task bar and selecting "Eye". This will create a new window panel for the selected input.

Using the Rx2000 front panel, the Eye menu can be displayed by selecting the corresponding "Anayzer" button.

The name Eye Pattern is given to the measurement of SDI clock jitter display that forms the shape of an eye due to the 2 superimposed clock cycles. The 'open eye' is displayed when monitoring a jitter free SDI signal and the eye closes increasingly as the severity of the jitter on the SDI signal increases.
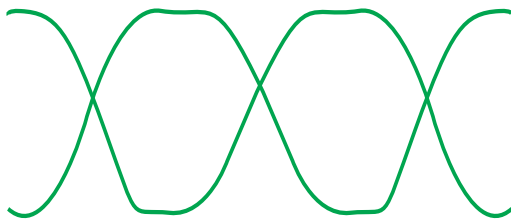
'Open Eye'
Ideal Eye Pattern
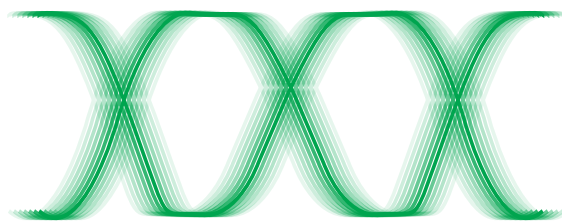
'Closed Eye'
Displaying Jitter

The Eye Pattern is formed by sampling the SDI signal at specific points in a progressive manner and displaying each sample taken on a persistent screen until the waveform is complete.

Jitter can be caused by a range of different things and the artefacts displayed in the Eye waveform are typically due to combinations of these at different frequencies and amplitudes:

Transmission jitter caused by the equipment generating the video signal. This could include clock phase jitter, amplitude jitter and wander.

Receiver phase lock loop errors in equipment decoding an SDI datastream. For example when video sources are switched and the circuitry of the equipment need time to establish phase lock or when the signal is distorted by long cable lengths.

Data dependent jitter due to the actual data content that, even after randomisation, that contains sequences of zeros long enough for the clock regeneration to loose phase lock.

Thermal and Shot Noise caused by the integrated circuits used within equipment. Integrated Circuits can contain 10s of thousands of discrete transistors that can all cause random errors, increasing in number as the temperature of the equipment rises.

Electromagnetic interference in Long cable lengths that may be susceptible to interference from the power grid and from power switching.

Distorted waveform shape, created by equipment within the broadcast chain, by long cable runs, by poorly terminated or un-equalised cables, poor frequency response of cables or poor equipment return-loss.

Problems occur when these errors cause a level of jitter outside the specified acceptable parameters. The different types of jitter are classified as follows:

Timing Jitter refers to a short-term time interval error above a low frequency threshold of 10 Hz (as defined in the SMPTE standards for SDI signals).

Alignment Jitter refers to artefacts above the specified threshold frequencies of (1 kHz for SD-SDI signals and 100 kHz for HD-SDI signals). Typically video equipment cannot tolerate Alignment Jitter which cause decoding errors due to incorrect sampling of the data stream because the SDI Clock transition occurs on the edge of the data sample instead of in the centre of the data sample.

Wander refers to a long-term time interval error, ie artefacts below 10 Hz. Typically all video equipment has the tendency to cause wander over a long period, the display of these artefacts are not easily displayed in a meaningful way but are better logged as errors that exceed tolerances over a long period.

Random Jitter refers to artefacts caused by random events or processes such as thermal or shot noise that cause small amplitude variations in the clock edge position or could cause large signal amplitude variations, though these typically would be infrequent.

Eye Display

The "Eye and Jitter" display shows the Eye Pattern against a vertical graticule of +500mV to -500mV. Four horizontal cursor lines show the 100%, 80%, 20% and 0% measurement positions on the waveform. Along the bottom of the display are continuous automatic measurements for:

Amplitude – measured in mV

Rise time – measured in Pico seconds. The rise time measurement is specified as the time between the 20% and 80% points on the eye waveform.

Fall time - measured in Pico seconds. The fall time measurement is specified as the time between the 20% and 80% points on the eye waveform.

Rise/fall difference - measured in Pico seconds

Rising edge overshoot – measured as a percentage of the overall signal amplitude.

Falling edge overshoot – measured as a percentage of the overall signal amplitude.

Cable length – measured in Metres. The cable length display is only an approximate value with 10m resolution thus a 5m cable will be shown as 0m long. The cable type affects the length displayed which has been calibrated for Belden 1694A cables.

Any measurements which exceed the specification of the SDI signal are indicated in RED whilst valid parameters are displayed in WHITE.

ⓘ Note that if jitter values are too large, the automated measurements cannot be made accurately and should NOT be relied on.

The eye display is only accurate when connected via a 1m cable, if a longer cable is used the eye will begin to 'close up' and measurements will become harder to perform. Note that the eye display is of the signal pre-equaliser, the equalizer in a system being used to compensate for long cable lengths. There is no method for the Rx instrument to view the signal post-equaliser.

Jitter Filters

The "Jitter 1" and "Jitter 2" filter options allow the specific type of jitter to be applied to the waveform and the thermometers displays. The options are:

Timing — as determined by the SMPTE standard for the specific video standard (ie jitter above the 10 Hz threshold)

Align — as determined by the SMPTE standard for the specific video standard (ie jitter above 1 kHz threshold for SD-SDI signals and 100 kHz for HD-SDI signals)

10Hz — jitter above a 10Hz threshold

100 Hz — jitter above a 100Hz threshold

1KHz — jitter above a 1KHz threshold

10KHz — jitter above a 10KHz threshold

100KHz — jitter above a 100KHz threshold

Jitter filter selection affects both the jitter thermometer and eye pattern displays. Timing and Alignment jitter filters are defined in the relevant SMPTE publication. The thermometer automatically calibrates to the specification of the video standard and chosen filter. When reading is in specification the thermometer bar is GREEN, when close to specification it is YELLOW, and when out of specification it's RED.

	3G-SDI (2.97Gbps)	HD-SDI (1.485Gbps)	SD-SDI (270Mbps)
Alignment Jitter	SD-SDI (270Mbps)	100 KHz high pass	1 KHz high pass
Alignment Jitter	10 Hz high pass	10 Hz high pass	10 Hz high pass
Upper limit	-3 dB at 9.5 MHz low pass	-3 dB at 4.75 MHz low pass	-3 dB at 0.86 MHz low pass

On screen horizontal cursors indicate where on the eye the rise time measurements are being made.

Please note that the Rx instrument takes a little time to stabilise when the SDI input standard changes.

Jitter Meter Ranges

	3G-SDI (2.97Gbps)	HD-SDI (1.485Gbps)	SD-SDI (270Mbps)
Alignment Full-Scale	0.52UI	0.34UI	0.34UI
Alignment (Red Threshold)	0.3UI	0.2UI	0.2UI
Alignment (Yellow Threshold)	0.2UI	0.14UI	0.14UI
Timing Full Scale	3.4 UI	1.7UI	0.34UI
Timing (Red Threshold)	2UI	1UI	0.2UI
Timing (Yellow Threshold)	1.4UI	0.7UI	0.14UI

Eye Colour — The eye colour may be set to green or blue and may also be adjusted in gain to allow the eye display to show 'hot spots' where the majority of the signal data is found.

Advanced Jitter Analysis (Option)

The Advanced Jitter Analysis option provides the user with additional tools on the Eye display to help determine the nature of jitter present in SDI signals.
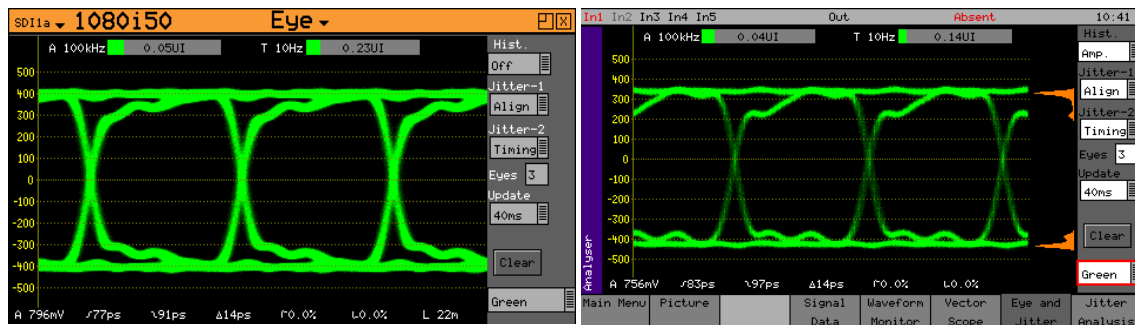
Histogram: Amp/Timing/Both. Histograms enable the operator to observe the distribution of samples in both amplitude (Amp) and time (Time). The amplitude histogram shows the distribution of samples over the complete visible eye picture. The time histogram shows the distribution of samples at the zero point of the eye waveform for two thirds of the visible time period.

Note that he time histogram overlays some of the automatic measurement display. The measurements may still be read by Remote Control if purchased.

Jitter-1: Timing/Align/10Hz/100 Hz/1KHz/10KHz/100KHz. This filter operates on both the left hand jitter thermometer and the eye waveform. The different filters enable the operator to understand more fully the nature of any jitter present. When in Timing or Alignment modes, the meter range is set to show appropriate ranges for the SMPTE specification at the current video input standard. .

Jitter-2: This is a second jitter measurement thermometer and may be set to Timing/Alig n/10Hz/100Hz/1KHz/10KHz/100KHz. This filter operates on just the right hand jitter thermometer. When in Timing or Alignment modes, the meter range is set to show appropriate ranges for the SMPTE specification at the current video input standard. When in other filter modes, the meter ranges are expanded so that larger ranges may be viewed.

Update: This allows selection of the update rate to allow longer display persistence. This may be set to 40ms (normal use) or infinite. When set to infinite, the Run and Clear buttons are enabled.

Run: This check box stops the display from updating so that a waveform may be investigated in more detail. It is only enabled when the update mode is set to infinite update mode.

Clear: This button clears the eye display. It is only enabled when the update mode is set to infinite update mode.

Eyes: Adjusts the number of eyes visible on the eye display. The 10 and 20 modes are useful for observing serial-parallel conversion jitter, the H, 2H, V, and 2V are useful for observing the effects of power supply born video synchronous noise in SDI signals. (H/2H/V/2V not yet implemented)

Jitter

The Rx Instrument with an Analyzer Eye Module installed and Advanced Jitter Analysis option can display the selected input in the form of an Jitter waveform.
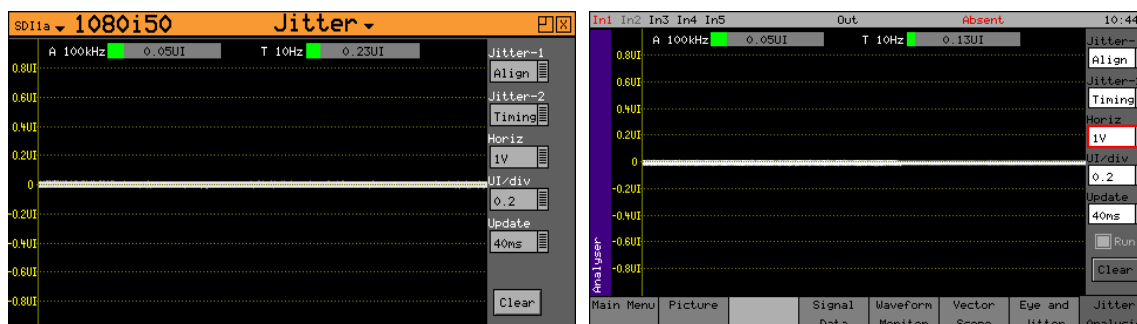
The Jitter window is accessed by clicking on an Analyzer Eye slot on the monitor output task bar and selecting "Jitter". This will create a new window panel for the selected input.

Using the Rx2000 front panel, the Jitter menu can be displayed by selecting the corresponding "Anayzer" button.

This screen shows a trace of jitter amplitude versus time along with two jitter thermometers and has the following controls:

Jitter-1:   Timing/Align/10Hz/100Hz/1KHz/10KHz/100KHz. This filter operates on both the left hand jitter thermometer and the jitter trace.

Jitter-2:   Timing/Align/10Hz/100Hz/1KHz/10KHz/100KHz. This filter operates on just the right hand jitter thermometer.

Horiz: H/2H/V/Frame – horizontal sweep control for jitter trace.

UI/div: 0.1/0.2/0.5/1.0 – vertical gain control for the sweep trace.

Update: This allows selection of the update rate to allow longer display persistence. This may be set to 40ms (normal use) or infinite. When set to infinite, the Run and Clear buttons are enabled.

Run: This check box stops the display from updating so that a waveform may be investigated in more detail. It is only enabled when the update mode is set to infinite update mode.

Clear: This button clears the eye display. It is only enabled when the update mode is set to infinite update mode.

Signal Information Menus

Overview

These pages give a detailed view of the status of the input (or generator output) signal. They are sub-divided into Video, Misc, Audio and Ancillary (ANC) status.

SDI Errors / Video Status

The Rx Instrument with an Analyzer Module installed can monitor the selected input and display any EDH (error detection and handling) or CRC (cyclic redundancy check) errors detected in the data stream.

The SDI Error window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "SDI Errors". This will create a new window panel for the selected input.
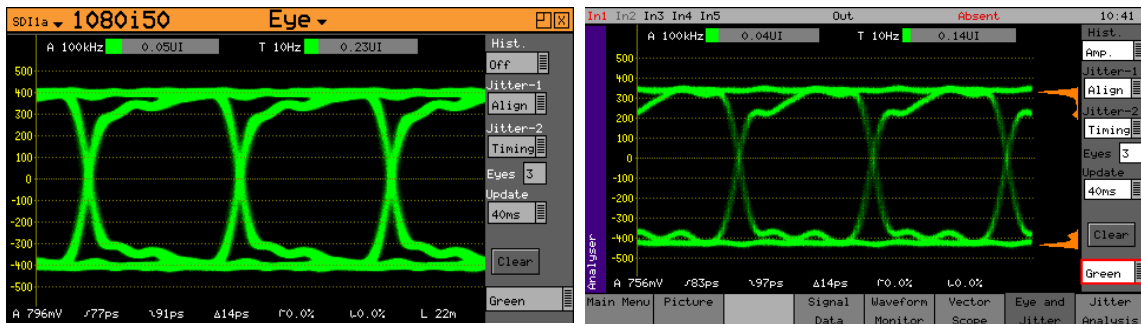
Using the Rx2000 front panel, the Video Status menu can be displayed by selecting the corresponding "Sig Info" button.

Selecting SDI Errors will display the EDH or CRC status of the analyzer input as appropriate for the video standard being monitored. The status of each EDH/ CRC count is displayed as the number of seconds since an error occurred.

EDH/CRC ERRORS

This displays the EDH or CRC status of the analyzer input as appropriate for the video standard being monitored. The status of each EDH/ CRC count is displayed as the number of seconds since an error occurred. The individual CRC fields may be reset individually or together. The 'running time' field shows the time since the last error reset occurred. The error rate field shows the number of errors per second. The running time will also be affected by the input being lost or being intermittent. CRC errors are ignored on the switching line if the 'Ignore switch line' check box is checked.

ANC checksum errors are also detected and counted and may be logged.

When analysing a 3G-Level B signal, the CRC status is displayed for each link or stream present according to the input video format. On an RX instrument with a Dual-Link module with 2 video inputs, only one 3G-Level B may be analysed for CRC status at a time.

EDH DATA

If the signal is SD (PAL-625 or NTSC-525) the EDH values for both active picture (AP) and full-field (FF) are displayed for each field. To enable engineers checking EDH integrity, the EDH values calculated for active picture and full-field are also displayed.

Under normal conditions, the EDH-AP values should be constant, the full-field values may change if audio or other ancillary data is embedded in the SDI signal.

The EDH flags for active picture, full-field and ancillary data are also displayed for diagnostic purposes.

Edh: Error Detected Here - This is set to 1 if a SDI error was detected. In the case of ancillary data, this means that one or more ANC data packets had an incorrect checksum.

Eda: Error Detected Already - This is set to 1 if a SDI error was detected in the signal received by the previous device.

Idh: Internal error Detected Here - This is set to 1 if a hardware error was detected in the previous device.

Ida: Internal error Detected Already - This is set to 1 if an idh flag was received by the previous device.

Ues: unknown error status: This is set to 1 if the previous device received an SDI signal from a device not supporting EDH.

Note that there is only one EDH detector which is connected to the input currently being analysed. On an Rx instrument with multiple video inputs, only the current input being analysed can check for EDH errors.

Cable Length

The Rx instrument measures the cable length connected to the SDI input BNC and the measurement is only an approximate value.

The cable type may be set to one of the following:

Belden 8282, 1694A, 1505, 1855A.

Canare L-5CFB

Image 1000

The selected cable type will affect the cable length measurement.

Active Picture CRC

16-bit CCITT CRCs are calculated for the active picture data of the received signal. This can be used to give a known value for known static picture content and allows the user to determine if the active picture content is as expected.

CRCs are calculated independently upon each 10-bit stream (luminance and chrominance) of the interface.

For example the generated 1920x1080, 100% bars in YCC422-10 should always produce a luminance CRC of 0x0AB4 and a chrominance CRC of 0xB88E, no matter what scanning mode (interlaced, segmented frame or progressive) or frame rate is used.

Note: when using 4:4:4, 4:4:4:4 or 12-bit video formats (in dual-link or 3Gbps) the CRCs are calculated for each of the packed 10-bit virtual interfaces and will therefore generate different values from those for YCC422-10.

See the "Active Picture CRC Technical Information" section at the end of the manual for details of CRC calculation.

Input Status / MISC Status

The Rx Instrument with an Analyzer Module installed can monitor the selected input and display the content of any SMPTE 352 packets detected in the data stream.
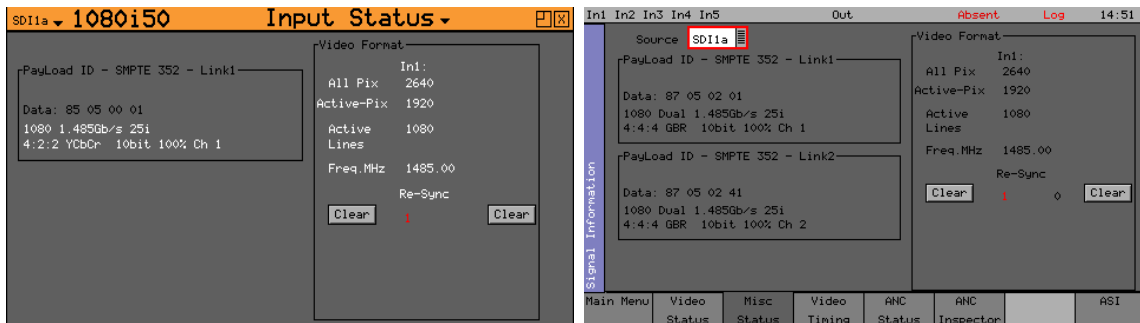

The Input Status & SMPTE 352 Status window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Input Status". This will create a new window panel for the selected input.

Using the Rx2000 front panel, the Misc Status menu can be displayed by selecting the corresponding "Sig Info" button.

Payload ID – SMPTE 352

If the Rx instrument has detected a SMPTE 352 ancillary packet, it will be displayed here in hex and decoded format.

The display shows the transport media, frame rate and interlaced/progressive/segmented frame mode, as well as colour format, bit depth, dynamic range and channel number. See the SMPTE 352 specification for further details.

When analysing a 3G-Level B signal, the SMPTE 352 status is displayed for each link or stream present according to the input video format. On an RX instrument with Dual-Link with 2 video inputs, only one 3G-Level B may be analysed for 352 status at a time.

Video Format

This displays the currently detected line length for both active video and full line including blanking as well as the number of active lines for the inputs present.

Note that the video frequency displayed is only correct if the Rx instrument has been calibrated and free running or has been connected to an accurate reference input.

If the input signal is not a known signal (i.e. the line count or pixel count is not recognised) The input status on the top line will show "Invalid" but the values in this section will be updated every few seconds.

The Re-sync counter displays the number of times the SDI data has been re-synchronised and can help detect intermittent SDI signal problems.

Video Timing

The Rx Instrument with an Analyzer Module installed can monitor the selected input and display its timing relationship with the locking reference.
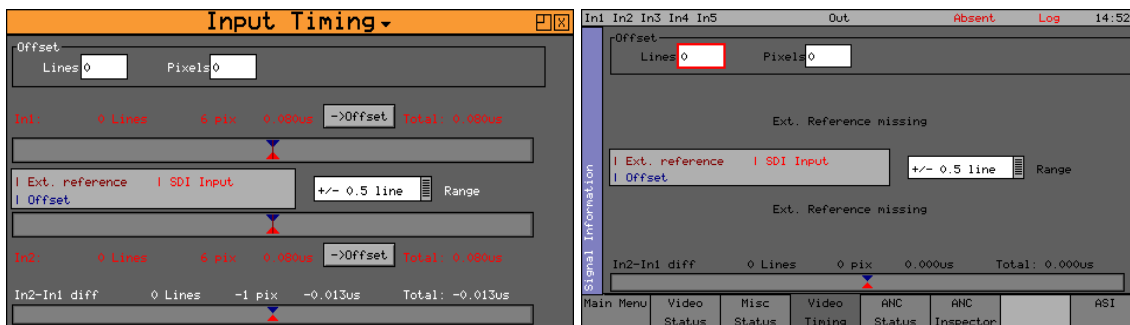
The Input Timing window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Input Timing". This will create a new window panel for the selected input.

Using the Rx2000 front panel, the Video Timing menu can be displayed by selecting the corresponding "Sig Info" button.

The timing of SDI input signals is displayed relative to the external reference. If no reference is present then an error message is displayed. If the signal is timed to within +/- 2 samples the values are displayed in black in lines and samples (spl) If mistimed, then they will be displayed in red. A bar graph also displays the timing value which may either be line timing (+/- 0.1 lines or +/- 0.5 lines) or frame timing (+/- 0.5 frame). The total timing value is also displayed in micro seconds.

The RED arrow on the bar shows the SDI input timing and the BLUE arrow shows the current target timing point. The BROWN line shows the timing of the reference signal.

To compare timings of different signals, connect the signal to be compared to the SDI input and select the "Offset" button to make this the current offset. All future timings will be relative to this offset value.

To clear the current offset, move the focus to the 2 offset fields, press OK to edit them and then press default.

(i) Note that all timing measurements are relative to line 1 on the SDI signal and line 1 on the reference signal. This can lead to different values to other test and measurement instruments that include an SD (PAL/NTSC) offset in their calculations. By comparing line 1 timings, the Rx instrument can be used to accurately measure time delays through up/down/cross converters.

ANC Status (SDI Analysis Option)

The Rx Instrument with an Analyzer Module installed and SDI analysis option can monitor the selected input and display details of any Ancillary packets within the SDI data stream.
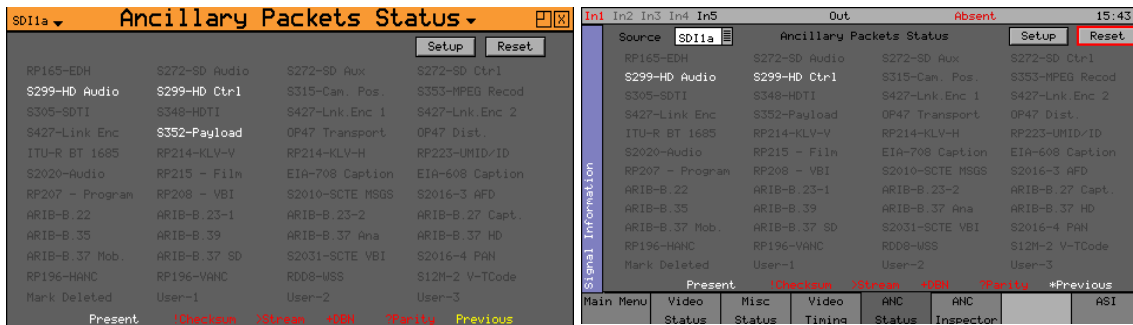
The Ancillary Packet Status window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "ANC Status". This will create a new window panel for the selected input.

Using the Rx2000 front panel, the ANC Status menu can be displayed by selecting the corresponding "Sig Info" button.

The ANC status menu shows which ANC packets are present on the SDI input and whether they have any errors.

Each field is colour coded according to whether the ANC packet is present (White), missing (Grey), has errors (Red), or has previously had errors (yellow).

If the field has errors then a symbol beside the field shows which error type it is. The bottom of the page shows the symbol for each type of error. The Reset button resets the "Previous Errors" state.
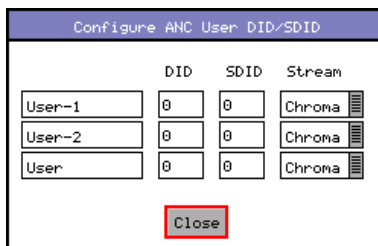
The Setup button and dialog allows user defined ANC packets to be configured.

The packet name, data ID (DID) and SDID may be specified for up to 3 user-defined ancillary packets. The stream field specifies whether the packet should be on the chroma stream, the luminance stream or both.

The data packets that can be trapped by the ANC Status are as follows:

RP165-EDH   this is the SMPTE RP165-EDH packet containing EDH (error data handling) and CRC (cyclic redundancy counts). This only appears on SD-SDI signals.

S272-SD Audio   this is the SMPTE 291M defined SD audio data in HANC space.

S272-SD Aux   this is the SMPTE 291M defined SD auxiliary data in HANC space.

S272-SD Ctrl   this is the SMPTE 291M defined SD control data in HANC space.

S299-HD Audio   this is the SMPTE 291M defined HD audio data in HANC space.

S299-HD Ctrl   this is the SMPTE 291M defined HD control data in HANC space.

S315-Cam. Pos   this is the SMPTE 291M defined camera position data in HANC and VANC space.

S353-MPEG Recod this is the SMPTE 291M defined MPEG recoding data in HANC and VANC space.

S305-SDTI	this is the SMPTE 291M defined SDTI transport data packet in active frame space.
S348-HDTI	this is the SMPTE 291M defined HD-SDTI transport in active frame space.
S427-Lnk. Enc 1	this is the SMPTE S427 defined link encryption data packet.
S427-Lnk. Enc 2	this is the SMPTE S427 defined link encryption data packet.
S427-Link Enc	this is the SMPTE S427 defined link encryption data packet.
S352-Payload	this is the SMPTE 291M defined Payload Identification data packet in VANC space.
OP47 Transport	this is the Free TV Operational Practice OP-47 defined transport of Closed Caption/Subtitling data in the VANC space.
OP47 Dist.	this is the Free TV Operational Practice OP-47 defined distribution of Closed Caption/Subtitling data in the VANC space.
ITU-R BT 1685	this is the ITU-R BT 1685 defined Structure of inter-station control data packets.
RP214-KLV-V	this is the SMPTE defined KLV Metadata transport in VANC space.
RP214-KLV-H	this is the SMPTE defined KLV Metadata transport in HANC space.
RP233-UMID/ID	this is the SMPTE defined UMID (Unique Material Identifier) in VANC space
S2020-Audio	this is the SMPTE S2020 defined standardized data packet defining the encoding for a Dolby stereo or a multi-channel surround group of audio channels.
RP215 – Film	this is the SMPTE defined recommended practice data packe for film codes in VANC space.
EIA-708 Caption	this is the EIA standard defined closed caption data for HD-SDI in VANC space.
EIA-608 Caption	this is the EIA standard defined closed caption data for SD SDI 525i (NTSC) in VANC space.
RP207 Program	this is the SMPTE RP207 defined program description data packet in VANC space.
RP208 – VBI	this is the SMPTE defined recommended practice VBI Data (vertical blanking interval data) in VANC space.
S2010-SCTE MSGS	this is the SMPTE S2010 defined standardized API message data in VANC space.
S2016-3 AFD	this is the SMPTE S2016 defined standardized AFD (active format description) and Bar data packet (defining active area of image).
ARIB-B.22	this is the ARIB defined Sub information data packet in the VANC space.
ARIB-B.23-1	this is the ARIB defined user data 1 packet in the VANC space.
ARIB-B.23-2	this is the ARIB defined user data 2 packet in the VANC space.
ARIB-B.27 Capt.	this is the ARIB defined caption data in the VANC space.

ARIB-B.35   this is the ARIB defined trigger signal data packet for data broadcasting.

ARIB-B.39   this is the ARIB defined inter-stationary control data packet in the VANC space.

ARIB-B.37   this is the ARIB defined analogue signal data in the VANC space.

ARIB-B.37 HD   this is the ARIB defined HD data packet in the VANC space.

ARIB-B.37 Mob   this is the ARIB defined closed captioning information data packet.

ARIB-B.37 SD   this is the ARIB defined SD data packet in the VANC space.

S2031-SCTE VBI   this is the SCTE S2031 standard defined VBI (vertical blanking interval) data packet for closed captioning.

S2016-4 PAN   this is the SCTE S2016 standard defined pan and scan data packet.

RP196-HANC   this is the SMPTE defined recommended practice Time Code data packet in HANC space.

RP196-VANC   this is the SMPTE defined recommended practice Vertical Timecode data packet in VANC space.

RDD8-WSS   this is the SMPTE defined wide screen switching data packet in the VANC space.

S12M-2 V-Tcode   this is the SMPTE S12M defined standardized frame timecode data packet in VANC space.

Mark Deleted   this is a user defined data packet used to mark other data packets for deletion (ie to be ignored by down-stream processes.

User-1   this is a user defined data packet.

User-2   this is a user defined data packet.

User-3   this is a user defined data packet.

ANC Inspector (SDI Analysis Option)

The Rx Instrument with an Analyzer Module installed and SDI analysis option can monitor the selected input and display the contents of selected Ancillary packets within the SDI data.
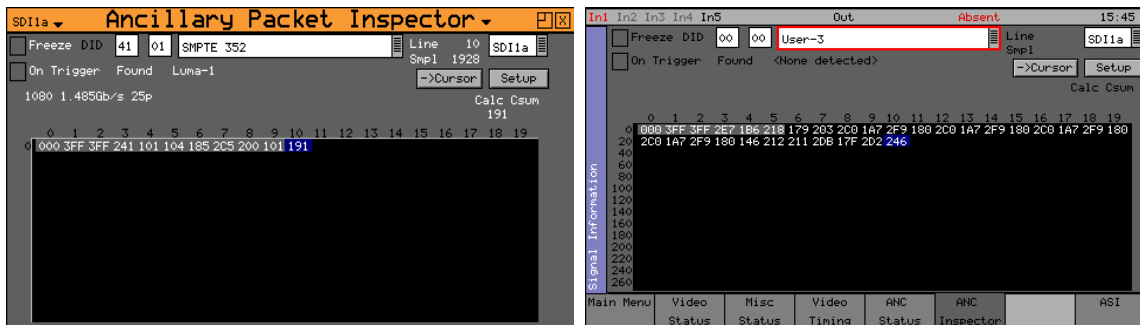
The Ancillary Inspector window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "ANC Inspector". This will create a new window panel for the selected input.

Using the Rx2000 front panel, the ANC Inspector menu can be displayed by selecting the corresponding "Sig Info" button.

The packet type can be selected using either the drop down list of known packets or the DID/SDID (Data Identifier/ Secondary Data Identifier) number fields (for example RP165 – EDH, S272 – SD Audio Group 1, S272 – SD Audio Group 2, etc). If the DID/SDID values match a known type, then that type will be selected in the drop down list. This may be further filtered using the Check Boxes on the Setup dialogue.

Note that the settings of the Setup dialogue affect the currently displayed data. For example if any trigger parameters (such as DID or SubDID set to specific values that don't actually appear in the data) are set this may prevent data being displayed.

When searching for specific data events it is advisable to turn off the Trigger parameters such as "DID", "SubDID", "Checksum", "DBN" (Data Block Number), "Parity" and "ANC Gaps" first to ensure that you are actually seeing data for the selected ANC packet. Only when the ANC Inspector is displaying streaming data, should you introduce the specific trigger parameters required to trap the data packet that you are looking for.

The Line and sample number of the detected packet is displayed to facilitate debugging of generation equipment. The complete data packet is displayed as a hexadecimal grid at the bottom of the page and may also be decoded into text above the grid.

If an error occurs in the packet, the header and checksum are displayed in red.

The display of data may be frozen by pressing the Freeze check box.

The 'Found' description shows in which stream the ANC packet was detected, Chroma or Luma and what kind of trigger was detected. This may be:

    C   Checksum Error
    D   DBN (Data block number) Error
    P   Parity Error
    G   ANC Gap error

Several of the above flags may be displayed at the same time.

The ANC packets detected may be filtered using the Setup dialogue. This allows a great deal of freedom in setting when the display will be triggered.

If the On Trigger check box is checked the data packet will cause the display to be frozen and the Freeze check box will turn red when a trigger condition is met. See the section on the ANC Inspector setup dialogue below. Un-checking the freeze button will restore normal operation.

The "->Cursor" button will copy the Line and Sample numbers to the SDI data view cursors to simplify navigation to the ANC packet under investigation.

ANC Inspector Setup
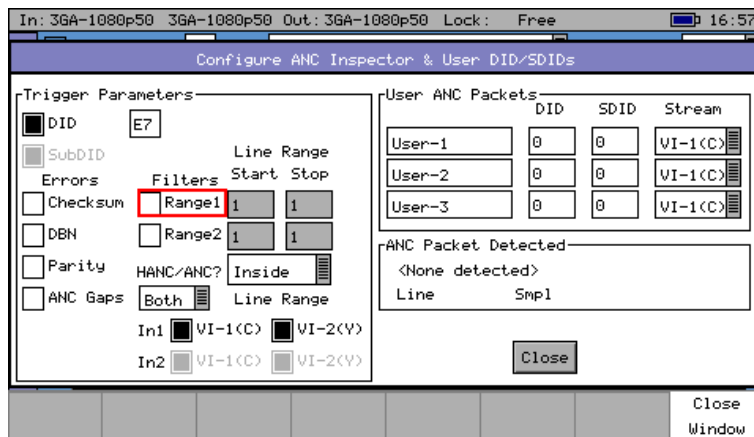
If the Setup button is pressed a dialogue box is shown to allow the ANC packet trigger parameters to be set. The trigger parameters allow only selected lines to be checked or excluded when checking for the presence of packets.

Line Range Filer   If either of the Line Range Filter check boxes are checked then the range of lines that the ANC inspector will check is limited to that range. If the Selection below the range is set to "Inside" then it will only check ANC packets inside the range (including the start and end lines). If it is set to "Outside" then it will only check ANC packets outside the specified range.

HANC/VANC Filter This is another filter for simpler selection of where to search for packets. It may be selected to search the HANC (Horizontal Ancillary Data) are, the VANC (Vertical Ancillary Data) area or both areas.
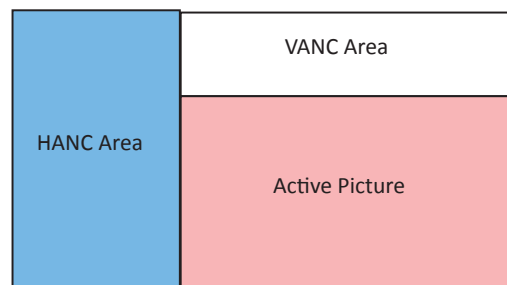
Error Triggers

If any of the "Errors" check boxes are checked, then the ANC packet data will only be displayed if an error occurs. The error states detected are:

Checksum: A checksum error in a packet was detected. ie Sum of data between DID and final UDW (User Data Words).

DBN: A Data Block number error was detected in an audio packet. The DBN field (in the same place as the SDID) of an audio packet should either be 0 and never change OR increment from 1...255 and then start at 1 again.

Parity: A parity error was detected for the DID, SDID and DataCount words in a packet. (Even Parity used and bit 9 is inverse of bit 8)

ANC Gaps   The ANC packets were separated by a gap containing video blanking data. EDH (DID = 0xf4) packets are ignored. Note that if an EDH packet is marked for deletion, this will result in an ANC GAP error.

The Setup dialogue also shows when an ANC packet has been detected and where it was found. This makes changing a filter simpler as the effect of the filter can be determined without closing the dialogue.

This dialogue also allows the user defined ANC packets to be configured.

Audio Menus

Audio Meters

The Rx Instrument with an Analyzer Module installed can monitor the selected input audio and graphically display the audio level for each audio channel.
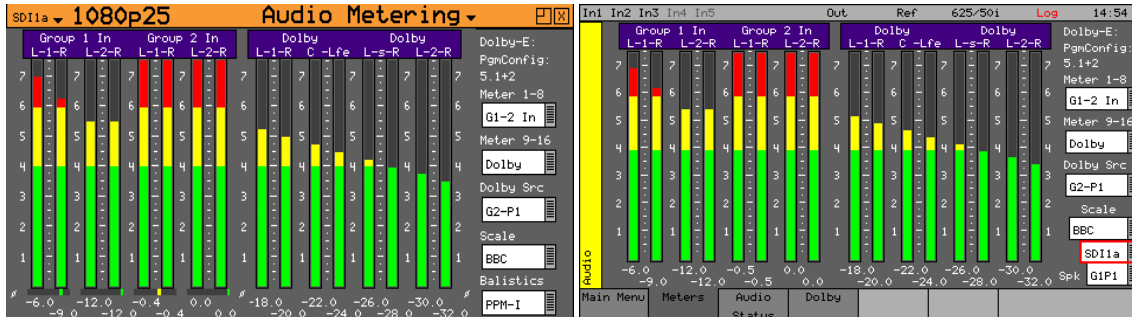
The Audio Metering window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Audio Meters". This will create a new window panel for the selected input.

Using the Rx2000 front panel, the Audio Meters menu can be displayed by selecting the corresponding "Audio" button.

This page shows up to 16 audio channels. The source for each block of 8 meters may be independently set to allow simultaneous metering of 8 inputs and 8 outputs or all 16 channels in an embedded SDI stream. This is selected using the drop down menus at the right of the window.

The scale and peak program meter ballistics can also be selected from the drop down menus.

Meter Options
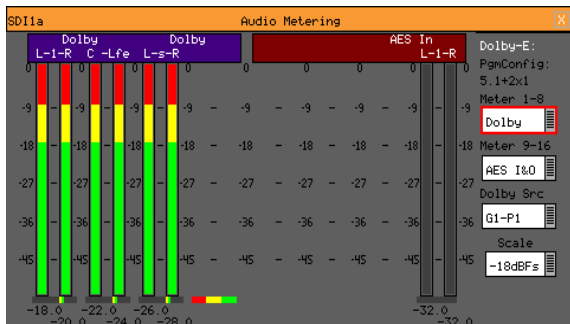
If the Dolby analyzer option is installed, the meters may be set to display the encoded Dolby levels for the specified audio pair or AES input.

If AES inputs are present then these may also be metered. At the bottom of each meter is the current audio level for that channel in dBFs (decibels relative to 0dB full-scale).

ⓘ Note that Dolby audio cannot be heard on the speaker as a Dolby decoder is not present.

Meter Scale

The scale used by the meters may be set to -18dB, -20dB. BBC or BBCM according to the standard operating level used. The graticule and audio levels displayed will change to match the selected scale.

Audio Phase Meters

At the bottom of each pair of audio PPMs are displayed the signal amplitudes and the stereo pair phase meters.

If the phase indicator is green and aligned to the right then the stereo pair is fully in phase. ie the signal on both left and right are exactly the same which only normally occurs when a mono signal is on both channels.

If the phase indicator is yellow and aligned in the centre this indicates that the stereo pair is 'in phase'. ie the normal position for a stereo pair.

If the phase indicator is red and aligned to the left then the stereo pair is fully out of phase. ie the signal on the left and right channels are 180 degrees out of phase.

Audio PPM and Ballistics

The Audio peak program meters can be set to different ballistic settings using the drop-down list:

> PPM I emulating the performance of IEC 60268-10 Type I PPM style audio meters typically used by German broadcasters.

> PPM II emulating the performance of IEC 60268-10 Type II PPM style audio meters typically used by UK broadcasters.

> Vu emulating the performance of IEC 60268-17 style audio meters typically used by American and Australian broadcasters.

> Vu-Fr emulating the performance of ITU-R Rec. BS.645 style audio meters typically used by French broadcasters.

These ballistics settings affect the response of the meter display to dynamic changes in audio level.

The audio level value for each audio channel is displayed numerically at the bottom of the display.

Audio Status

The Rx Instrument with an Analyzer Module installed can monitor the selected input audio and detail its audio encoding details.
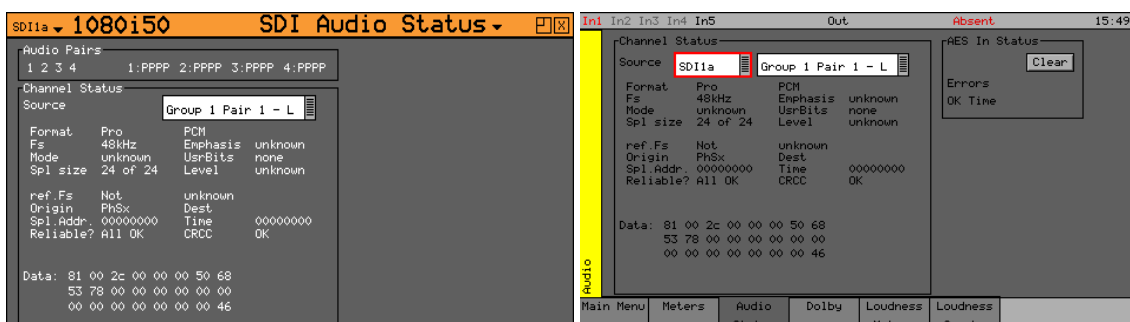
The SDI Audio Status window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Audio Satus". This will create a new window panel for the selected input.

Using the Rx2000 front panel, the Audio Status menu can be displayed by selecting the corresponding "Audio" button.

The Audio Status menu shows the Channel Status for the selected audio channel is displayed in decoded form as well as a hexadecimal dump of the bytes.

Dolby Meta-data / Dolby-E Status (Dolby E Analyzer Option)

The Rx Instrument with an Analyzer Module installed and Dolby E Analyzer Option can monitor the selected input audio and provide details of its Dolby E audio encoding.
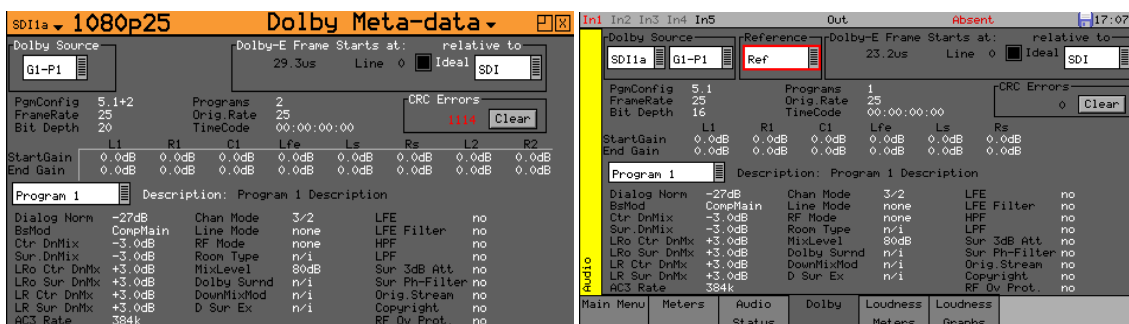
The Dolby Meta-data window is accessed by clicking on an Analyzer slot on the monitor output task bar and selecting "Dolby MetaData". This will create a new window panel for the selected input.

Using the Rx2000 front panel, the Dolby menu can be displayed by selecting the corresponding "Audio" button.

The Dolby-E status option allows display of the Dolby-E meta-data present in the selected audio stream and determines whether the Dolby-E packet is timed correctly on the SDI video stream.

This option therefore allows the correct timing of the Dolby-E packets with the SDI signal to be checked at all stages in a broadcast chain.

Checks can be made to see that the Dolby E has been created correctly and transferred transparently through the broadcast chain unaffected by routers/switchers, satellite links, etc.

Overview

There are a number of Dolby broadcast digital audio standards that transport audio data over an SMPTE 337M AES carrier with a 48kHz sample rate:

Dolby Digital

Dolby Digital Plus

Dolby E

These standards can be used to transport mono, stereo, 5.1 and 7.1 audio programmes:

Dolby 5.1 - involves five channels for normal-range speakers (20 Hz – 20,000 Hz) (right front, centre, left front, rear right, rear left) and one channel (20 Hz – 120 Hz allotted audio) for the subwoofer driven low-frequency effects.

Dolby 7.1 uses six channels in the primary program (Independent Substream) for a standard 5.1 surround sound mix and then the 2 remaining 2 channels in an ancillary programme (Dependent Substream) to provide the additional down-mix.

Dolby E

Dolby E is an audio encoding and decoding technology developed by Dolby Laboratories that allows up to 8 channels of audio (mono, stereo, 5.1 or 7.1) that for a primary programme (Programme 1) and optional ancillary programs. These 8 channels are compressed (loss-less) into a digital stream that can be transferred between compatible devices and stored on a standard stereo pair of audio tracks. The most elaborate mode in common use is Dolby 7.1 which uses all eight channels to provide surround sound.

Analyser Reference

In order for the Dolby-E data to be decoded correctly, the internal audio circuitry requires a reference that is synchronized to the input signal. The Generator Reference MUST therefore NOT be set to Free-Run or Dolby-E errors may be detected. The description field will display "Invalid Reference" if an incorrect reference is selected.

SDI source with Dolby-E embedded on a pair

OPTICAL
A   B   A   LP2   IN2   LP1   IN1
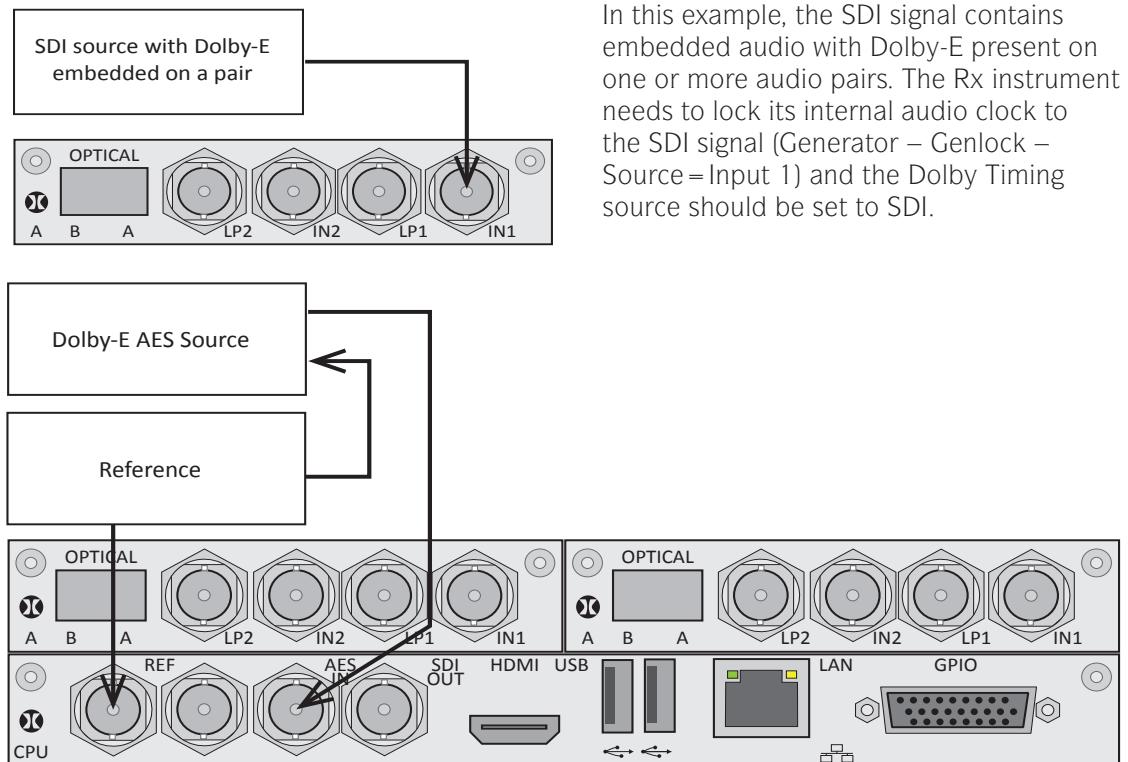
In this example, the SDI signal contains embedded audio with Dolby-E present on one or more audio pairs. The Rx instrument needs to lock its internal audio clock to the SDI signal (Generator – Genlock – Source = Input 1) and the Dolby Timing source should be set to SDI.

Dolby-E AES Source

Reference

OPTICAL
A   B   A   LP2   IN2   LP1   IN1

OPTICAL
A   B   A   LP2   IN2   LP1   IN1

REF   AES IN   SDI OUT   HDMI   USB   LAN   GPIO
CPU

In the example above, the AES signal contains a Dolby-E stream. The Rx instrument needs to lock its internal audio clock to the external reference signal (Generator – Genlock – Source = 1Ref) and the Dolby Timing source should be set to Ext.Ref. The AES source MUST be locked to the same reference as the Rx.

Source selection

The Dolby-E may be monitored from any of the SDI input embedded audio channel pairs or the AES input.

Dolby Framing Values

It is important for the Dolby-E packet to be positioned well away from the video switching line so that Dolby-E packets are not corrupted by downstream switchers. At all places in the signal chain where audio can be delayed by a different value to the video, the Dolby-E packet needs to be re-timed to make sure that this timing specification is met. The position of the Dolby-E packet in the video frame is displayed in lines and micro-seconds (us).

Timing source

Dolby-E timing may be measured relative to the SDI input or the External reference. If the 'Ideal' check box is checked, the Dolby-E Frame timing is relative to the normal position that it should be, ie it should be as close to 0 as possible. Each video standard has a specified 'Ideal' line number that the Dolby-E packet should start on. If the Dolby-E timing line is outside the valid range of lines it will be displayed in red. If it is outside the ideal range it will be displayed in dark green – this is still a valid Dolby-E position but not recommended by Dolby. The timing measurement is always displayed in terms of the SDI input lines and thus if an AES input is used as the Dolby-E source, the line position will NOT be displayed.

If you do not have the same reference as the SDI source, you will have to set the Reference Source and Dolby Timing Source to be the SDI input.

IMPORTANT: If Dolby-E is present on a fast frame rate signal (50p, 59p or 60p) then it should always be referenced to a interlaced reference at the same field rate as the packet length is longer than a single frame and must start at the beginning of an even numbered frame.

Programme configuration
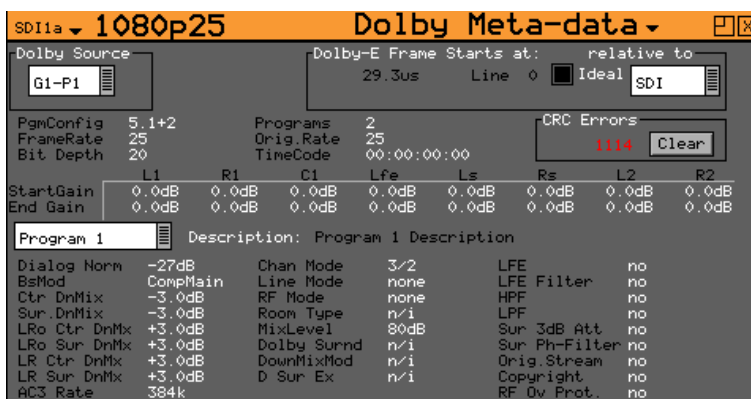
This displays the Program configuration (5.1 + 2 etc), the number of program in the meta-data, the frame rates and bit depths and time-code if any present.

Errors:	This displays the number of CRC errors detected in the Dolby-E meta-data.
Start Gain:	These fields indicate the gain to be applied to the specified channel at the beginning of the audio frame when decoding.
End Gain:	These fields indicate the gain to be applied to the specified channel at the end of the audio frame when decoding.
Program selection:	Selects which set of program meta-data is shown. Up to 8 programs can be encoded in the Dolby-E packet dependent on the Program Configuration.
Program description	User defined description for the selected program.

Programme Metadata

The "Audio" – "Dolby" menu allows the metadata for a Dolby E data stream to viewed. For any programme this metadata would be created as part of Dolby E authoring process. The following metadata can be viewed for Program 1:

Dialogue Norm	is the normal audio level for dialogue. Ideally all transmitted programs would have the same value.
BsMod	(Bitstream Mode) indicates the type of audio service that the bitstream contains. Complete Main (CM) is the normal mode of operation and contains a complete audio program including dialog, music, and effects.
Ctr DnMix	(centre down-mix) is a weighting value used in the encoding and decoding of surround sound mixes for a Dolby 5.1 Independent Substream.
Sur DnMix	(surround down-mix) is a weighting value used in the encoding and decoding of surround sound mixes for a Dolby 5.1 Independent Substream.
LRoCtrDnMix	(left/right/stereo/centre down-mix) is a weighting value used in the encoding and decoding of surround sound mixes for a Dolby 7.1 Dependent Substream.
LRoSurDnMix	(left/right/stereo/surround down-mix) is a weighting value used in the encoding and decoding of surround sound mixes for a Dolby 7.1 Dependent Substream.
LR CtrDnMix	(left/right/centre down-mix) is a weighting value used in the encoding and decoding of surround sound mixes for a Dolby 5.1 Independent Substream.
LR SurDnMix	(left/right/surround down-mix) is a weighting value used in the encoding and decoding of surround sound mixes for a Dolby 5.1 Independent Substream.
Chan Mode	defines the channel configuration for Program 1 (ie mono, stereo, 5.1 channels).
Line Mode	this is an Operational Mode / Dynamic Compression Mode that is used by consumer and professional decoder products that simplifies the implementation of Dialogue Normalization, Dynamic Range Control, and down mixing functions, all of which are necessary in Dolby Digital products.
RFMode	this is an Operational Mode / Dynamic Compression Mode that is used by consumer and professional decoder products that simplifies the implementation of Dialogue Normalization, Dynamic Range Control, and down mixing functions, all of which are necessary in Dolby Digital products.
Room Type	this informational parameter indicates the type and calibration of the mixing room used for the final audio mixing session.
MixLevel	the Surround Down mix Level parameter indicates the nominal Lo/Ro down mix level of the Surround channel(s) with respect to the Left and Right channels
DolbySurnd	the Dolby Surround Mode parameter indicates whether or not a two-channel Dolby Digital bitstream is conveying a Dolby Surround encoded program.
DownMixMod	this controls the Down Mix Mode which is used by the content creator to optimise Centre and Surround channel levels for use in stereo down mix mode for any two-channel programmes.
D Sur Ex	this controls the Dolby Surround Ex channel that provides an extra audio channel for Dolby 5.1. The extra surround channel of the Dolby Surround Ex system is matrix-encoded onto the discrete left-surround and right-surround channels of the 5.1 mix.

The following control bits can also be viewed:

LFE
: the LFE Channel parameter enables or disables the Low-Frequency Effects (LFE) channel.

HPF
: this parameter can be used to activate the DC High pass filter for all input channels.

LPF
: the LFE Low pass Filter parameter can be used to activate a 120 Hz low-pass filter applied to the LFE input channel.

Sur 3dB Alt
: the Surround Channel 3 dB Attenuation function is use to apply a 3 dB attenuation to the Surround channels of a multichannel soundtrack created in a room with film style calibration, when encoding it for consumer home theatre playback.

Sur Ph + Filter
: the Surround Channel 90-Degree Phase-Shift feature is used for generating multichannel Dolby Digital bitstreams that can be down-mixed in an external two channel decoder to create a true Dolby Surround compatible output.

Org Stream
: the Original Bitstream informational parameter sets the value of a single bit within the Dolby Digital bitstream. This bit has a value of 1 (box checked) if the bitstream is an original. If it is a copy of an original bitstream, it has a value of 0.

Copyright
: the Copyright Bit informational parameter sets the value of a single bit within the Dolby Digital bitstream. If this bit has a value of 1 (box checked), the information in the bitstream is indicated as protected by copyright. If it has a value of 0, it is not copyright protected.

RF 0v Prot
: the RF Over-modulation Protection parameter determines whether or not an RF pre-emphasis filter is used in the overload protection algorithm to prevent RF over-modulation in set-top box decoders.

Peak Metering

The peak audio levels are included in the Dolby-E meta-data packet and may be displayed on the Analyzer-Audio-Meters page. Select the appropriate set of meters to display Dolby levels and then they will follow the selected Dolby-E source.

Note that audio cannot be decoded by the Rx range of products and so you will NOT be able to listen to the Dolby-E signal. Note also that the LFE channel audio levels do not seem to be metered by current Dolby encoding modules.

See the logging section for details on which changes of Dolby-E status may be logged.

System Menus

Preset Memories

The Rx Instrument settings for Generator, Analyzer and HDMI® monitor output can be saved and recalled as required.
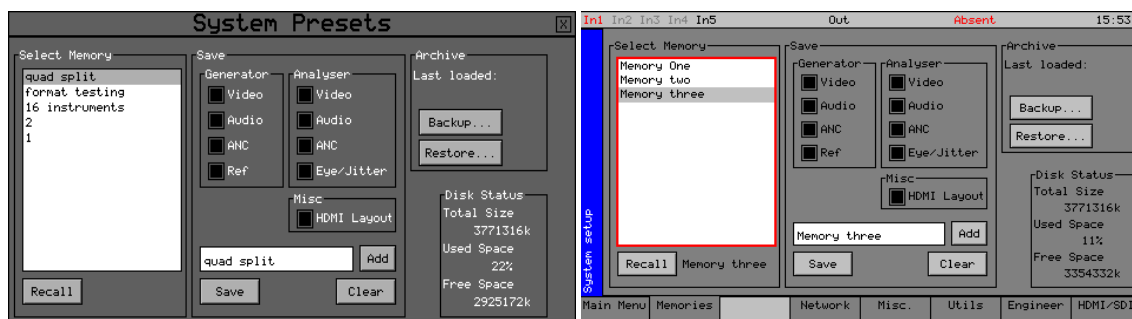
The System Presets window is accessed by clicking on the Preset Save menu on the monitor output task bar.

Using the Rx2000 front panel, the Memories menu can be displayed by selecting the corresponding "System" button.

The Memories menu displays the current settings in the Rx instrument may be saved for future recall.

The check boxes on the right-hand side determine what is saved in the memory. Non overlapping memories may then be combined together. For example saving generator or HDMI setting separately without affecting analyser settings.

ⓘ Note that if log-in has been enabled for an Rx instrument, memories may only be added, edited, renamed or cleared and archives backed up by a user with "Modify Memories" permissions.

Saving Memories

Select the memory to save settings to by moving the cursor to the 'Select Memory' list and pressing 'OK'. Use the up/down cursor keys to select the memory and then press 'OK'. The name edit field next to the memory list will be updated with the name of the selected memory.

Specify which aspects of the Rx instrument are to be saved in the memory using the check boxes on the right hand side. If you want to change the name of the memory see the section 'Renaming Memories' below before saving.

Move the cursor to the 'Save' button and press 'OK'. The text field under the Memory list will change to show the last Saved or Recalled memory.

Recalling Memories

Select the memory to be recalled by moving the cursor to the 'Select Memory' list and pressing 'OK'. Use the up/down cursor keys to select the memory and then press 'OK'. The name edit field next to the memory list will be updated with the name of the selected memory.

Move the cursor to the 'Recall' button and press 'OK'. The text field under the Memory list will change to show the last Saved or Recalled memory.

Renaming Memories

Select the memory to be renamed by moving the cursor to the 'Select Memory' list and pressing 'OK'. Use the up/down cursor keys to select the memory and then press 'OK'. The name edit field next to the memory list will be updated with the name of the selected memory.

Move the cursor to the edit field and press 'OK'. The menu keys at the bottom of the screen will change to show text keys similar to a mobile phone. Pressing a key repeatedly will cycle through the characters for that key. Pressing a different key will move the cursor to the next position and insert the first key value for that key. The cursor left and right keys can be used to move the position of the text cursor which is where the next character will be inserted. The 'Back Space' key will delete the key to the left of the cursor. The 'Cancel' key will cancel edit mode and restore the original text. Once you have finished editing the name, press 'OK' to rename the memory.

Adding Additional Memories

To add a new memory, press the ADD button. This will use the current memory name and settings.

Clearing Memories

Select the memory to be cleared by moving the cursor to the 'Select Memory' list and pressing 'OK'. Use the up/down cursor keys to select the memory and then press 'OK'. The name edit field next to the memory list will be updated with the name of the selected memory.

Move the cursor to the 'Clear' button and press 'OK'. The memory list will show the default name for that memory. A cleared memory cannot be recalled.

Exporting Memories

Memories can be exported to a single file for backup purposes and re-imported into the internal format. This allows different sets of memories to be used for different tasks, such as command scripts. Exported memories are in a text format and so may be edited on a PC and downloaded to/from the backups directory on the Rx instrument via FTP or USB.
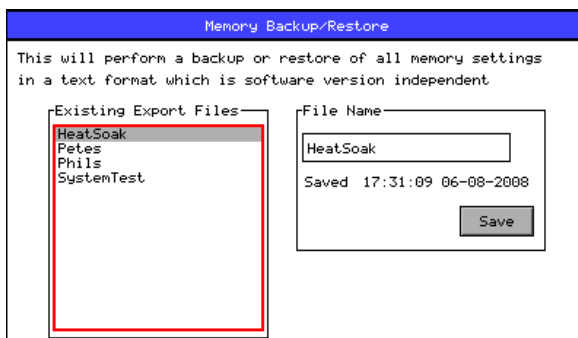
To export memories, select the Backup... button which will open a window to select the file to create. Existing files are shown and a new filename may be selected using the File Name edit box. Select the Save button to create the backup file. The filename created will have a .mem file extension.

To import memories, select the Restore... button which will open a window to select the file to import. Existing files are shown and one should be selected before the Load button is pressed. Select the Load button to import the backup file.

ⓘ Note that when importing a backup file, all existing memories are deleted before the backup file is loaded so make sure that they are backed up first.

Disk Space

The disk space section shows total size of the internal flash disk and how much is used as a percentage and how much is free.

Network

The Rx Instrument is fully network compatible and has a complete network interface to allow control of any Rx instrument from any other unit. The Network menu allows the Rx instrument to be configured as part of a network
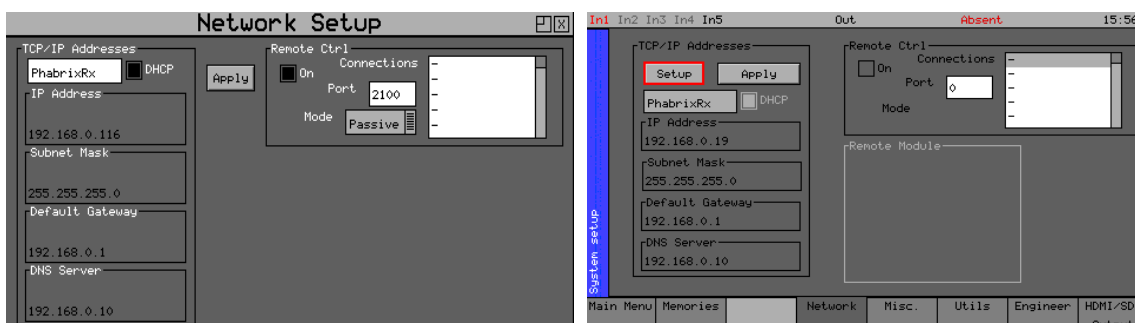
The Network Setup window is accessed by clicking on the System menu on the monitor output task bar and selecting "Network Setup".

Using the Rx2000 front panel, the Network menu can be displayed by selecting the corresponding "System" button.

Network Setup

On all Rx instruments the network addressing can be setup using the HDMI® monitor output. On the Rx2000 instrument the IP Address can be setup using the Front Panel menus.

ⓘ Note that if the Rx instrument is turned on without the network connected, you will have to select the "Re-connect" button to set networking up correctly. This is because the Ethernet connection auto senses whether it has to swap the cable over which means that you can use any Ethernet cable with the Rx instrument but it also requires the Ethernet connection to be present when starting up.

The IP Address for the Rx instrument can be setup using the "Network Setup" window on the HDMI® monitor output. A new "Network Setup" window can be created by right-clicking with a mouse in the display area and selecting the "Network Setup" option.

If the DHCP check box is enabled, then the Rx instrument will attempt to automatically request an IP Address from any network it is connected to. This will only work if there is a DHCP server on network.

If your network has 'static' (non changing) addresses, you will need to see your network administrator to get an address assigned to your instrument and to get the Subnet mask and default gateway address. These details can then be entered in the corresponding boxes in the menu. Select each numeric box in turn and use the up and down cursors to pick the required value.

When the IP Address, Subnet Mask, Defualt Gateway and DNS Server values have been setup, use the Apply button to attach the Rx instrument to the network.

On the Rx2000 instrument, select the "System" - "Network" menu to access the IP Address, Subnet Mask, Default Gateway and DNS Server values. Select the "Setup" button and edit the settings. Note that if the DHCP check box is enabled, you will not be able to change these values. Once the network addressing has been setup, select the "Apply" button to attach the Rx instrument to the network.

Remote Control of Rx Instrument (Cost Option)

To allow remote control of an Rx instrument, you must have the TCP/IP address of the instrument set and the Remote Control 'On' check box must be checked.

The list box shows a list of current connections made to the instrument. This includes the web browser connection (127.0.0.1) which may be seen intermittently as the web browser connects every few seconds and then disconnects again. See the remote control documentation available for download for more information on the protocol and method of control.

The Rx instrument uses a default Port Number of 2100 for remote control access (See Remote Control SDK documentation on Download section of PHABRIX Web Site) This port number may now be changed if it conflicts with other applications in your system.

Misc

The specific unit and software option details of the Rx instrument can be viewed using the Misc menu. This shows serial numbers, Rx instrument MAC address and version information. It also allows the date and time to be set and factory default settings to be recalled. The options security code is entered on this page if options are purchased.
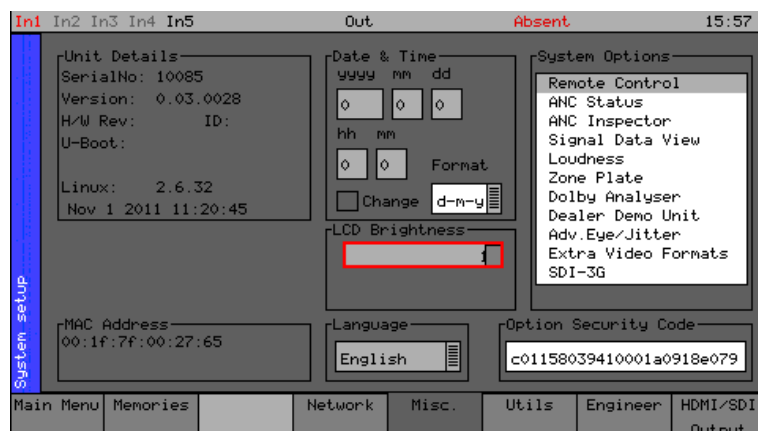
Using the Rx2000 front panel, the Misc menu can be displayed by selecting the corresponding "System" button.

The "System Info" window on the HDMI® monitor output can also be used to display this information.

Changing The Date/Time

Check the 'Enable Change' check box under the date and time fields and then use the cursor to move around the date and time. Press 'OK' to edit a field and again to complete the change. When all fields have been edited, uncheck the 'Enable Change' check box and the new date and time will be set.

Note that the date may not be changed while a 30 day trial option is active.

Changing the Date Format:

The date format used on logging screens etc may be set using the Format selection control. Three formats are available: Date-Month-Year, Month-Date-Year and Year-Month-Date.

Setting LCD Brightness

Use the LCD brightness slider to set the front panel screen brightness.

Setting User Language

The language used to display the menus in may be changed to one of the supported languages. (Currently only English is supported)

Changing Options Security Code

When new options are purchased for the Rx instrument a new Security Code will be supplied. This is specific to this instrument and cannot be used on other units. The security code is entered using the Edit field below the System Option list and is edited by pressing OK and using the menu function keys. If an incorrect Security code is entered a dialogue will be displayed. The new Security code will only be saved if it is valid, the old code will be used until a valid code is entered. Once a valid new code has been entered, the list of options provided by that code will be displayed. The options code is stored independently to memories and system settings.

System Status / Utils

The current status of the hardware modules can be viewed using the Utils menu. This menu displays details of the Rx instrument's module (board) operating status and details the system temperature and individual board voltages.
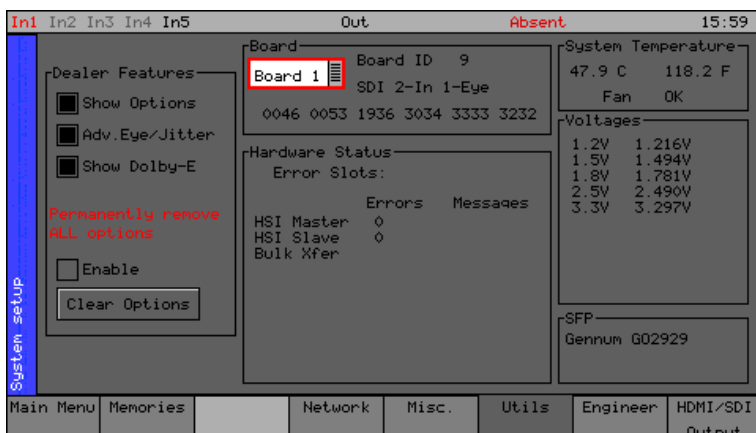
Using the Rx2000 front panel, the Utils menu can be displayed by selecting the corresponding "System" button.

The "System Status/Board Status" window on the HDMI® monitor output can also be used to display this information.

Dealer Features

This section of the menu details the features that can be used by suppliers of the Rx instrument.

Show Options	this check box, if selected, will enable the features throughout the menu system.
Enable	this check box, if selected, allows options to be cleared from the Rx instrument.
Clear Option	this function, when pressed, will remove the selected options from the Rx instrument.

Board (Module)

This section of the menu details the Modules that are currently installed in the Rx chassis.

Front	if this is selected will display the hardware details of the front panel board.
CPU	if this is selected will display the hardware details of the CPU Board.
Board 1	if this is selected will display the hardware details of the Module fitted in chassis slot 1.
Board 2	if this is selected will display the hardware details of the Module fitted in chassis slot 2.
Board 3	if this is selected will display the hardware details of the Module fitted in chassis slot 3.
Board 4	if this is selected will display the hardware details of the Module fitted in chassis slot 4.

Hardware Status

This section of the menu shows any hardware errors that have been recorded by the Rx instrument. If the error count is greater than 0, contact you local dealer for advice.

System Temperature

This section of the menu displays the current Rx instrument temperature. This information is provided for diagnostics purposes only.

Voltages

This section of the menu displays the current voltages for the currently selected board in the "Board" section of the menu. This information is provided for diagnostics purposes only.

SFP

This section of the menu displays the type of SFP (Small Form Factor Package) module is installed in the board currently selected board in the "Board" section of the menu. This information is provided for diagnostics purposes only.

Engineer

The Engineer menu is used to manage the Rx instrument and allows user access to be setup and the installation of new versions of software.
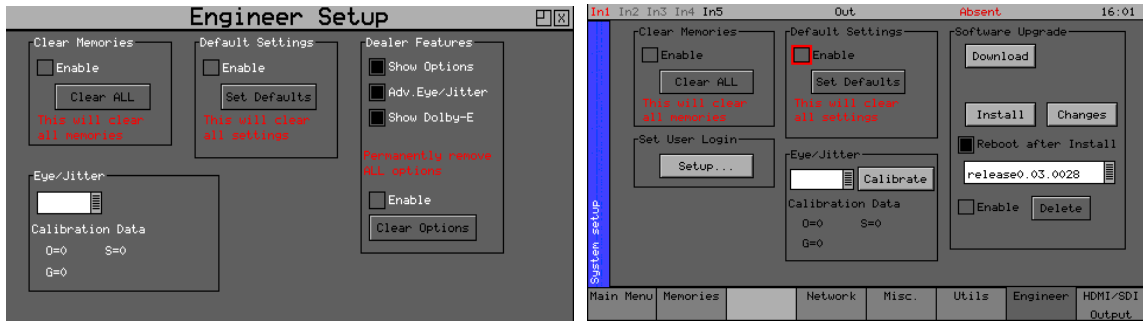
The Engineer Setup window is accessed by clicking on the System menu on the monitor output task bar and selecting "Engineer Setup".

Using the Rx2000 front panel, the Engineer menu can be displayed by selecting the corresponding "System" button.

Clear Memories

This section of the menu allows the defined users who can access the Rx instrument to be cleared. To use this function, select the 'Enable' check box and press the 'Clear ALL' button. This will clear all of the user memories will be deleted.

Default Settings

This section of the menu allows you to reset the Rx instrument back to its default settings. To do this, select the 'Enable' check box and press the 'Set Defaults' button and the factory defaults will be recalled. This will not affect the system Security Code or Free Run frequency.

Software Upgrade

This section of the menu allows new software versions to be installed. The Rx instrument may download and install new versions of software when available. This process is a two stage process: Download the software and then install it.

Note that on the HDMI® monitor output this controlled from the System Info menu.

> 1. To download the latest software version, make sure that the network settings are correct and that the Rx instrument is connected to the internet via the Ethernet connection.

> Pressing the Download button will cause the current release of software to be downloaded from the Phabrix Web Site. This will take a short time dependent on the connection to the Internet. Once the download has completed, the software will be checked for errors before being stored on the Rx instrument for future installation. If the latest software is already present on the Rx instrument, no software will be downloaded and a message will be shown.

> ⓘ Note that multiple releases of software may be stored on the Rx instrument so a previous release can be re-installed if required.

> 2. To install the downloaded software on the Rx instrument, select the release using the field with releases listed. The largest number is the latest release. Select the 'Install' button and a confirmation dialogue will be shown. Press "Yes" and the installation will start. This process takes several minutes to decompress the software, extract the files and then reprogram the hardware. If an error is given during the installation, retry the installation and or download. Do NOT turn the Rx instrument off until an installation has completed correctly.

Once the installation has competed, if "Reboot after Install" is checked the Rx instrument will re-start with the new software installed. If not checked then the instrument should be turned off and on again manually.

> Note that as part of the installation procedure, all memories are archived to a backup file and then deleted. They can be restored from the System-Memories page using the Restore button and selecting the '_Before_Upgrade' archive.

The software release notes can be viewed by selecting the Changes button.

HDMI Output

The Rx range of products provide a Monitor output in the form of an HDMI output that can display up to 16 instrument windows at 1920 x 1080 resolution. This menu also controls the use of the SDI output on the CPU board and allows the built-in generator to be used
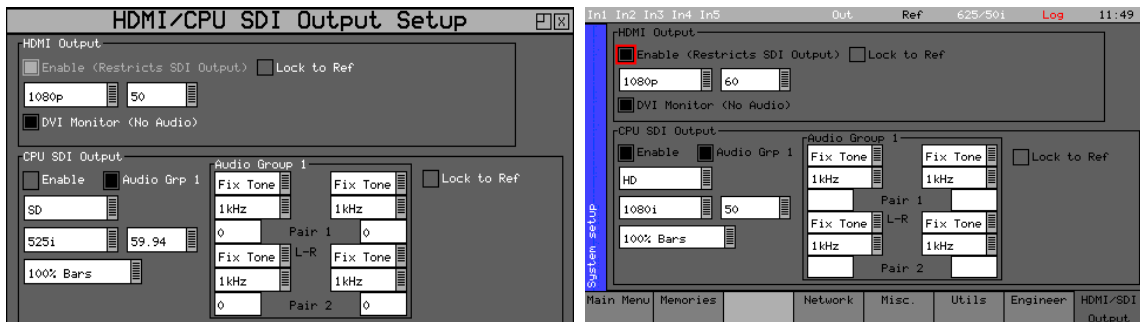
The HDMI/CPU SDI Output Setup window is accessed by clicking on the System menu on the monitor output task bar and selecting "HDMI/CPU SDI Output Setup".

Using the Rx2000 front panel, the HDMI/SDI Output menu can be displayed by selecting the corresponding "System" button.

The Monitor output display can display the pre-sets selected by the "Pre-set Buttons" and can be controlled by a USB mouse and keyboard connected to the Rx instrument

> ⓘ Note that on the Rx 500 and Rx 1000 instruments, the Monitor Output is always enabled. But on the Rx 2000 instrument, however, the Monitor output can be enable/disabled in the "HDMI/SDI Output" menu that is available from the Instrument Display on the front of the instrument.

The HDMI® monitor output can only be in the following formats:

> 1080p, 50, 59.94 or 60

> 1080i, 50, 59.94 or 60

If the "Lock to Ref" check box is enabled the HDMI output will be locked to the system's locking reference input signal. See the "External Locking Reference" section.

CPU SDI Output

The built-in video signal Generator on the CPU board (standard on all Rx instruments) provides an SDI test output. This is tied to the HDMI® monitor output and can only produce test signals in a range of video formats matching those of the HDMI output. If an unrestricted range of test signal video formats is needed, then either the HDMI out needs to be disabled or an additional Generator module is required.

With the HDMI output enabled (always enabled on the Rx 500 and Rx 1000 instruments and configurable on the Rx 2000 instrument) then the frame rate of the SDI output is limited to be match to the HDMI output. The HDMI standard and frame rate combo-boxes will be limited to 1080p 50/59/60. If the HDMI output is disabled (Rx 2000 only), the SDI output may be any frame rate.

Using SDI output as Test Pattern Generator

The SDI output on the CPU module can be used as a test pattern and audio tone generator. This output is limited to specific test patterns and can only provide audio tones for Audio Group 1

Select the required video format, line rate and frame rate from the drop down menus in the "CPU SDI Output" section then select "100% Bars", "75% Bars" of "CheckField" as the test pattern.

The audio source for each channel may be Silence, Fixed tone (a range of fixed frequencies), variable tone (set in 1Hz steps from 1Hz to 23.99kHz) or white noise.

If the "Lock to Ref" check box is enabled the test pattern will be locked to the system's locking reference input signal. See the "External Locking Reference" section.

Using HDMI over SDI

If you wish to route the HDMI® monitor output over SDI this can be done in two different ways dependent on the chosen format of the HDMI Output:

When using 1080p in the "HDMI Output" section, then select "Enable", "3G-A", 1080p format and "HDMI output" in the "CPU/SDI Output" section.

When using 1080i in the "HDMI Output" section, then select "Enable", "HD", 1080i format and "HDMI output" in the "CPU/SDI Output" section.

External Locking Reference

When using an external locking reference signal, the Rx system will provide the best possible locking regardless of the locking reference frame rate and the generated frame rate.

When the frame rate of the locking reference is exactly the same as the generated frame rate, there will be an exact lock vertical and horizontal between them.

When the frame rate of the locking reference and the generated frame rate are divisible (for example 50/25, 60/30, 59.94/23.98) there will be an exact lock vertical and horizontal between them.

When there is no relationship between the frame rate of the locking reference and that of the generated frame rate (for example a 625/50 locking reference and a 23.98 generated test pattern) then there will be a static lock between them but this will not be consistent.

System Info

The System Info window displays the system software status and options that are installed on the HDMI® monitor output.

The System Info window is accessed by clicking on the System menu on the monitor output task bar and selecting "System Info".

Setting User Language

The language used to display the menus in may be changed to one of the supported languages. (Currently only English is supported)

Changing Options Security Code

When new options are purchased for the Rx instrument a new Security Code will be supplied. This is specific to this instrument and cannot be used on other units. The security code is entered using the Edit field below the System Option list and is edited by pressing OK and using the menu function keys. If an incorrect Security code is entered a dialogue will be displayed. The new Security code will only be saved if it is valid, the old code will be used until a valid code is entered. Once a valid new code has been entered, the list of options provided by that code will be displayed. The options code is stored independently to memories and system settings.

Software Upgrade

This section of the menu allows new software versions to be installed. The Rx instrument may download and install new versions of software when available. This process is a two stage process: Download the software and then install it.

> 1. To download the latest software version, make sure that the network settings are correct and that the Rx instrument is connected to the internet via the Ethernet connection.

> Pressing the Download button will cause the current release of software to be downloaded from the Phabrix Web Site. This will take a short time dependent on the connection to the Internet. Once the download has completed, the software will be checked for errors before being stored on the Rx instrument for future installation. If the latest software is already present on the Rx instrument, no software will be downloaded and a message will be shown.

ⓘ Note that multiple releases of software may be stored on the Rx instrument so a previous release can be re-installed if required.

2. To install the downloaded software on the Rx instrument, select the release using the field with releases listed. The largest number is the latest release. Select the 'Install' button and a confirmation dialogue will be shown. Press "Yes" and the installation will start. This process takes several minutes to decompress the software, extract the files and then reprogram the hardware. If an error is given during the installation, retry the installation and or download. Do NOT turn the Rx instrument off until an installation has completed correctly.

Once the installation has competed, if "Reboot after Install" is checked the Rx instrument will re-start with the new software installed. If not checked then the instrument should be turned off and on again manually.

ⓘ Note that as part of the installation procedure, all memories are archived to a backup file and then deleted. They can be restored from the System-Memories page using the Restore button and selecting the '_Before_Upgrade' archive.

The software release notes can be viewed by selecting the Changes button

Board Status

The Board Status window displays the current status of the hardware modules on the HDMI® monitor output. This can then be used to inspect which Modules have been installed in the Rx instrument.
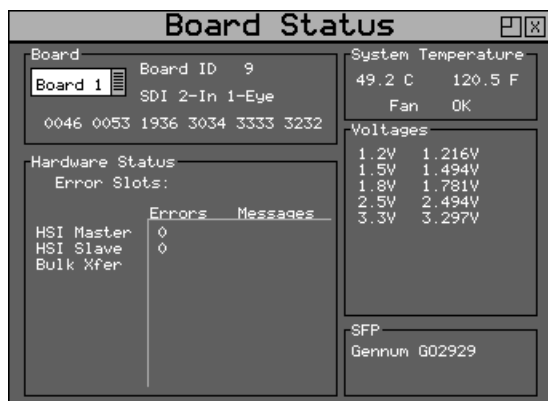
The Board Status window is accessed by clicking on the System menu on the monitor output task bar and selecting "Board Status".

Board (Module)

This section of the menu details the Modules that are currently installed in the Rx chassis.

Front	if this is selected will display the hardware details of the front panel board.
CPU	if this is selected will display the hardware details of the CPU Board.
Board 1	if this is selected will display the hardware details of the Module fitted in chassis slot 1.
Board 2	if this is selected will display the hardware details of the Module fitted in chassis slot 2.
Board 3	if this is selected will display the hardware details of the Module fitted in chassis slot 3.
Board 4	if this is selected will display the hardware details of the Module fitted in chassis slot 4.

Hardware Status

This section of the menu shows any hardware errors that have been recorded by the Rx instrument. If the error count is greater than 0, contact you local dealer for advice.

System Temperature

This section of the menu displays the current Rx instrument temperature. This information is provided for diagnostics purposes only.

Voltages

This section of the menu displays the current voltages for the currently selected board in the "Board" section of the menu. This information is provided for diagnostics purposes only.

SFP

This section of the menu displays the type of SFP (Small Form Factor Package) module is installed in the board currently selected board in the "Board" section of the menu. This information is provided for diagnostics purposes only.

Date/Time Setup

The Date/Time Setup window displays the current status of the hardware modules on the HDMI® monitor output. This can then be used to set the date and time of the Rx instrument.
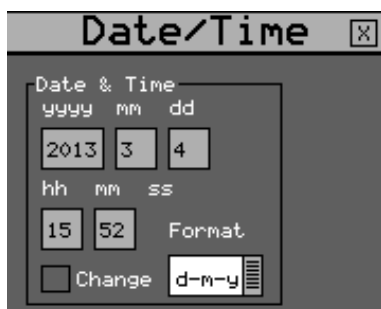
The Date/Time Setup window is accessed by clicking on the System menu on the monitor output task bar and selecting "Date & Time Setup".

This menu can also be displayed by clicking on the date displayed in the bottom right of the Monitor Output display.

Changing The Date/Time

Check the 'Enable Change' check box under the date and time fields and then use the cursor to move around the date and time. Press 'OK' to edit a field and again to complete the change. When all fields have been edited, uncheck the 'Enable Change' check box and the new date and time will be set.

Note that the date may not be changed while a 30 day trial option is active.

Changing the Date Format:

The date format used on logging screens etc may be set using the Format selection control. Three formats are available: Date-Month-Year, Month-Date-Year and Year-Month-Date.

Audio Monitoring Setup / Speaker Menu

The Speaker menu controls which audio pair that can be heard on the loud speakers and headphone output of the Rx instrument.
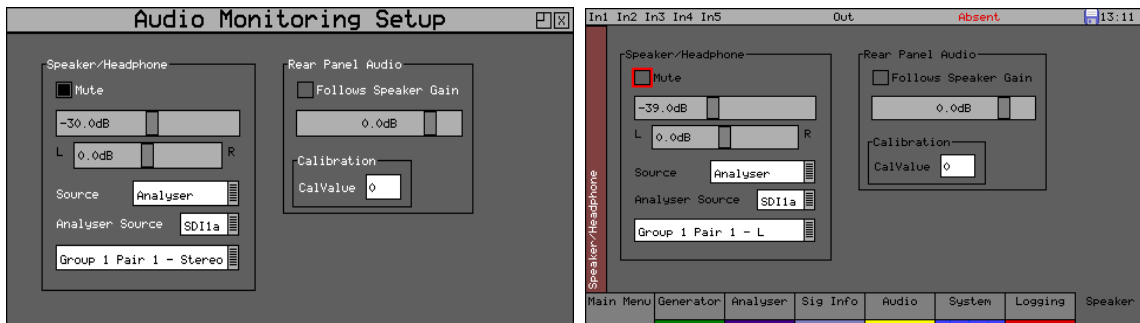
The Audio Monitoring Setup window is accessed by clicking on the System menu on the monitor output task bar and selecting "Audio Monitor Setup".

Using the Rx2000 front panel, the Speaker menu can be displayed by selecting the "Speaker" button.

Speaker / Headphone

The Rx2000 instrument contains stereo loud speakers and associated stereo headphone socket which can be connected to any of the audio input or output channels or pairs. The Rx1000 and Rx500 instruments only have a stereo headphone socket.

The "Mute" check box allows both signals to be muted.

A volume control is provided to adjust the level to headphones and speaker together. The balance control can be used to adjust the Left-Right balance for the source being monitored.

The monitored source can be set to the input or output of the Rx instrument and the input and output sources can be set independently to either a stereo pair or single audio channel.

The "Analyzer Source" is used to select the specific input that is to be heard.

The speaker can be muted when headphones are plugged in by checking the "Mute" box.

Note that when listening to an audio source, the Rx instrument needs the audio to be synchronous with that of the Rx Generator. If this is NOT the case, 'clicks' will be heard on the speaker. Either connect the Rx instrument reference to the same reference as the SDI input source and set the "Generator" - "GenLock" source to Ref or set the genlock source to Input-1.

Rear Panel Audio

The controls in the Rear Panel Audio section of the menu are used to setup the audio levels of the unbalanced analogue audio available on the D-type connector on the CPU module.

The "Follows Speaker Gain" check box if enabled will cause the audio level of the analogue signal follow the level set by the volume control on the front panel of the Rx unit. If the check box is not enabled the analogue audio level will remain the same regardless of the front panel volume control.

The volume slider below the "Follows Speaker Gain" check box can be adjusted to set the nominal output volume of the analogue output signal.

The "CalValue" value is use to calibrate the analogue circuitry on the CPU Module to ensure that analogue audio signal level matches the digital audio level being produced by the Generator module.

Time Code Setup

The Time Code Displays window controls display of time code information on the HDMI® monitor output. Time code is available on the locking reference input an on each video input that is analysed.
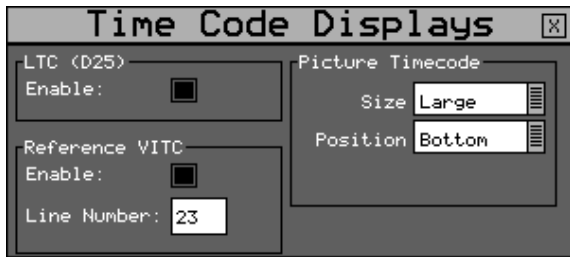
The Time Code Displays window is accessed by clicking on the System menu on the monitor output task bar and selecting "Time Code Displays". This window is also display when selected on the Picture instrument.

The Time Code Displays window allows Vertical Interval Timecode (VITC) present on the analogue (625i/50 and 525i/59.94) locking reference signal connected to the "REF" connection on the rear of the Rx unit, and Longitudinal Timecode (LTC) present on the "GPIO" D-type connector, to be displayed on the Task Bar of the HDMI® monitor output.

The line number where the VITC is located on the analogue locking reference signal can be selected using the "Line Number" field.

This window also allows the ANC Timecode from the video input to be displayed in 3 different positions and 3 different sizes on the picture window.

Default Window Size

The Default Window Sizes window controls how instrument windows are added to the HDMI® monitor output and their starting size.
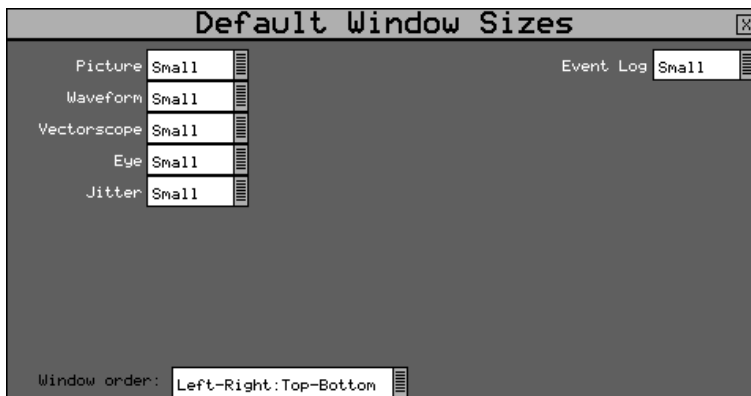
Instrument windows can be automatically assembled on screen either left to right or top to bottom.

The default size of Picture, Waveform, Vectorscope, Eye and Jitter windows can be set as small (1/16 screen size) or Quad (1/4 screen size).

Loudness Meters

The tools provided in the "Loudness" window allow the loudness of the selected stereo audio pair, 5.1 surround or 7.1 surround audio group to be monitored and measured. The Rx system provides a single Loudness meter as standard and an additional 3 Loudness meters are available as an option. The Loudness meter is access via the "System" - "Loudness" menu on the HDMI® monitor output.
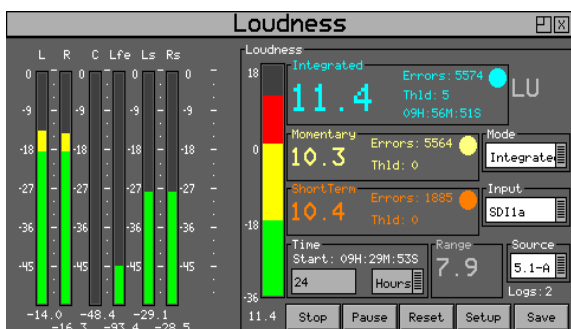
Loudness is measured in accordance with ITU and EBU Recommendation 128 which define the measurement in terms of Loudness Units (UI) and Loudness Units Full Scale (LUFS) over different time periods.

The Loudness display allows the required mode (Integrated, Momentary or Short Term), input (SDI, Fibre or AES) and audio source to be selected and allows automatic loudness logging to be setup and triggered.

The left hand part of the window displays the actual audio values of the select audio channels numerically and graphically. The right hand part of the window provides the current Integrated, Momentary and Short Term loudness values, a loudness bar graphically displaying the selected loudness mode value, input and source selection and loudness logging controls.

Mode

The loudness is measured simultaneously with three different time periods:

M (momentary) covering the shortest timescale of 400ms

S (short term) covering the intermediate timescale of 3 seconds

I (integrated) covering the duration of a program or segment

The M, S and I values are displayed for the selected audio pair, 5.1 surround sound audio channels or 7.1 surround sound audio channels.

Input and Source

The SDI input with the embedded audio channels to be monitored is selected using the "Input" drop-down list. The audio channels within the selected input are then selectable from the "Source" drop-down list. The loudness meter can display and log the loudness of stereo pairs (for example "G1-P1"), 5.1 surround sound audio channels or 7.1 surround sound audio channels.
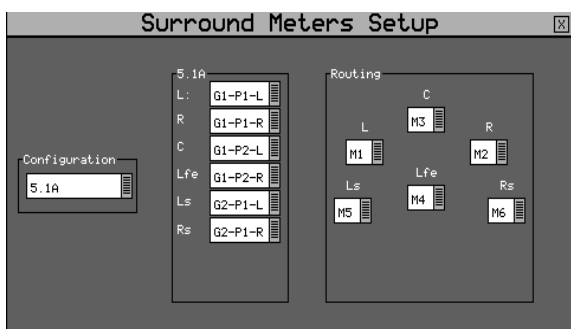
Note that the channel mapping for the 5.1 and 7.1 surround sound channels is defined in the "System" - "Surround Meters Setup" window.

This allows the individual audio channels from the selected SDI input(s) to be mapped to the L (left), R (right), C (centre), Lfe (low frequency effects), Ls (left surround), Rs (right surround), Bsl (back surround left) and Bsr (back surround right)

The meter display graticules change according to the source type selected

Setup
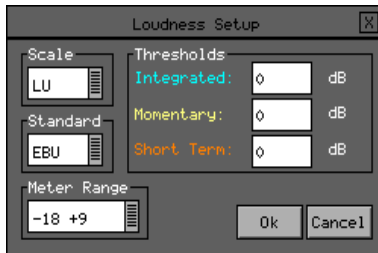
The Loudness Setup allows the meter scale (LU or LUFS), measurement standard (EBU or ITU) and Meter Range as well as user-defined threshold values for Integrated, Momentary and Short Term loudness.

LUFS has a -23 dB weighting to standardise broadcast loudness measurement and prevent digital clipping. So if a -23 dB test tone is measured it will give 0 LUFS.

The following functions are available in the Loudness Setup menu:

> Scale - allows the displayed scale of LU (Loudness Unit) or LUFS (Loudness Unit Full Scale) to be selected. These affect the loudness values measured.

> Standard - allows the EBU or ITU loudness measurement standard to be selected. These affect the loudness values measured.

> Meter Range - allows the range of the overall loudness measurement to be set as "-18 +9", "-36 +18", "-20 +10" or "-40 +20"

> The "Integrated", "Momentary" and "Short Term" threshold values define the level, above which, a loudness error is logged as exceeding the defined limits. The errors count is displayed on the Loudness window.

Selecting the OK button will save the current changes and the Cancel button will discard any changes made.

Loudness Logging

As defined in the EBU Recommendation 128, the loudness meter provides the following functions:

> Start – starts the loudness logging process using the currently defined criteria for the duration of time setup in the "Time" section of the Loudness window.

> Pause – pauses the current loudness logging process while retaining the existing logged loudness levels.

> Continue – resumes the loudness logging process from the point where it was paused.

> Reset – clears the current loudness log.

> Save - allows the current loudness log to be saved.

Loudness logs are stored automatically each time the pre-set duration is reached. These will be individual, time-stamped CSV (comma separated value) files which are held in the "loudness" folder within the Rx operating system.

See the "Rx File Structure" section in the "Maintenance" chapter for details.

Log files can be saved manually at any time by selecting the Save function. This will bring-up a file dialogue window and on-screen keyboard to allow the CSV file to be named appropriately.

Confidence Check

These different measure modes can give unpredictable results dependent on the type of program and the combination of narrative, music and loud audio events such as explosions. The actual values measured are also affected by the meter scale.

As a simple confidence check, use a stereo sine wave, 1000 Hz, -23.0 dBFS (per-channel peak level), in phase as the test tone applied to both channels simultaneously for 20 second duration. This should give the following results:

> M, S, I = -23.0 ±0.1 LUFS or M, S, I = 0.0 ±0.1 LU

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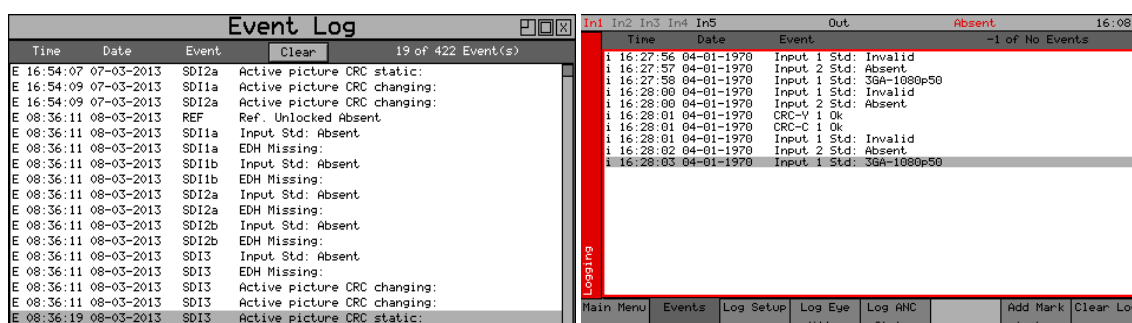
Logging Menus

Overview

Logging allows events to be detected and recorded for future examination. The events to be logged can be specified so that unwanted events do not appear in the event log. If a system has a problem with intermittent signals, the Rx instrument can be connected to that source and can be left for several days to log any errors. At the end of that period the log can be examined and the time and date of each error noted.

Event Log

The Event Log is where events, that have triggers setup in the Log Setup menu, are recorded.

The Event Log window is accessed by clicking on the Logging menu on the monitor output task bar and selecting "Event Log".

Using the Rx2000 front panel, the Events menu can be displayed by selecting the corresponding "Logging" button.

Pressing the OK button on the Rx2000 front panel when the highlight is on the event log page allows the event log to be scrolled through to view all events in the list. The currently selected event is shown on the event log header.

The event log may be cleared by pressing 'Clear Log' button; a dialogue will be shown asking the user to confirm the action. A date stamped 'mark' may be inserted into the event log to allow users to see when a test started or when a significant event happened using the 'Add Mark in log' button.

ⓘ Note that the event log only shows changes in status, so if the input is always in error and never good, an event will not be shown. To get the full state of the instrument will require looking at the current status as well as the event log.

Log Setup

The Log Setup menu allows specific events to be tracked by the Rx instrument. The events to be logged are set up on this page by checking the appropriate 'Log' check boxes.
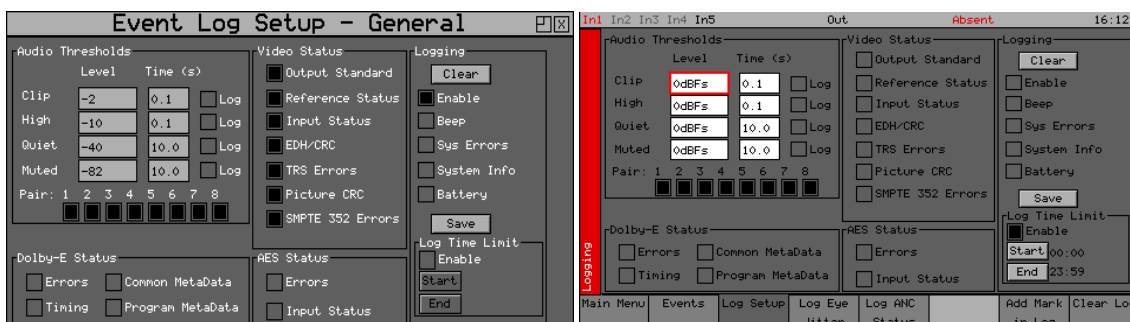
The Log Setup window is accessed by clicking on the Logging menu on the monitor output task bar and selecting "Log Setup".

Using the Rx2000 front panel, the Log Setup menu can be displayed by selecting the corresponding "Logging" button.

Audio Thresholds

This section allows the thresholds for audio events to be set. If the audio level for a channel is higher than that specified for the Clip or High fields for the number seconds specified then an event will be added to the event log. If the audio level for a channel is lower than that specified for the Quiet or Muted fields, then and event will be added to the event log. Logging may be limited to specified audio pairs.

Video Status

This section allows specific video status events to be logged:

Output Standard   A log event will be added whenever the generator video standard changes.

Reference Status   A log event will be added whenever the external reference standard changes or the external reference input is lost or re-appears.

Input Status   A log event will be added whenever the input video standard changes or if the input is lost or re-appears.

EDH/CRC   A log event will be added whenever a EDH/CRC error state changes. If the EDH/CRC state is correct, the event will show OK, else it will show FAIL. Separate Luma and Chroma CRC events may be shown. Note that EDH/CRC events may occur when an SDI signal is connected or removed.

TRS Errors   If the number of lines changes or line length changes during a frame, the input video will be detected as the TRS changing and an event logged. If the signal stays changing only a single event will be logged. If the SDI signal has a static line count and line length for 5 seconds, a TRS OK event will be added to the log. This reduces the number of log events for a bad SDI signal.

Picture CRC   This should only be used for static single frame test patterns (do not use for Zone Plate, dynamic broadcast signals or CheckField/Pathalogical test patterns which are two frames long at HD). This can be used to log changes in the CRC for the active picture (a value which is unique for each test pattern). If the CRC changes and was previously OK an error is added to the event log. If the CRC is the same as the last frame for 5 seconds an OK event will be added to the event log. Thus, if the active picture CRC is continuously changing there will only be one event in the log until the picture remains static when an OK event will be added.

AES Status

This section allows AES audio errors to be logged:

Errors   A log event will be added whenever the embedded audio error status changes. This may be due to a Data Block Number error, ECC error or phase error status change. The event entry will detail which state has changed.

Input Status   A log event will be added if the AES signal disappears or appears.

Dolby-E Status (Requires Dolby-E Analysis Option)

This section allows Dolby-E errors to be logged.

Errors   will add an event to the event log when a Dolby-E input stream is detected or lost. An event will also be added if a CRC error is detected in the Dolby-E meta-data stream. If an error is detected in the Dolby-E stream, it may mean that the Dolby-E stream has not been synchronised with the embedded audio clocks.

Timing   will log if the Dolby-E frame timing is outside the Dolby specified 'Ideal' range. A Warning event will be given if the signal is OK but slightly outside the range and an Error event if it is on an invalid line.

Common Metadata   will log any changes of the common meta-data (Program Configuration, Bit Depth, Frame Rates)

Program Metadata   will log any changed program meta-data. This can be useful for following changes to a program stream over a long period of transmission.

Logging

This section controls ALL logging events

Clear   clears all entries in the event log.

Enable   enables the logging process. If this is not checked, no events will be added to the log. This is a simple method of turning off ALL logging temporarily.

Beep   causes the Rx will emit a short tone when an Event is added to the log. Note that the beep will happen even if the Speaker is set to Mute.

SYS Errors   allows system errors to be displayed in the Event Log if they happen. If you are having problems with your Rx, checking this box can add events that can help PHABRIX determine the nature of the problem.

System Info   allows system to report additional internal messages in the Event Log if they happen. If you are having problems with your Rx instrument, checking this box can add events that can help PHABRIX determine the nature of the problem.

Save   saves the current event log to a text file in the currently specified language. The log file created, logfile.txt may be downloaded using a FTP connection.

Log Time Limit

The time when logging is enabled may be limited by time of day. Logging will start at the specified start time and end at the specified end time. The specified times must be after the current time. Un-check the box to log at all times. Logging must be enabled using the check box above for this to work.

Eye Log Setup / Log Eye Jitter

The Eye Log Setup menu allows specific Eye and Jitter events to be tracked by the Rx instrument. The events to be logged are set up on this page by checking the appropriate 'Log' check boxes.
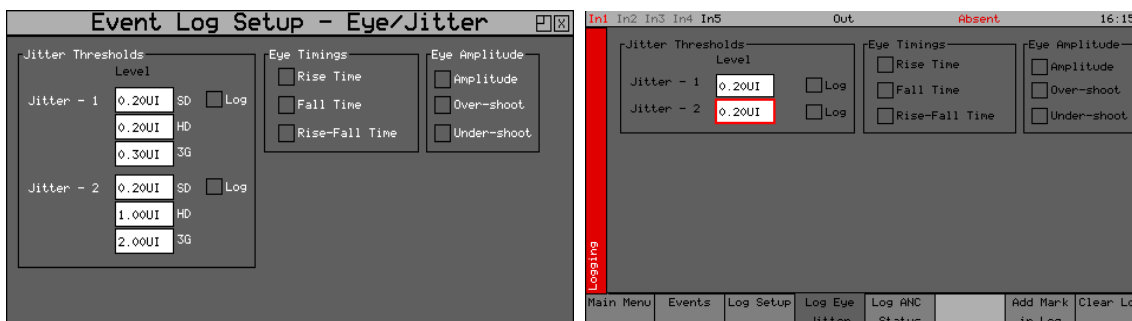
The Eye/Jitter Logging window is accessed by clicking on the Logging menu on the monitor output task bar and selecting "Eye Log Setup".

Using the Rx2000 front panel, the Log Eye Jitter menu can be displayed by selecting the corresponding "Logging" button.

Jitter Thresholds

The jitter level at which an event is added may be set independently for each meter. (Only one meter provided as standard) This allows you to set the maximum allowed jitter level and then test for invalid values over a period of time.

A different jitter threshold may be set for each of the 3 SDI data rates (SD/HD/3G) for both Jitter1 and Jitter2. The defaults are the maximum values specified by the SMPTE standard.

Jitter errors are detected within 200ns and so intermittent peak errors can be detected.

Eye Timings

If checked, these controls will enable logging of invalid timing values. An event will be logged if the value exceeds the valid SMPTE range and an event will be logged when the signal becomes valid again.

Eye measurements are performed using statistical calculations on the waveforms and are thus performed at a slower rate than jitter measurements. Measurements can take a few seconds to stabilise and this should be taken into account.

Eye Amplitude

If checked, these controls will enable logging of invalid amplitude or over-shoot/undershoot values. An event will be logged if the value exceeds the valid SMPTE range and an event will be logged when the signal becomes valid again.

Eye measurements are performed using statistical calculations on the waveforms and are thus performed at a slower rate than jitter measurements. Measurements can take a few seconds to stabilise and this should be taken into account.

Log ANC Status

The Log ANC Status menu allows specific ANC data events to be tracked by the Rx instrument. The events to be logged are set up on this page by checking the appropriate 'Log' check boxes.
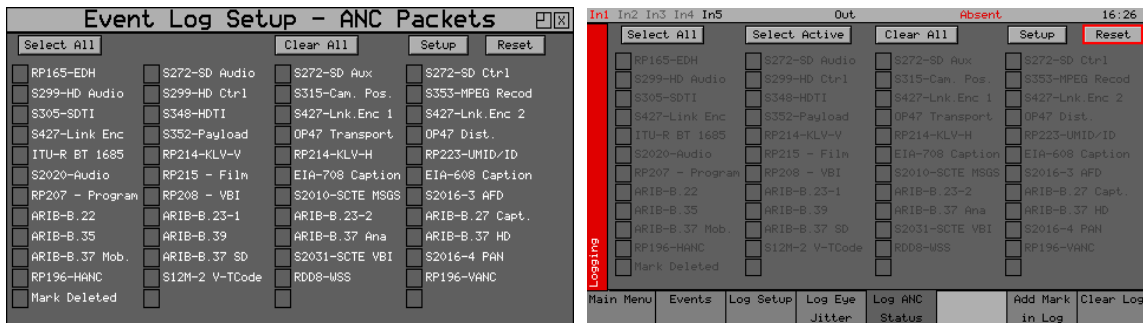
The ANC Packet Logging window is accessed by clicking on the Logging menu on the monitor output task bar and selecting "ANC Log Setup".

Using the Rx2000 front panel, the Log ANC Status menu can be displayed by selecting the corresponding "Logging" button.

The Log ANC Status menu allows you to select which ANC packets to log when changes in status occur (eg Present, Checksum Error, Missing, Parity Error). Individual check-boxes are provided to determine which packet DID/SDID combinations are logged.

See the Ancillary Packet Status section for definitions of these check boxes.

Select All   Pressing this causes the check boxes for all packets to be checked.

Select Active   Pressing this causes the check boxes for all packets currently present to be checked.

Select All   Pressing this causes the check boxes for all packets to be un-checked.

Setup   This allows the user to define and name their own DID/SDID values for an ANC packet type.
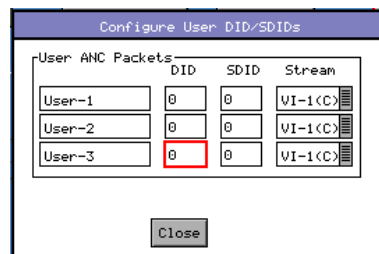
Reset   Clears the state for all packet types and thus a packet that was displayed as previously in error is shown as OK.

Admin Menus

USB Disk Connected Window
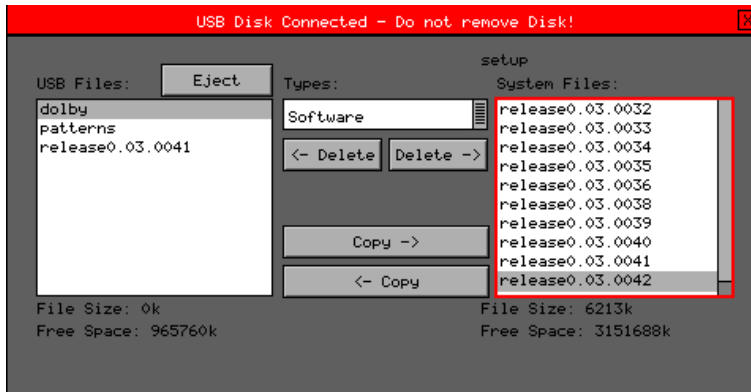
If a USB pen drive is plugged into the Rx unit, the "USB Disk Connected" window will be displayed. This allows items to be copied between the USB route directory and specific Rx folders.

The left-hand pane show the files in the route directory of the USB pen drive and the right-hand pane shows the files in the currently selected Rx folder.

The Types drop down box allows the selection of the following Rx folders:

> Software
> Screen Captures
> Archives
> Pattern NTSC
> Pattern PAL
> Pattern 720 YCC
> Pattern 720 RGB
> Pattern 1080 YCC
> Pattern 1080 RGB
> Pattern 1035 YCC
> Fonts

Files can be deleted from either the USB route directory or the currently selected Rx folder using the two delete buttons:

<- Delete   permanently deletes the selected/highlighted file in the USB route directory.

Delete ->   permanently deletes the selected/highlighted file in the USB route directory.

Great care must be taken not to delete files use by the Rx operating system.

Files can be copied between the USB route directory or the currently selected Rx folder using the two copy buttons:

Copy ->   copies the currently selected/highlighted file in the USB route directory to the currently selected Rx folder.

<-Copy   copies the currently selected/highlighted file in the selected Rx folder to the USB route directory.

Before the USB pen drive is removed from the Rx unit, select the Eject button to close the session. This will prevent accidental damage or corruption of the files on the USB pen drive.

PHABRIX® **A** Glossary

Glossary

Glossary of Terms

3G-SDI	is a single 2.970 Gbit/s serial link (standardized in SMPTE 424M) that will replace the dual link HD-SDI (is standardized in SMPTE 372M).
Advanced EyeMonitoring	is the Eye Monitoring functionality provided by the Rx Range.
AES	Audio Engineering Society
AES3-2003	standard for digital audio — Digital input-output interfacing —Serial transmission format for two channel linearly represented digital audio data.
AFD	(Active Format Description) is a standard set of codes that can be sent in the MPEG video stream or in the baseband SDI video signal that carries information about their aspect ratio and active picture characteristics as defined by SMPTE S2016.
Alignment Jitter	refer to artefacts above the specified threshold frequencies of (1 kHz for SD-SDI signals and 100 kHz for HD-SDI signals). Typically video equipment cannot tolerate Alignment Jitter which cause decoding errors due to incorrect sampling of the data stream because the SDI Clock transition occurs on the edge of the data sample instead of in the centre of the data sample.
ANC	(Ancillary Data) refers to a means which by non-video information (such as audio, EDH and other forms of essence and metadata) are embedded within the serial digital interface. There are 2 types if Ancillary Data, HANC (Horizontal Ancillary Data) and VANC (Vertical Ancillary Data). See SMPTE 291M: Ancillary Data Packet and Space Formatting.
ARIB-B.22	this is the ARIB defined Sub information data packet in the VANC space.
ARIB-B.23-1	this is the ARIB defined user data 1 packet in the VANC space.
ARIB-B.23-2	this is the ARIB defined user data 2 packet in the VANC space.
ARIB-B.27 Capt.	this is the ARIB defined caption data in the VANC space.
ARIB-B.35	this is the ARIB defined trigger signal data packet for data broadcasting.
ARIB-B.39	this is the ARIB defined inter-stationary control data packet in the VANC space.
ARIB-B.37	this is the ARIB defined analogue signal data in the VANC space.
ARIB-B.37 HD	this is the ARIB defined HD data packet in the VANC space.
ARIB-B.37 Mob	this is the ARIB defined closed captioning information data packet.
ARIB-B.37 SD	this is the ARIB defined SD data packet in the VANC space.
ASI	(Asynchronous Serial Interface) is a streaming data format which often carries an MPEG Transport Stream (MPEG-TS). An ASI signal can carry one or multiple SD, HD or audio programs that are already compressed.
Audio Jack	this is the front panel ¼ inch head phone socket used for local audio monitoring.
Bar Data	defines the extent of the image within the coded frame as part of the AFD (active format description as defined by SMPTE S2016.

Chassis	is the physical enclosure of the Rx range that is used to mount various hardware modules.
CPU	Central Processor Unit
CRC	(cyclic redundancy check) is an error-detecting code commonly used in digital networks and storage devices to detect accidental changes to raw data. Blocks of data entering these systems get a short check value attached, based on the remainder of a polynomial division of their contents; on retrieval the calculation is repeated, and corrective action can be taken against presumed data corruption if the check values do not match.
DBN	(Data Block Number) is a data word within the ANC Data. See DID for more information.
DID	(Data Identifier) – is the first data word with in the ANC Data that defines the type of data contained within the packet. This word is followed by either a 'Secondary Data Identifier (SDID) or a Data Block Number (DBN), followed by a Data Count (DC). After the Data Count word are 0 - 255 (inclusive) User Data Words (UDW), followed by a Checksum (CS) word.
Dolby E	is an audio encoding and decoding technology developed by Dolby Laboratories that allows up to 8 channels of audio to be compressed into a digital stream that can be transferred between compatible devices and stored on a standard stereo pair of audio tracks.
DVI	Digital Visual Interface
EDH	(Error Detection and Handling) protocol is an optional but commonly used addition to the Standard Definition-Serial Digital Interface (SDI) standard. This protocol allows an SD-SDI receiver to verify that each field of video is received correctly.
EIA-708 Caption	this is the EIA standard defined closed caption data for HD-SDI in VANC space.
EIA-608 Caption	this is the EIA standard defined closed caption data for SD SDI 525i (NTSC) in VANC space.
FPGA	a field-programmable gate array (FPGA) is an integrated circuit designed to be configured by the customer or designer after manufacturing.
Function Buttons	these are the set of 8 buttons below the Instrument Display on the Sx and Rx Ranges that are used to select the Instrument Display menu options.
GPI	General Purpose Input)
Graticule	this is the scale displayed on an oscilloscope, vector scope or waveform monitor that provides a visual indication of the signal amplitude, time base and phase relationship.
HANC	(Horizontal Ancillary Data) is non-video data that is transmitted within the horizontal blanking interval of the video data. See ANC for further information.
HDMI®	(High-Definition Multimedia Interface) is a compact audio/video interface for transferring uncompressed digital audio/video data from a HDMI-compliant device ("the source" or "input") to a compatible digital audio device, computer monitor, video projector, and digital television.

IEC 60268-10	defining Type I PPM style audio meters typically used by German broadcasters and Type II PPM style audio meters typically used by UK broadcasters.
IEC 60268-17	defining VU style audio meters typically used by American and Australian broadcasters.
Input Status Bar	is the bottom part of the Monitor Output display that shows the format and status of the input signals currently connected to the Rx chassis.
Instrument Display	is the TFT monitor available on the Sx Range of products and on the Rx 2000.
Integrated Loudness	covering the duration of a program or segment as defined in ITU-R Recommendations 128.
ITU-R Rec 128	defining the measurement in terms of Loudness Units (UI) and Loudness Units Full Scale (LUFS) over different time periods.
ITU-R Rec. BS.645	defining VU style audio meters typically used by French broadcasters.
ITU-R BT 1685	this is the ITU-R BT 1685 defined Structure of inter-station control data packets.
LTC/GPIO/Analogue	(Longitudinal Time Code/General Purpose Input Output)
MADI	(Multichannel Audio Digital Interface) or AES10 is an Audio Engineering Society (AES) standard electronic communications protocol that defines the data format and electrical characteristics of an interface that carries multiple channels of digital audio.
Module	this is a factory fitted hardware component for the Rx series chassis.
Momentary Loudness	covering the shortest timescale of 400ms as defined in ITU-R Recommendations 128.
Monitor Output	The Rx range of products provide an HDMI (and optional SDI) monitor output that can display up to 16 instrument panels at 1920 x 1080. This Monitor output display can display the pre-sets selected by the "Pre-set Buttons" and can be controlled by a USB mouse and keyboard connected to the Rx unit.
Navigation Buttons	These are the up, down, left, right arrow buttons available on the Sx and Rx Ranges.
OLED	Organic Light-Emitting Diode
OP47 Transport	this is the Free TV Operational Practice OP-47 defined transport of Closed Caption/Subtitling data in the VANC space.
OP47 Dist.	this is the Free TV Operational Practice OP-47 defined distribution of Closed Caption/Subtitling data in the VANC space.
PHRXKT1	is the rack mounting kit for the RX 1000 unit.
PHRXKT2	s the rack mounting kit for the RX 2000 unit.
PHRXM-A	is the Dual Input, single Analyser module.
PHRXM-AE	is the Dual Input, single Analyser module with eye/jitter functionality.
PHRXM-AEE	is the Dual Input, single Analyser module with dual eye/jitter functionality.
PHRXM-AG	is the single input Analyser module + Generator module.
PHRXM-AGE	is the single input Analyser module with eye/jitter functionality + Generator module.

PHRXM-8AES	26-way, D-type connector module providing 8 channels of AES audio (via a break-out cable) and MADI support.
PHRXM-DD	Dolby-E decode module
PHRXM-OPTAA	dual optical receiver SFP module.
PHRXM-OPTAG	optical transceiver SFP module.
PHRXM-OPTGG	dual optical transmitter SFP module.
PHRXO-3G	3G-SDI software option providing support for SMPTE 424M
PHRXO-AA	dual analyser software option
PHRXO-EA	advance eye pattern analyser software option
PHRXO-SD	SDI Data viewer software option
PHRXO-BD–A	basic Dolby analysis software option
PHRXO-BD–G	Dolby Generator software option
PHRXO-L	loudness Monitor software option
PHRXO-ASI	ETR 210 Tables 1, 2, 3 - software option
PHABRIX Rx 500	is a 1U height half rack mount Rasteriser which is small and light enough to fit a variety of applications from camera shading in OB environments or studio editing suites as well as manufacturing R&D departments. The Rx 500 has two input slots with 4 simultaneous inputs. All inputs are switchable and each can be independently controlled as picture or analysis instruments on an HDMI® monitor Output.
PHABRIX Rx 1000	is a 1U height 19" (482cm) rack mount Rasterizer with the ability to monitor up to 8 simultaneous inputs with loop through and is powerful enough to support simultaneous display of instruments across each module on HDMI® monitor Output. All inputs are switchable and each can be independently controlled as picture or analysis instruments with central control and report logging.
PHABRIX Rx 2000	is a 2U height 19" (482cm) rack mount Rasterizer with 2 on-board displays and the ability to monitor up to 8 simultaneous inputs with loop through and is powerful enough to support simultaneous display of instruments across each module on HDMI® monitor Output. All inputs are switchable and each can be independently controlled as picture or analysis instruments with central control and report logging.
PHABRIX SxA	is a 3G-SDI , HD-SDI and SD-SDI handheld SDI test signal generator, analyser and monitor supporting AES audio.
PHABRIX SxD	is a 3G-SDI , HD-SDI and SD-SDI handheld SDI test signal generator, analyser and monitor supporting dual link.
PHABRIX SxE	is a 3G-SDI , HD-SDI and SD-SDI handheld SDI test signal generator, analyser and monitor supporting eye and jitter measurement.
Pre-set Buttons	These are the set of 8 buttons below the Video Confidence display on the Rx 2000 that are used to select pre-defined inputs for display.
PSU	Power Supply Unit
Random Jitter	refers to artefacts caused by random events or processes such as thermal or shot noise that cause small amplitude variations in the clock edge position or could cause large signal amplitude variations, though these typically would be infrequent.

Rasteriser	is an electronic device used to display (either as picture or waveform) the video/audio data in a 3G-SDI, HD-SDI and SD-SDI stream. Typically a Rasteriser will display multiple output forms of the same input data stream.
RDD8-WSS	this is the SMPTE defined wide screen switching data packet in the VANC space.
RP165-EDH	this is the SMPTE RP165-EDH packet containing EDH (error data handling) and CRC (cyclic redundancy counts). This only appears on SD-SDI signals.
RP196-HANC	this is the SMPTE defined recommended practice Time Code data packet in HANC space.
RP196-VANC	this is the SMPTE defined recommended practice Vertical Timecode data packet in VANC space.
RP207 Program	this is the SMPTE RP207 defined program description data packet in VANC space.
RP208 – VBI	this is the SMPTE defined recommended practice VBI Data (vertical blanking interval data) in VANC space.
RP214-KLV-V	this is the SMPTE defined KLV Metadata transport in VANC space.
RP214-KLV-H	this is the SMPTE defined KLV Metadata transport in HANC space.
RP215 – Film	this is the SMPTE defined recommended practice data packe for film codes in VANC space.
RP233-UMID/ID	this is the SMPTE defined UMID (Unique Material Identifier) in VANC space
S272-SD Audio	this is the SMPTE 291M defined SD audio data in HANC space.
S272-SD Aux	this is the SMPTE 291M defined SD auxiliary data in HANC space.
S272-SD Ctrl	this is the SMPTE 291M defined SD control data in HANC space.
S299-HD Audio	this is the SMPTE 291M defined HD audio data in HANC space.
S299-HD Ctrl	this is the SMPTE 291M defined HD control data in HANC space.
S305-SDTI	this is the SMPTE 291M defined SDTI transport data packet in active frame space.
S348-HDTI	this is the SMPTE 291M defined HD-SDTI transport
S315-Cam. Pos	this is the SMPTE 291M defined camera position data in HANC and VANC space.
S353-MPEG Recod	this is the SMPTE 291M defined MPEG recoding data in HANC and VANC space.
S427-Lnk. Enc 1	this is the SMPTE S427 defined link encryption data packet.
S427-Lnk. Enc 2	this is the SMPTE S427 defined link encryption data packet.
S427-Link Enc	this is the SMPTE S427 defined link encryption data packet.
S2010-SCTE MSGS	this is the SMPTE S2010 defined standardized API message data in VANC space.
S2016-3 AFD	this is the SMPTE S2016 defined standardized AFD (active format description) and Bar data packet (defining active area of image).
S2016-4 PAN	this is the SCTE S2016 standard defined pan and scan data packet.

S2020-Audio	this is the SMPTE S2020 defined standardized data packet defining the encoding for a Dolby stereo or a multi-channel surround group of audio channels.
S2031-SCTE VBI	this is the SCTE S2031 standard defined VBI (vertical blanking interval) data packet for closed captioning.
SDI	(Serial Digital Interface) capable of transferring SD or HD broadcast video and broadcast audio between compatible devices.
SDID	(Secondary Data Identifier) is a data word within the ANC Data packet. See DID for more details.
Short Term Loudness	covering the intermediate timescale of 3 seconds as defined by ITU-R Recommendations 128.
SMPTE	(Society of Motion Picture & Television Engineers)
SMPTE RP211	Implementation of 24P, 25P and 30P Segmented Frames for 1920 x 1080 Production Format
SMPTE 259M	Implement a SMPTE 259M Serial Digital Interface Using SMPTE HOTLink™ and CY7C9235/9335
SMPTE 260M	Television - 1125/60 High-Definition Production System - Digital Representation and Bit-Parallel Interface
SMPTE 274M	High Definition (HD) Image Formats for Television Production
SMPTE-276M	Television - Transmission of AES-EBU Digital Audio Signals Over Coaxial Cable
SMPTE 292M	Bit-Serial Digital Interface for High-Definition Television Systems
SMPTE 296M	1280 × 720 Scanning, Analogue and Digital Representation and Analogue Interface
SMPTE 297-2006	Serial Digital Fiber Transmission System for SMPTE 259M, SMPTE 344M, SMPTE 292 and SMPTE 424M Signals
SMPTE 352	Payload Identification Codes for Serial Digital Interfaces — Amendment 1
SMPTE 424M	3 Gb/s Signal/Data Serial Interface
SMPTE 425-B	Mapping of 2 x SMPTE 292M HD SDI interfaces. Level-B can carry a Dual Link 1.485 Gb/s payload or two HD 1.485 Gb/s payloads..
SMPTE 425M-A	Direct mapping of source image formats
SMPTE 428-9	D-Cinema Distribution Master – Image Characteristics
TFT	(Thin Film Transistor) is a type of LCD (Liquid Crystal Display) monitor.
Timing Jitter	refers to a short-term time interval error above a low frequency threshold of 10 Hz (as defined in the SMPTE standards for SDI signals).
UDW	(User Data Words) contains the actual "payload" data of the ANC Data package. See DID for more information.
UI	(Unit Interval) is time between consecutive clock cycles used to sample the SDI data stream. The UI measurement is used for Eye Pattern measurement.
UMID	(Unique Material Identifier) is a special code that is used to identify audio-visual (AV) materials.

VANC

(Vertical Ancillary Data) is non-video data that is transmitted within the vertical blanking interval of the video data. See ANC for further information.

Video Confidence Display is the TFT monitor available on the Rx 2000 that allows the picture to be displayed for the selected input.

Wander

refers to a long-term time interval error, ie artefacts below 10 Hz. Typically all video equipment has the tendency to cause wander over a long period, the display of these artefacts are not easily displayed in a meaningful way but are better logged as errors that exceed tolerances over a long period.

B Specification

Rx Platform

Overview

The 'Rx platform' has been designed to serve the varied test and measurement needs of the broadcast industry. PHABRIX has developed not a single product in the traditional sense but a modular system from which specific broadcast client requirements can be satisfied.

The Rx platform allows a flexible approach to test and measurement on a new technological platform designed for longevity. The system has been created to allow broadcast engineers to specify features according to the complexity of the required test and measurement application by simply adding additional modules and software licenses to their chosen core chassis.

Adding modules is like adding independent new instruments, each module providing a dedicated set of instruments for the task required.

The Rx Platform is available in a choice of chassis types:

Rx2000 – a unique audio video monitoring solution combining front panel instrumentation, via dual TFT screens, and integrated full range stereo speakers. Unique 2U tapered 'tilt-in-bay' engineering with four Rx module bays.

Rx1000 rasterizer – a compact 1U, 19" rack-mount chassis with OLED display interface with four Rx module bays.

Rx500 rasterizer – a compact 1U, ½ rack width chassis with OLED display interface with two Rx module bays.

Rx2000

Description

Description

The Rx2000 is a 2U rack mounted instrument that provides the following:

Two front panel TFT screens, one to display the selected input image and the other to display the generator and analyzer menus and selected analyzer instrument panels such as Waveform monitor. Vectorscope and Eye Pattern display.

Rasterised HDMI/SDI outputs to allow up to 16 individual instrument panels (windows) to be displayed on a single DVI 1920 x 1080 resolution monitor. Ideal for outside broadcast facilities and engineering bays where space is at a premium.

Individual input selection, for instant confidence and monitoring of feeds, using dedicated source selection buttons.

Control via front panel controls, for in-bay use and remotely via a network connection using a web browser.

Front panel audio monitoring, provided by high quality speakers and/or a head phone socket, to allow the monitoring of the selected Audio channel.

4 Module slots allowing the installation of Analyzer and Generator modules.

Environmental Requirements

Operating Temperature	0-40 °C
Operating Humidity	<85% RH (no condensation)
Power Requirements	AC 90-250V 50/60Hz 16W max
Height	2U, 3.5inch, 8.8cm
Width	19inch, 48.2cm
Depth	5.9inch, 15cm
Weight	4.19lbs, 1.9kg

Dimensions

Front Panel Dimensions

88mm

485mm
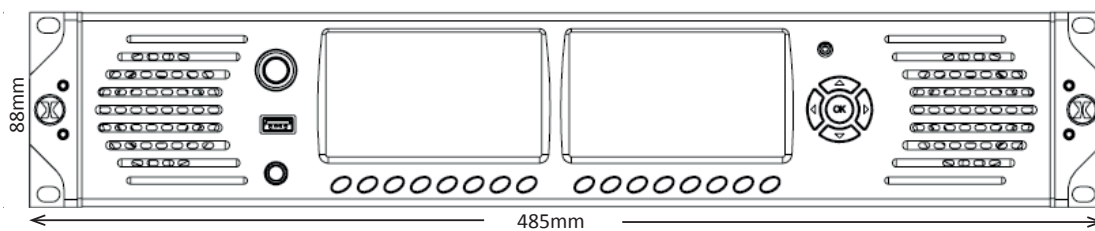
Back Panel Dimensions
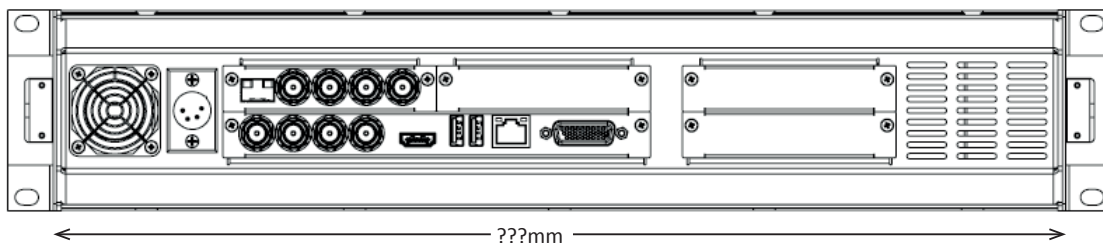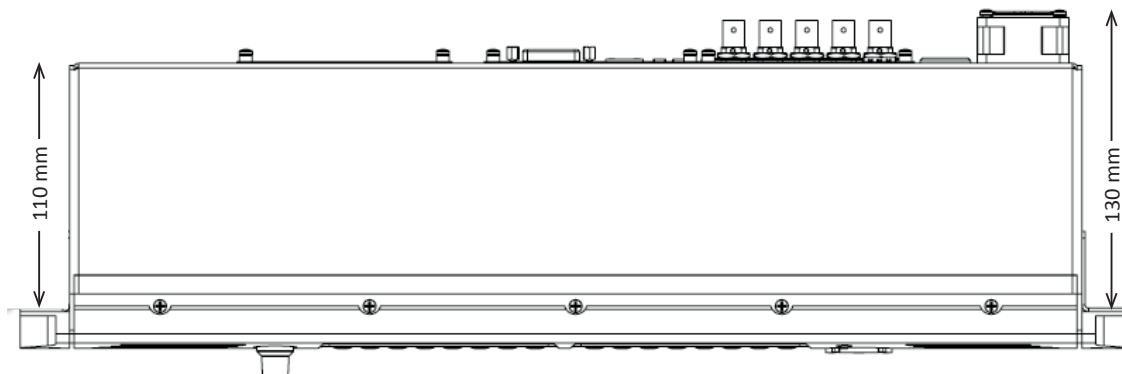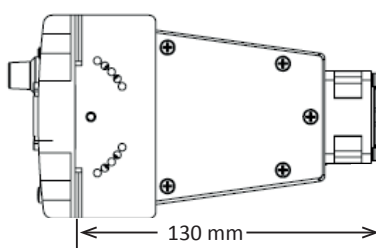
???mm

Top Panel Dimensions

110 mm

130 mm

Side Panel Dimensions

130 mm

Front Panel

The front panel provides access to the Video Confidence Display, the Instrument Display and menu system.

Front Panel Display

Display Type	4.3 inch TFT colour
Quantity	2
Display Format:	480 x 272 24 bits
Backlight	Variable brightness
Screen Saver	Reduces brightness after user adjustable time under battery operation.

Loud Speakers

Output Power	5W RMS per channel (THD 0.5%)
Frequency response	120Hz-20kHz

Headphone Output

Connector	1/4 Inch Stereo Jack
Level	Adjustable
Quantity	1 (front mounted)
Purpose	Local monitoring of audio

Rear Panel

The rear panel provides the Rx instrument's connections via the CPU module and the installed Analyzer or Generator modules. See the "Modules" section for details of the different modules.

Power Connection

Connector	4-pin XLR, Male
Voltage	12V +/- 5% AC. DC Power adapter provided

External Locking Reference

Label	REF
Input Signal	Tri-level or Bi-Level (black burst) syncs 50/59.94/60Hz
Connector	BNC
Input Impedance	75 Ω terminated
Input Return Loss	> 40dB to 6MHz (typical)
Maximum Input voltage	+/- 2V
Specification	Tri-level syncs (SMPTE 274M and SMPTE 296M) 600 mV pk-pk PAL Black Burst (ITU624-4/SMPTE318) 1V pk-pk, Composite NTSC (SMPTE 170M) 1V pk-pk

AES Input

Label	AES IN
Connector	BNC
Input Impedance	75 Ω terminated
Maximum Input Voltage	+/- 2V
Sample Rates	The input has a sample rate converter and so will accept any sample rate from 32kHz to 192kHz.
Specification	Conforming to AES3-2003 and SMPTE-276M

SDI Out

Label	SDI OUT
Connector	BNC
Input Impedance	75 Ω terminated
Output Level	+/- 400mV
Purpose	Is an basic SD-SDI or HD-SDI signal generator output that provides test signals generated by the on-board Generator. This output can also be used to provide an SDI monitor output tied to the HDMI® monitor output.
Test Signals	100% Colour Bars, 75% Colour Bars. or Check Field Pathological

HDMI

Connector	Type A
Video Format	1920 x 1080 RGB 4:4:4
Audio Format	4 x PCM stereo audio at 48 KHz
Purpose	Monitor output that allows up to 16 individual instrument panels (or windows) to be displayed.

Local Control

USB Connector	USB 2 Type A
Quantity	3 (1 x front mounted, 2 x rear mounted)
Purpose	Keyboard and mouse control for HDMI® monitor output of instrument and software installation.

Networking

Ethernet	IEEE 802.3 10/100Mb/s (10/100-base-T connection)
Ethernet Connector	RJ-45
Purpose	Browser control of instrument and FTP access to system files and allowing the Rx instrument to be connected into a network and accessed via TCP/IP so that it can be controlled remotely.

GPIO - Terminal

Label	GPIO
Connector	26-way D-type connector (CPU Board)
Pins	1 (TX) , 2 (RX), 3 (RTS), 4 (CTS)
Format	RS-232 Compatible
Purpose	Diagnostics

GPIO - Longitudinal Timecode (LTC)

Label	GPIO
Connector	26-way D-type connector (CPU Board)
Pins	5 (RX - P), 6 (RX-N)
Format	RS-422 Compatible

GPIO - Analogue Audio Output

Label	GPIO
Connector	26-way D-type connector (CPU Board)
Pins	7 (Audio Line Out - Right), 8 (Audio Line Out - Left)
Type	Stereo Pair
Level	(1V peak-to-peak analogue audio, full scale 0dBFS)
Purpose	Audio Monitoring

GPIO

Label	GPIO
Connector	26-way D-type connector (CPU Board)
Power	5 Volt (pin 9), current-limted GPIO supply for 'open drain' input/ outputs. 0 Volt/ signal ground (pins 10 to 18)
Format	open drain with 10K Ω pull-up to +5 Volts
Pins	19 (GPIO - 0), 20 (GPIO - 1), 21 (GPIO - 2), 22 (GPIO - 3), 23 (GPIO - 4), 24 (GPIO - 5), 25 (GPIO - 6), 26 (GPIO - 7)
Purpose	Not currently implemented.

Specification

Rx1000 Rasteriser

Description

The Rx1000 is a 1U rack mounted instrument that provides the following:

OLED display to allow the monitoring inputs and the selection of Monitor display, Analyzer and Generator presets.

Rasterised HDMI/SDI outputs to allow up to 16 individual instrument panels (windows) to be displayed on a single DVI 1920 x 1080 resolution monitor. ideal for outside broadcast facilities and engineering bays where space is at a premium.

Individual input selection, for instant confidence and monitoring of feeds, using dedicated source selection buttons.

Control via front panel controls, for in-bay use and remotely via a network connection using a web browser.

Front panel audio monitoring, provided by high quality speakers and/or a head phone socket, to allow the monitoring of the selected Audio channel.

4 Module slots allowing the installation of Analyzer and Generator modules.

Environmental Requirements

Operating Temperature	0-40 °C
Operating Humidity	<85% RH (no condensation)
Power Requirements	AC 90-250V 50/60Hz 16W max
Height	1U, 1.75inch, 4.4cm
Width	19inch, 48.2cm
Depth	6.7inch, 17cm
Weight	3.75lbs, 1.7kg

Dimensions

Front Panel Dimensions
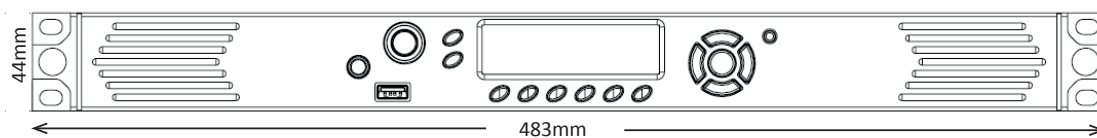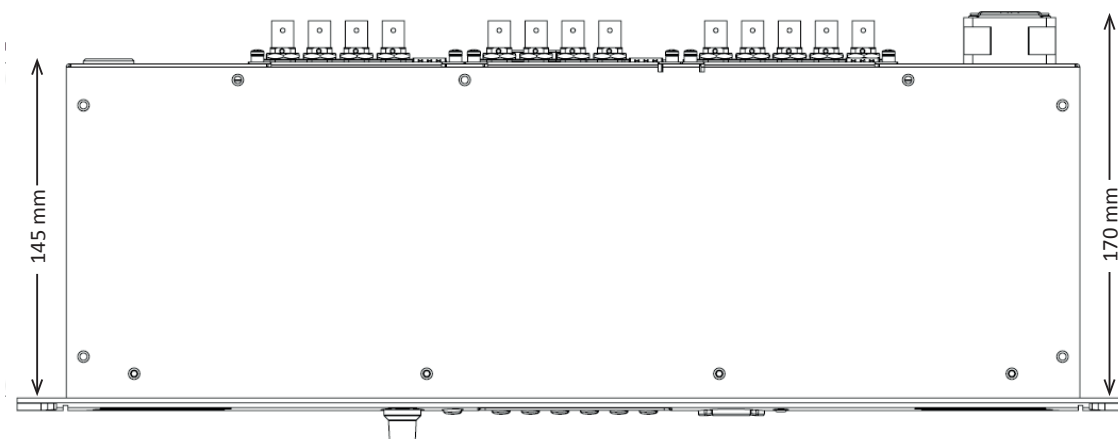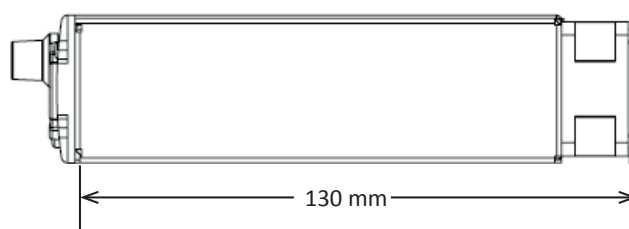
44mm

483mm

Top Panel Dimensions

145 mm

170 mm

Side Panel Dimensions

130 mm

Front Panel

The front panel provides access to the OLED Display and menu system to allow preset Monitor display, Analyzer and Generator settings to be recalled.

Front Panel Display

Display Type	OLED display
Quantity	1
Backlight	Variable brightness
Screen Saver	Reduces brightness after user adjustable time.

Headphone Output

Connector	1/4 Inch Stereo Jack
Level	Adjustable
Quantity	1 (front mounted)
Purpose	Local monitoring of audio

Rear Panel

The rear panel provides the Rx instrument's connections via the CPU module and the installed Analyzer or Generator modules. See the "Modules" section for details of the different module types.

Power Connection

Connector	4-pin XLR, Male
Voltage	12V +/- 5% AC. DC Power adapter provided

External Locking Reference

Label	REF
Input Signal	Tri-level or Bi-Level (black burst) syncs 50/59.94/60Hz
Connector	BNC
Input Impedance	75 Ω terminated
Input Return Loss	> 40dB to 6MHz (typical)
Maximum Input voltage	+/- 2V
Specification	Tri-level syncs (SMPTE 274M and SMPTE 296M) 600 mV pk-pk PAL Black Burst (ITU 624-4/SMPTE 318) 1V pk-pk, Composite NTSC (SMPTE 170M) 1V pk-pk

AES Input

Label	AES IN
Connector	BNC
Input Impedance	75 Ω terminated
Maximum Input Voltage	+/- 2V
Sample Rates	The input has a sample rate converter and so will accept any sample rate from 32kHz to 192kHz.
Specification	Conforming to AES3-2003 and SMPTE-276M

SDI Out

Label	SDI OUT
Connector	BNC
Input Impedance	75 Ω terminated
Output Level	+/- 400mV
Purpose	Is an basic SD-SDI or HD-SDI signal generator output that provides test signals generated by the on-board Generator. This output can also be used to provide an SDI monitor output tied to the HDMI® monitor output.
Test Signals	100% Colour Bars, 75% Colour Bars. or Check Field Pathological

HDMI

Connector	Type A
Video Format	1920 x 1080 RGB 4:4:4
Audio Format	4 x PCM stereo audio at 48 KHz
Purpose	Monitor output that allows up to 16 individual instrument panels (or windows) to be displayed.

Local Control

USB	USB 2
USB Connector	Type A
Quantity	3 (1 x front mounted, 2 x rear mounted)
Purpose	Keyboard and mouse control of the HDMI® monitor output of instrument and software installation.

Networking

Ethernet	IEEE 802.3 10/100Mb/s (10/100-base-T connection)
Ethernet Connector	RJ-45
Purpose	Browser control of instrument and FTP access to system files and allowing the Rx instrument to be connected into a network and accessed via TCP/IP so that it can be controlled remotely.

GPIO - Terminal

Label	GPIO
Connector	26-way D-type connector (CPU Board)
Pins	1 (TX) , 2 (RX), 3 (RTS), 4 (CTS)
Format	RS-232 Compatible
Purpose	Diagnostics

GPIO - Longitudinal Timecode (LTC)

Label	GPIO
Connector	26-way D-type connector (CPU Board)
Pins	5 (RX - P), 6 (RX-N)
Format	RS-422 Compatible

GPIO - Analogue Audio Output

Label	GPIO
Connector	26-way D-type connector (CPU Board)
Pins	7 (Audio Line Out - Right), 8 (Audio Line Out - Left)
Type	Stereo Pair
Level	(1V peak-to-peak analogue audio, full scale 0dBFS)
Purpose	Audio Monitoring

GPIO -

Label	GPIO
Connector	26-way D-type connector (CPU Board)
Power	5 Volt (pin 9), current-limted GPIO supply for 'open drain' input/ outputs. 0 Volt/ signal ground (pins 10 to 18)
Format	open drain with 10K Ω pull-up to +5 Volts
Pins	19 (GPIO - 0), 20 (GPIO - 1), 21 (GPIO - 2), 22 (GPIO - 3), 23 (GPIO - 4), 24 (GPIO - 5), 25 (GPIO - 6), 26 (GPIO - 7)
Purpose	Not currently implemented

Specification

Rx500 Rasteriser

Description

The Rx500 is a 1U, half rack width instrument (available with optional rack mount kit) that provides the following:

OLED display to allow the monitoring inputs and the selection of Monitor display, Analyzer and Generator presets.

Rasterised HDMI/SDI outputs to allow up to 16 individual instrument panels (windows) to be displayed on a single DVI 1920 x 1080 resolution monitor. ideal for outside broadcast facilities and engineering bays where space is at a premium.

Individual input selection, for instant confidence and monitoring of feeds, using dedicated source selection buttons.

Control via front panel controls, for in-bay use and remotely via a network connection using a web browser.

Front panel head phone socket to allow the monitoring of the selected Audio channel.

2 Module slots allowing the installation of Analyzer and Generator modules.

Environmental Requirements

Operating Temperature	0-40 °C
Operating Humidity	<85% RH (no condensation)
Power Requirements	AC 90-250V 50/60Hz 16W max
Height	1U, 1.75inch, 4.4cm
Width	8.5 inch, 24.1cm
Depth	6.7inch, 17cm
Weight	1.65lbs, 0.75kg

Dimensions

Front Panel Dimensions
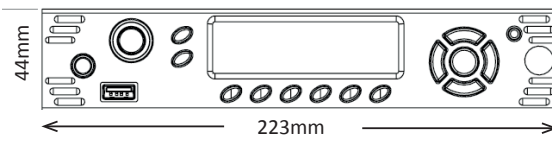
44mm

223mm

Top Panel Dimensions

170 mm

145 mm

165 mm

Side Panel Dimensions

164 mm
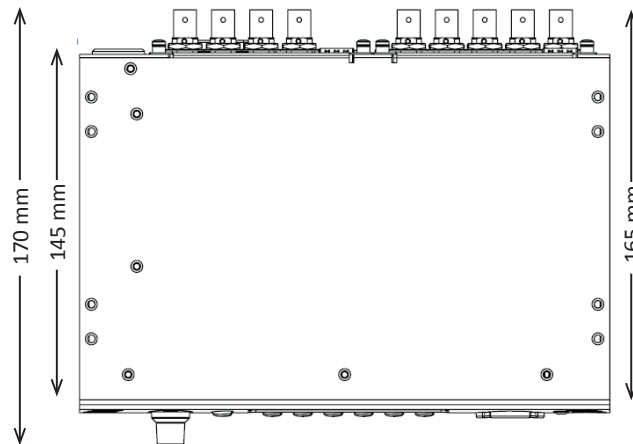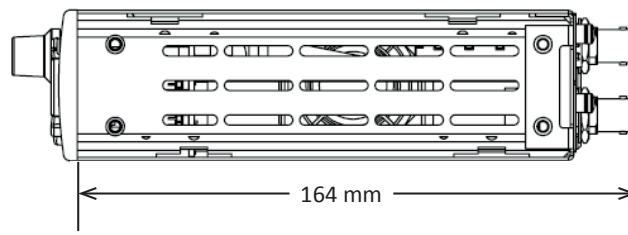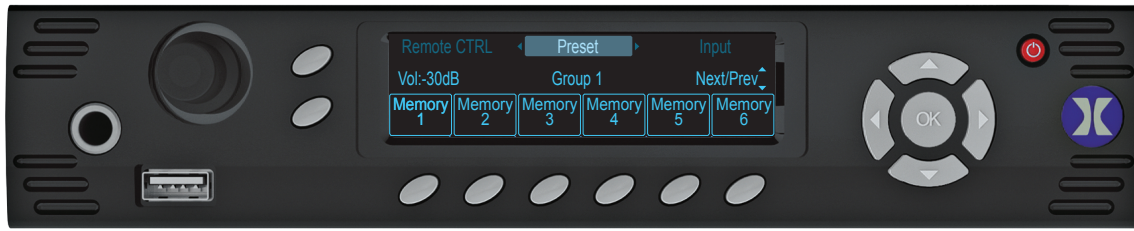
Front Panel

The front panel provides access to the LCD Display and menu system to allow preset Monitor display, Analyzer and Generator settings to be recalled.

Front Panel Display

Display Type	LED display
Quantity	1
Backlight	Variable brightness
Screen Saver	Reduces brightness after user adjustable time.

Headphone Output

Connector	1/4 Inch Stereo Jack
Level	Adjustable
Quantity	1 (front mounted)
Purpose	Local monitoring of audio

Rear Panel

The rear panel provides the Rx instrument's connections via the CPU module and the installed Analyzer or Generator modules. See the Modules section for details of the different module types.

Power Connection

Connector	4-pin XLR, Male
Voltage	12V +/- 5% AC. DC Power adapter provided

External Locking Reference

Label	REF
Input Signal	Tri-level or Bi-Level (black burst) syncs 50/59.94/60Hz
Connector	BNC
Input Impedance	75 Ω terminated
Maximum Input voltage	+/- 2V
Purpose	allows the Rx instrument to be locked to a studio reference.
Specification	Tri-level syncs (SMPTE 274M and SMPTE 296M) 600 mV pk-pk PAL Black Burst (ITU 624-4/SMPTE 318) 1V pk-pk, Composite NTSC (SMPTE 170M) 1V pk-pk

AES Input

Label	AES IN
Connector	BNC
Input Impedance	75 Ω terminated
Maximum Input Voltage	+/- 2V
Sample Rates	The input has a sample rate converter and so will accept any sample rate from 32kHz to 192kHz.
Specification	Conforming to AES3-2003 and SMPTE-276M

SDI Out

Label	SDI OUT
Connector	BNC
Output Impedance	75 Ω terminated
Output Level	+/- 400mV
Purpose	Is an basic SD-SDI or HD-SDI signal generator output that provides test signals generated by the on-board Generator. This output can also be used to provide an SDI monitor output tied to the HDMI® monitor output.
Test Signals	100% Colour Bars, 75% Colour Bars. or Check Field Pathological

HDMI

Connector	Type A
Video Format	1920 x 1080 RGB 4:4:4
Audio Format	4 x PCM stereo audio at 48 KHz
Purpose	Monitor output that allows up to 16 individual instrument panels (or windows) to be displayed.

Local Control

USB Connector	USB 2 Type A
Quantity	3 (1 x front mounted, 2 x rear mounted)
Purpose	Keyboard and mouse control of the HDMI® monitor output of instrument and software installation.

Networking

Ethernet	IEEE 802.3 10/100Mb/s (10/100-base-T connection)
Ethernet Connector	RJ-45
Purpose	Browser control of instrument and FTP access to system files and allowing the Rx instrument to be connected into a network and accessed via TCP/IP so that it can be controlled remotely.

GPIO - Terminal

Label	GPIO
Connector	26-way D-type connector (CPU Board)
Pins	1 (TX) , 2 (RX), 3 (RTS), 4 (CTS)
Format	RS-232 Compatible
Purpose	Diagnostics

GPIO - Longitudinal Timecode (LTC)

Label	GPIO
Connector	26-way D-type connector (CPU Board)
Pins	5 (RX - P), 6 (RX-N)
Format	RS-422 Compatible

GPIO - Analogue Audio Output

Label	GPIO
Connector	26-way D-type connector (CPU Board)
Pins	7 (Audio Line Out - Right), 8 (Audio Line Out - Left)
Type	Stereo Pair
Level	(1V peak-to-peak analogue audio, full scale 0dBFS)
Purpose	Audio Monitoring

GPIO -

Label	GPIO
Connector	26-way D-type connector (CPU Board)
Power	5 Volt (pin 9), current-limted GPIO supply for 'open drain' input/ outputs. 0 Volt/ signal ground (pins 10 to 18)
Format	open drain with 10K Ω pull-up to +5 Volts
Pins	19 (GPIO - 0), 20 (GPIO - 1), 21 (GPIO - 2), 22 (GPIO - 3), 23 (GPIO - 4), 24 (GPIO - 5), 25 (GPIO - 6), 26 (GPIO - 7)
Purpose	Not currently implemented

Specification

Specification

Rx Modules

Single Analyzer, Dual Input

The PHRXM-A module allows 2 connected SDI or Optical video signals to be present continuously and switched for analysis or display by the single analyzer channel as required.

The PHRXM-A module provides the following connections:

Analyzer SDI Inputs

Label	IN1 and IN2
Supported standards	SD-SDI or HD-SDI. See Supported formats
Connector	BNC
Input Impedance	75 Ω terminated
Input Return Loss	Better than 15dB (5MHz-1485MHz) and 10dB (1485MHz-2970MHz)
Maximum Input Voltage	+/- 2V
Purpose	Analyzer Input

Analyzer SDI Outputs

Label	LP1 and LP2
Connector	BNC
Output Impedance	75 Ω terminated
Purpose	Loop through of IN1 and IN2

Analyzer Optical Inputs

Label	OPTICAL A and B
Type	SFP Optical Dual Receiver Module (option PHRXM-OPTAA)
Specifications	SMPTE 424M, SMPTE 292M, and SMPTE 259M
Purpose	To provide 2 optical video/audio inputs

Analyzer Functionality

The PHRXM-A module provides analyzer functionality for two concurrently connected SD-SDI, HD-SDI or Optical inputs. With the module installed the Analyzer menu (see chapter 2 for details) allows the follow monitoring to be displayed:

The Picture viewer is provided to allow you to monitor the selected input to give confidence that the signal is present, is the correct subject (or feed), it is moving and looks OK.

The Vectorscope allows you to check the hue, saturation and phase of the selected input. Controls are provided to allow you to select the line (s) to be monitored (ideal for checking any embedded test pattern in the selected feed), the field to be checked and the graticule scale.

The Waveform Monitor allows you to check the levels of the video content are correct. Controls are provided to allow you to select the waveform (YCbCr, Y, Cb, Cr, GBR, Red, Green or Blue), the horizontal and vertical scale and the line(s) to be monitored.

The Audio monitor (16 embedded audio channels, 48 kHz, 20-bit (SD-SDI) 24-bit (HD-SDI)) allows you to check the audio levels of the selected input. In addition to the visual display, the selected audio channel can be monitored via the front panel loud speakers or head phone jack.

Single Analyzer, Dual Input, Physical Layer Measurement

The PHRXM-AE module allows 2 connected SDI or Optical video signals to be present continuously and selected for analysis or display by the single analyzer channel as required.

The PHRXM-AE module provides the following connections:

Analyzer SDI Inputs

Label	"IN1" and "IN2"
Supported standards	SD-SDI or HD-SDI. See Supported formats
Connector	BNC
Input Impedance	75 Ω terminated
Input Return Loss	Better than 15dB (5MHz-1485MHz) and 10dB (1485MHz-2970MHz)
Maximum Input Voltage	+/- 2V
Purpose	Analyzer Inputs

Analyzer SDI Outputs

Label	LP1 and LP2
Connector	BNC
Output Impedance	75 Ω terminated
Purpose	Loop through of IN1 and IN2

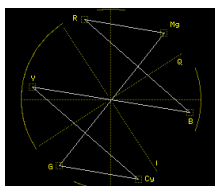## Analyzer Optical Inputs

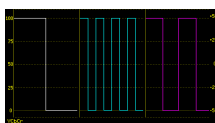|	
Label	OPTICAL A and B
Type	SFP Optical Dual Receiver Module (option PHRXM-OPTAA)
Specifications	SMPTE 424M, SMPTE 292M, and SMPTE 259M
Purpose	To provide 2 optical video/audio inputs

Analyzer Functionality

The PHRXM-AE module provides analyzer functionality for two concurrently connected SD-SDI, HD-SDI or Optical inputs. With the module installed the Analyzer menu (see chapter 2 for details) allows the follow monitoring to be displayed:
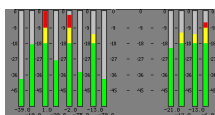

The Picture viewer is provided to allow you to monitor the selected input to give confidence that the signal is present, is the correct subject (or feed), it is moving and looks OK.

The Vectorscope allows you to check the hue, saturation and phase of the selected input. Controls are provided to allow you to select the line (s) to be monitored (ideal for checking any embedded test pattern in the selected feed), the field to be checked and the graticule scale.
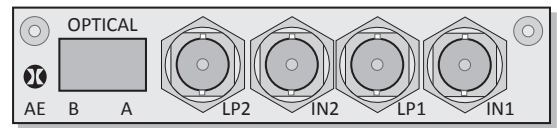

The Waveform Monitor allows you to check the levels of the video content are correct. Controls are provided to allow you to select the waveform (YCbCr, Y, Cb, Cr, GBR, Red, Green or Blue), the horizontal and vertical scale and the line(s) to be monitored.

The Audio monitor (16 embedded audio channels, 48 kHz, 20-bit (SD-SDI) 24-bit (HD-SDI)) allows you to check the audio levels of the selected input. In addition to the visual display, the selected audio channel can be monitored via the front panel loud speakers or head phone jack.

The Eye Pattern monitor allows you to check the level of jitter present in the selected source. Controls are provided to allow you to isolate specific frequencies of jitter to ensure that they are within acceptable tolerances.

The Jitter monitor allows you to measure the amplitude of jitter present in the selected source against time. Controls are provided for scaling and filtering to isolate specific jitter types.

Single Analyzer, Single Generator

The PHRXM-AG module allows a single connected SDI or Optical video signal to be monitored continuously and allows the generation of a single SDI or Optical video test signal.

The PHRXM-AG module provides the following connections:

Analyzer SDI Input

Label	SDI ANA IN
Supported standards	SD-SDI or HD-SDI. See Supported formats
Connector	BNC
Input Impedance	75 Ω terminated
Input Return Loss	Better than 15dB (5MHz-1485MHz) and 10dB (1485MHz-2970MHz)
Maximum Input Voltage	+/- 2V
Purpose	Analyzer Input

Analyzer SDI Output

label	SDI ANA OUT
Connector	BNC
Output Impedance	75 Ω terminated
Purpose	Loop through of SDI ANA IN

Analyzer Optical Input

Label	OPTICAL ANA
Type	SFP Optical Single Receiver Module/Single Transmitter (option PHRXM-OPTAG)
Specifications	SMPTE 424M, SMPTE 292M, and SMPTE 259M
Purpose	To provide 1 optical video/audio input

Generator SDI Outputs

label	SDI GEN OUT
Supported standards	SD-SDI or HD-SDI. See Supported formats
Connector	BNC x 2
Output Impedance	75 Ω terminated
Output Level	+/- 400mV
Purpose	Generator Output

Generator Optical Ouput

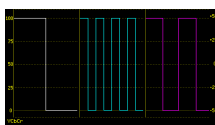|	
Label	OPTICAL GEN
Type	SFP Optical Single Receiver Module/Single Transmitter (option PHRXM-OPTAG)
Specifications	SMPTE 424M, SMPTE 292M, and SMPTE 259M
Purpose	To provide 1 optical video/audio output

Analyzer Functionality

The PHRXM-AG module provides analyzer functionality for two concurrently connected SD-SDI, HD-SDI or Optical inputs. With the module installed the Analyzer menu (see chapter 2 for details) allows the follow monitoring to be displayed:
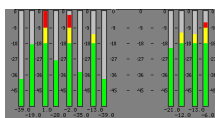

The Picture viewer is provided to allow you to monitor the selected input to give confidence that the signal is present, is the correct subject (or feed), it is moving and looks OK.
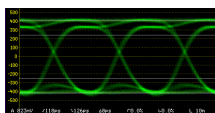

The Vectorscope allows you to check the hue, saturation and phase of the selected input. Controls are provided to allow you to select the line (s) to be monitored (ideal for checking any embedded test pattern in the selected feed), the field to be checked and the graticule scale.
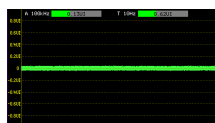

The Waveform Monitor allows you to check the levels of the video content are correct. Controls are provided to allow you to select the waveform (YCbCr, Y, Cb, Cr, GBR, Red, Green or Blue), the horizontal and vertical scale and the line(s) to be monitored.

The Audio monitor (16 embedded audio channels, 48 kHz, 20-bit (SD-SDI) 24-bit (HD-SDI)) allows you to check the audio levels of the selected input. In addition to the visual display, the selected audio channel can be monitored via the front panel loud speakers or head phone jack.
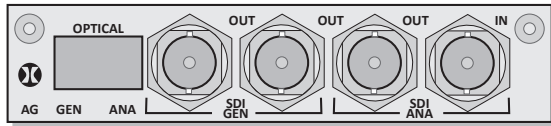
Generator Functionality

The PHRXM-AG module provides a single video/audio signal generator functionality. The Generator menu (see chapter 2 for full details) allows the following test signals to be generated. The Generator provides:

32, 10-bit Line-based video test patterns such as colour bars, ramp, colour plate, multiburst and user defined (DPX, YUV, TGA, BMP) that can be used to check video levels, linearity, saturation, hue, colour phase and frequency response.

Pathogenic video test patterns such as Bars + Red, SMPTE Bars, Check Field that can be used to check that decoding, encoding and transmission processes are correct.

Zone Plate generator test patterns are provided and allow the selection of several predetermined zone plates as well as 3 user customisable zone plates.

17 fixed Audio test tones (fixed 100Hz to 20kHz), variable tones (1Hz-24Khz in 1Hz steps), intermittent tone, white noise or silence on audio pairs and audio groups. Audio level variable (0 to -100dB in 1dB steps).

Single Analyzer, Single Generator, Physical Layer Measurement

The PHRXM-AGE module allows a single connected SDI or Optical video signal to be monitored continuously and allows the generation of a single SDI or Optical video test signal.

The PHRXM-AGE module provides the following connections:

Analyzer SDI Input

Label	SDI ANA IN
Supported standards	SD-SDI or HD-SDI. See Supported formats
Connector	BNC
Input Impedance	75 Ω terminated
Input Return Loss	Better than 15dB (5MHz-1485MHz) and 10dB (1485MHz-2970MHz)
Maximum Input Voltage	+/- 2V
Purpose	Analyzer Input

Analyzer SDI Output

Label	SDI ANA OUT
Connector	BNC
Output Impedance	75 Ω terminated
Purpose	Loop through of SDI ANA IN

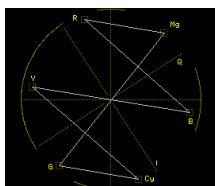## Analyzer Optical Input

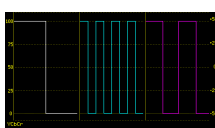|	
Label	OPTICAL ANA
Type	SFP Optical Single Receiver Module/Single Transmitter (option PHRXM-OPTAG)
Specifications	SMPTE 424M, SMPTE 292M, and SMPTE 259M
Purpose	To provide 1 optical video/audio input

Generator SDI Outputs

label	SDI GEN OUT
Supported standards	SD-SDI or HD-SDI. See Supported formats
Connector	BNC x 2
Output Impedance	75 Ω terminated
Output Level	+/- 400mV
Purpose	Generator Output

Generator Optical Output

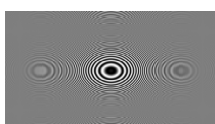|	
Label	OPTICAL GEN
Type	SFP Optical Single Receiver Module/Single Transmitter (option PHRXM-OPTAG)
Specifications	SMPTE 424M, SMPTE 292M, and SMPTE 259M
Purpose	To provide 1 optical video/audio output

Generator Functionality

The PHRXM-AGE module provides a single video/audio signal generator functionality. The Generator menu (see chapter 2 for full details) allows the following test signals to be generated. The Generator provides:
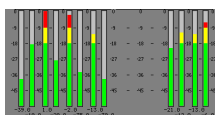
 32, 10-bit Line-based video test patterns such as colour bars, ramp, colour plate, multiburst and user defined (DPX, YUV, TGA, BMP) that can be used to check video levels, linearity, saturation, hue, colour phase and frequency response.

 Pathogenic video test patterns such as Bars + Red, SMPTE Bars, Check Field that can be used to check that decoding, encoding and transmission processes are correct.
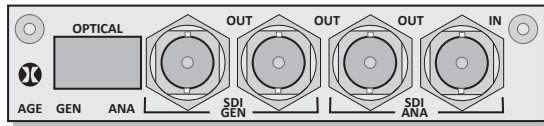
 Zone Plate generator test patterns are provided and allow the selection of several predetermined zone plates as well as 3 user customisable zone plates.

 17 fixed Audio test tones (fixed 100Hz to 20kHz), variable tones (1Hz-24Khz in 1Hz steps), intermittent tone, white noise or silence on audio pairs and audio groups. Audio level variable (0 to -100dB in 1dB steps).

Analyzer Functionality

The PHRXM-AGE module provides analyzer functionality for two concurrently connected SD-SDI, HD-SDI or Optical inputs. With the module installed the Analyzer menu (see chapter 2 for details) allows the follow monitoring to be displayed:

 The Picture viewer is provided to allow you to monitor the selected input to give confidence that the signal is present, is the correct subject (or feed), it is moving and looks OK.

 The Vectorscope allows you to check the hue, saturation and phase of the selected input. Controls are provided to allow you to select the line (s) to be monitored (ideal for checking any embedded test pattern in the selected feed), the field to be checked and the graticule scale.

 The Waveform Monitor allows you to check the levels of the video content are correct. Controls are provided to allow you to select the waveform (YCbCr, Y, Cb, Cr, GBR, Red, Green or Blue), the horizontal and vertical scale and the line(s) to be monitored.

 The Audio monitor (16 embedded audio channels, 48 kHz, 20-bit (SD-SDI) 24-bit (HD-SDI)) allows you to check the audio levels of the selected input. In addition to the visual display, the selected audio channel can be monitored via the front panel loud speakers or head phone jack.

 The Eye Pattern monitor allows you to check the level of jitter present in the selected source. Controls are provided to allow you to isolate specific frequencies of jitter to ensure that they are within acceptable tolerances.

 The Jitter monitor allows you to measure the amplitude of jitter present in the selected source against time. Controls are provided for scaling and filtering to isolate specific jitter types.

Single/Dual Analyzer, Dual Input, Physical Layer Measurement
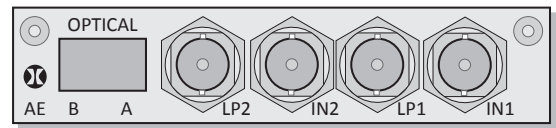
The PHRXM-AEE module allows 2 connected SDI or Optical video signals to be monitored continuously and selected for analysis or display by the single analyzer channel as standard, but can have dual analyzers if the PHRXO-AA software option has been installed.

The PHRXM-AEE module provides the following connections:

Analyzer SDI Inputs

Label	"IN1" and "IN2"
Supported standards	SD-SDI or HD-SDI. See Supported formats
Connector	BNC x 2
Input Impedance	75 Ω terminated
Input Return Loss	Better than 15dB (5MHz-1485MHz) and 10dB (1485MHz-2970MHz)
Maximum Input Voltage	+/- 2V
Purpose	Analyzer Inputs

Analyzer SDI Outputs

Label	LP1 and LP2
Connector	BNC
Output Impedance	75 Ω terminated
Purpose	Loop through of IN1 and IN2

Analyzer Optical Inputs

Label	OPTICAL A and B
Type	SFP Optical Dual Receiver Module (option PHRXM-OPTAA)
Specifications	SMPTE 424M, SMPTE 292M, and SMPTE 259M
Purpose	To provide 2 optical video/audio inputs

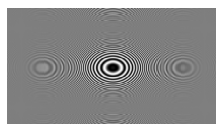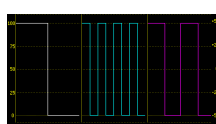## Analyzer Functionality

The PHRXM-AEE module provides analyzer functionality for two concurrently connected SD-SDI, HD-SDI or Optical inputs. With the module installed the Analyzer menu (see chapter 2 for details) allows the follow monitoring to be displayed:
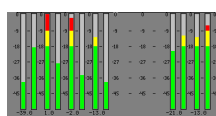
The Picture viewer is provided to allow you to monitor the selected input to give confidence that the signal is present, is the correct subject (or feed), it is moving and looks OK.
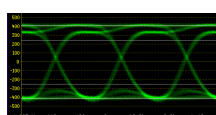
The Vectorscope allows you to check the hue, saturation and phase of the selected input. Controls are provided to allow you to select the line (s) to be monitored (ideal for checking any embedded test pattern in the selected feed), the field to be checked and the graticule scale.
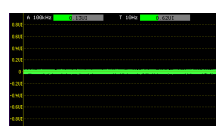
The Waveform Monitor allows you to check the levels of the video content are correct. Controls are provided to allow you to select the waveform (YCbCr, Y, Cb, Cr, GBR, Red, Green or Blue), the horizontal and vertical scale and the line(s) to be monitored.

The Audio monitor (16 embedded audio channels, 48 kHz, 20-bit (SD-SDI) 24-bit (HD-SDI)) allows you to check the audio levels of the selected input. In addition to the visual display, the selected audio channel can be monitored via the front panel loud speakers or head phone jack.

The Eye Pattern monitor allows you to check the level of jitter present in the selected source. Controls are provided to allow you to isolate specific frequencies of jitter to ensure that they are within acceptable tolerances.

The Jitter monitor allows you to measure the amplitude of jitter present in the selected source against time. Controls are provided for scaling and filtering to isolate specific jitter types.

Dual Output Generator Module
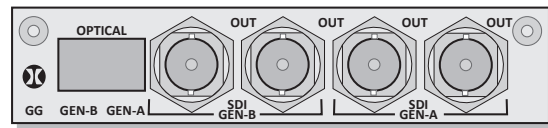
The PHRXM-GG module allows the generation of a two independent SDI or Optical video test signals with the same video format, colour space and frame rate for Dual link use.

The PHRXM-GG module provides the following connections:

Generator SDI Outputs

Label	SDI GEN-A OUT and SDI GEN-B OUT
Supported standards	SD-SDI or HD-SDI. See Supported formats
Connector	BNC x 4
Output Impedance	75 Ω terminated
Output Level	+/- 400mV
Purpose	Generator Outputs

Generator Optical Outputs

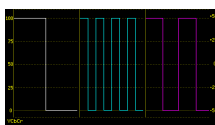|	
Label	OPTICAL GEN-A and OPTICAL GEN-B
Type	SFP Optical Dual Transmitter Module (option PHRXM-OPTAG)
Specifications	SMPTE 424M, SMPTE 292M, and SMPTE 259M
Purpose	To provide 2 optical video/audio outputs

Generator Functionality

The PHRXM-GG module provides a dual video/audio signal generator functionality. The Generator menu (see chapter 2 for full details) allows the following test signals to be generated. The Generator provides:

 32, 10-bit Line-based video test patterns such as colour bars, ramp, colour plate, multiburst and user defined (DPX, YUV, TGA, BMP) that can be used to check video levels, linearity, saturation, hue, colour phase and frequency response.

 Pathogenic video test patterns such as Bars + Red, SMPTE Bars, Check Field that can be used to check that decoding, encoding and transmission processes are correct.

 Zone Plate generator test patterns are provided and allow the selection of several predetermined zone plates as well as 3 user customisable zone plates.

 17 fixed Audio test tones (fixed 100Hz to 20kHz), variable tones (1Hz-24Khz in 1Hz steps), intermittent tone, white noise or silence on audio pairs and audio groups. Audio level variable (0 to -100dB in 1dB steps).

AES Digital Audio Input / Output
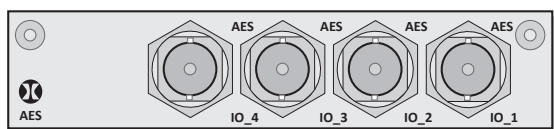
The PHRXM-4AGE module allows 4 x AES digital audio pairs to be routed to the Audio Meter and Loudness instruments.

Label	AES IO_1 TO AES IO_4
Connector	4 x BNC
Standard	AES3-4-2009 Annex D "Coaxial transmission"
Input Impedance	75 Ω terminated
Input Return Loss	Better than 15dB (5MHz-1485MHz)
Maximum Input Voltage	+/- 2V
Input Sample Rate	32kHz to 192kHz
Output Sample Rate	48kHz
Input Bit Depth	20bit or 24bit
Output Bit Depth	24bit
Purpose	AES digital audio pair Input and Output

Supported Video Formats

SD 270 Mb/s

Standard	Resolution	Colour Space	Rate
EBU Tech. 3267-E	720 x 576	4:2:2 (Y'C'BC'R')/10-bit	I 50.00
SMPTE 259M	720 x 483	4:2:2 (Y'C'BC'R')/10-bit	I 59.94

HD 1.485 Gb/s (SMPTE 292M)

Standard	Resolution	Colour Space	Rate
SMPTE 296M	1280 x 720	4:2:2 (Y'C'BC'R')/10 bit	P 23.98
			P 24.00
			P 25.00
			P 29.97
			P 30.00
			P 50.00
			P 59.94
			P 60.00
SMPTE 260M	1920 x 1035	4:2:2 (Y'C'BC'R')/10 bit	I 59.94
			I 60.00
SMPTE 274M	1920 x 1080	4:2:2 (Y'C'BC'R')/10 bit	I 50.00
			I 59.94
			I 60.00
SMPTE 274M	1920 x 1080	4:2:2 (Y'C'BC'R')/10 bit	P 23.98
			P 24.00
			P 25.00
			P 29.97
			P 30.00
SMPTE RP211	1920 x 1080	4:2:2 (Y'C'BC'R')/10 bit	sF 23.98
			sF 24.00
			sF 25.00
			sF 29.97
			sF 30.00

Dual Link 1.485 Gb/s (SMPTE 327M)

Standard	Resolution	Colour Space	Rate
SMPTE 274M	1920 x 1080	4:2:2 (Y'C'BC'R')/10 bit	P 50.00
			P 59.94
			P 60.00
	1920 x 1080	4:4:4 (R'G'B'), 4:4:4:4 (R'G'B' + A)/10-bit	P or sF 23.00
			P or sF 24.00
			P or sF 25.00
			P or sF 29.97
			P or sF 30.00
			I 50.00
			I 59.94
			I 60.00
SMPTE 274M	1920 x 1080	4:4:4 (R'G'B')/12-bit	P or sF 23.00
			P or sF 24.00
			P or sF 25.00
			P or sF 29.97
			P or sF 30.00
			I 50.00
			I 59.94
			I 60.00
SMPTE 274M	1920 x 1080	4:4:4 (Y'C'BC'R'), 4:4:4:4 (Y'C'BC'R' + A)/10-bit	P or sF 23.00
			P or sF 24.00
			P or sF 25.00
			P or sF 29.97
			P or sF 30.00
			I 50.00
			I 59.94
			I 60.00
SMPTE 274M	1920 x 1080	4:4:4 (Y'C'BC'R')/12 bit	P or sF 23.00
			P or sF 24.00
			P or sF 25.00

			P or sF 29.97
			P or sF 30.00
			I 50.00
			I 59.94
			I 60.00
SMPTE 274M	1920 x 1080	4:2:2 (Y'C'BC'R')/12 bit	P or sF 23.00
			P or sF 24.00
			P or sF 25.00
			P or sF 29.97
			P or sF 30.00
			I 50.00
			I 59.94
			I 60.00
SMPTE 428-9	2048 x 1080	4:4:4 (X'Y'Z')/12 bit	P or sF 23.98
			P or sF 24.00

3G Level-A 2.97 Gb/s (SMPTE 425M-A)

Standard	Resolution	Colour Space	Rate
SMPTE 274M	1920 x 1080	4:2:2 (Y'C'BC'R')/10 bit	P 50.00
			P 59.94
			P 60.00
SMPTE 296M	1280 x 720	4:4:4 (R'G'B'), 4:4:4:4 (R'G'B'+A)/10-bit	P 23.00
			P 24.00
			P 25.00
			P 29.97
			P 30.00
			P 50.00
			P 59.94
			P 60.00
SMPTE 296M	1280 x 720	4:4:4 (Y'C'BC'R'), 4:4:4:4 (Y'C'BC'R'+A)/10-bit	P 23.00 *
			P 24.00 *
			P 25.00 *
			P 29.97 *
			P 30.00 *
			P 50.00 *
			P 59.94 *
			P 60.00 *
SMPTE 274M	1920 x 1080	4:4:4 (R'G'B'), 4:4:4:4 (R'G'B'+A)/10-bit	P or sF 23.00 *
			P or sF 24.00 *
			P or sF 25.00 *
			P or sF 29.97 *
			P or sF 30.00 *
			I 50.00 *
			I 59.94 *
			I 60.00 *
SMPTE 274M	1920 x 1080	4:4:4 (Y'C'BC'R'), 4:4:4:4 (Y'C'BC'R'+A)/10-bit	P or sF 23.00 *
			P or sF 24.00 *
			P or sF 25.00 *
			P or sF 29.97 *
			P or sF 30.00 *
			I 50.00 *
			I 59.94 *
			I 60.00

SMPTE 274M	1920 x 1080	4:4:4 (R'G'B')/12-bit	P 23.00 *
			P 24.00 *
			P 25.00 *
			P 29.97 *
			P 30.00 *
			I 50.00 *
			I 59.94 *
			I 60.00 *
SMPTE 274M	1920 x 1080	4:4:4 (Y'C'BC'R')/12 bit	P 23.00 *
			P 24.00 *
			P 25.00 *
			P 29.97 *
			P 30.00 *
			I 50.00 *
			I 59.94 *
			I 60.00 *
SMPTE 428-9	2048 x 1080	4:4:4 (X'Y'Z')/12 bit	P or sF 23.98 *
			P or sF 24.00 *
SMPTE 274M	1920 x 1080	4:2:2 (Y'C'BC'R')/12 bit	P or sF 23.98 *
			P or sF 24.00 *
			P or sF 25.00 *
			P or sF 29.97 *
			P or sF 30.00 *
			I 50.00 *
			I 59.94 *
			I 60.00 *

* Advance Format Option required

3G Level-B 2.97 Gb/s (SMPTE 425-B)

Payload type
1 x SMPTE 372M dual-link payload
2 x SMPTE 292M HD 720 payloads
2 x SMPTE 292M HD 1080 payloads

Built-in Generator Formats (CPU Module)

The following test patterns are available:

100% Colour Bars

75% Colour Bars

Check Field

Standard	Resolution	Colour Space	Rate
EBU Tech. 3267-E	720 x 576	4:2:2 (Y'C'BC'R')/10-bit	I 50.00
SMPTE 259M	720 x 483	4:2:2 (Y'C'BC'R')/10-bit	I 59.94
SMPTE 296M	1280 x 720	4:2:2 (Y'C'BC'R')/10 bit	P 23.98
			P 24.00
			P 25.00
			P 29.97
			P 30.00
			P 50.00
			P 59.94
			P 60.00
SMPTE 274M	1920 x 1080	4:2:2 (Y'C'BC'R')/10 bit	I 50.00
			I 59.94
			I 60.00
SMPTE 274M	1920 x 1080	4:2:2 (Y'C'BC'R')/10 bit	P 23.98
			P 24.00
			P 25.00
			P 29.97
			P 30.00
3G-A SMPTE 274M	1920 x 1080	4:2:2 (Y'C'BC'R')/10 bit	P 50.00
			P 59.94
			P 60.00
3G-B SMPTE 274M	1920 x 1080	4:2:2 (Y'C'BC'R')/10 bit	P 50.00
			P 59.94
			P 60.00

C Maintenance

Warranty

Overview

The Rx range benefits from a 2 year warranty including telephone and email support. Each Rx leaves our UK factory with its own unique list of quality controlled settings which are recorded by our manufacturing department. Should the Rx require calibration, these settings are compared with its pre- calibration state to ensure consistency and traceability.

The product has been designed and manufactured to be of the highest quality. However, should the instrument develop a fault during the warranty period, please return to your local PHABRIX agent for repair.

Calibration services are available throughout the PHABRIX network of distributors. www. phabrix.com

Warranty Exceptions

PHABRIX are not responsible for free service during the warranty period under the following conditions:

> Incorrect voltage applied to instrument.
>
> Incorrect power adaptor used.
>
> Fire, natural disaster.
>
> Repair of instrument by non PHABRIX approved agent
>
> Repair of damage caused by third party products.
>
> Repair of damage caused by improper use.
>
> Repair without proof of purchase.

Product Registration

Please register your product on-line at www.phabrix.com

Registration of your product ensures a further year of support.

Maintenance

General Maintenance

The Rx2000, Rx1000 and Rx500 instruments have been designed to need minimum maintenance. The use of low power components means that there is not need for large amounts of cooling and therefore there are is not need to clean fan filters.

The case can be cleaned by wiping gently with a soft cloth, lightly dampened with a neutral cleaning agent. A screen cleaning cloth may be used to clean the LCD. Do not apply force to the LCD when cleaning or it may be damaged.

⚠️ *Warning always remove the power supply from the instrument and turn OFF before cleaning. Do not allow any water or other liquid to enter the instrument while cleaning.*

Preventative Maintenance

For long reliable use of the Rx instrument please take the following precautions:

Install the Rx instrument in a position which has adequate air flow and is not in direct sun light.

Ensure that connecting cables are tied back so that they do not put strain on the rack mounts and that the do not obstruct air flow.

Ensure that the fan grills are not obstructed.

Avoid installations where there are dramatic changes in temperature, high humidity and areas contaminated by dust, smoke or construction debris.

Avoid installations that may be affected by vibration.

Do not exceed the rated operation of the Rx instrument, ie temperature and signal levels.

⚠️ *The instrument should only be operated between 0 and 40 °Centigrade. If the instrument is operated at a higher temperature there is a possibility of a fire hazard. If the temperature is changed rapidly from a cold environment to a hot environment, moisture can be created internally which can cause malfunction or damage the instrument. Allow the instrument to sit for 30 minutes without power applied to reduce any possibility of condensation. If the temperature rises above 60°Centigrade a warning dialog will be given. If the temperature rises above 65°Centigrade the instrument will be turned OFF. Under both conditions, an event will be added to the event log to show what happened.*

Software Maintenance

Installing New Software

New software can be installed on the Rx instrument using 3 different techniques that take into account the location of the Rx instrument, the type of network access that the Rx instrument has and you company's IT policy.

Note that during the installation process the instrument will not be available for use.

> ℹ️ Note also that any existing Presets stored will be archived and will need to be restored if they are required. See the "System"-"Memories" section in chapter 2 for details about how to restore presets archived by the installation of an new version of software.

Using a USB Pen Drive

If you have direct access to the equipment bay where the Rx instrument is housed, place a new version of software into the root directory of a USB pen drive and then simply plug the pen drive into the front of the Rx instrument:

1. Download the latest Rx software version from the PHABRIX website and un-zip the software file in the root directory of a USB pen drive.

2. Plug the USB pen drive into the USB socket on the front panel of the Rx instrument.

After about 30 seconds the software will automatically be copied from the USB pen drive to the Rx instrument and Rx instrument will automatically restart.

3. Remove the USB pen drive from the front of the Rx instrument and wait for the new software to be installed (up to 10 minutes depending on the number and type of Rx Modules that are installed. The progress will be indicated on the front panel screen and on the Monitor output:

"Loading new software if found"

"Program CPU FPGA"

"Program FPGA Slot 1"

"Program FPGA Slot 2"

"Program FPGA Slot 3"

"Program FPGA Slot 4"

During this time the software will be decompressed, files will be extracted and the hardware (FPGAs) will be reprogrammed. If an error is given during the installation, retry the installation and or download. Do NOT turn the instrument off until an installation has completed correctly.

> ⚠️ *Warning do not use a USB hard drive as the Rx instrument cannot support this and it will damage the Rx instrument.*

Software Download from Internet

If you have access to the Rx instrument's Monitor output or access via a web browser (see chapter 1 for details), and the Rx instrument has Internet network access, you can down load and install directly into the Rx instrument from the browser:

This process is a two stage process, first the new software needs to be Downloaded then the new software needs to be installed.

1. In the System - Network menu (Network window on Monitor Output) check that he network settings are correct and that the instrument is connected to the internet via the Ethernet connection.

2. From the System menu, select Engineer (Engineer Setup window on Monitor Output) to download the latest software version. Pressing the Download button will cause the current release of software to be downloaded from the PHABRIX Web Site.

This will take a short time dependent on the connection to the Internet. Once the download has completed, the software will be checked for errors before being stored on the instrument for future installation. If the latest software is already present on the Rx instrument, no software will be downloaded and a message will be shown.

Note that multiple releases of software may be stored on the Rx instrument so a previous release can be re-installed if required.

3. To install the downloaded software on the Rx instrument, select the release using the field with releases listed. The largest number is the latest release. Select the 'Install' button and a confirmation dialogue will be shown. Press "Yes" and the installation will start. This process takes several minutes to decompress the software, extract the files and then reprogram the hardware. If an error is given during the installation, retry the installation and or download. Do NOT turn the instrument off until an installation has completed correctly.

Once the installation has competed, if "Reboot after Install" is checked the instrument will re-start with the new software installed. If not checked then the instrument should be turned off and on again manually.

Note that as part of the installation procedure, all memories are archived to a backup file and then deleted. They can be restored from the System-Memories page using the Restore button and selecting the '_Before_Upgrade' archive.

The software release notes can be viewed by selecting the Changes button.

FTP Transfer from a connected PC

If the software cannot be installed, for example because the Rx instrument does not have Internet access or you cannot physically access the Rx instrument, you can transfer the software files directly to the Rx instrument's Setup folder:

1. Download the latest Rx software version from the PHABRIX website and un-zip the software file into a folder that can be accessed by the FTP client.

2. Connect to the Rx instrument using an FTP client as described in the "FTP Connection" section.

3. Copy the contents of the Rx instrument's "Setup" folder to a safe place just in case they are needed.

4. Copy the new software files to the Rx instrument's "Setup" folder, overwriting the existing files.

5. Using the "System" - "Engineer" menu find the new software version in the "Software Upgrade section of the menu then select "Install".

Wait for the new software to be installed (upto 10 minutes depending on the number and type of Rx Modules that are installed. The progress will be indicated on the front panel screen and on the Monitor output.

During this time the software will be decompressed, files will be extracted and the hardware (FPGAs) will be reprogrammed. If an error is given during the installation, retry the installation and or download. Do NOT turn the instrument off until an installation has completed correctly.

Reverting to a Earlier Version of Software

If you need to revert to an earlier version of software:

Use the "System" - "Engineer" menu find the version of software you require in the "Software Upgrade section of the menu then select "Install".

Wait for the new software to be installed (up to 10 minutes depending on the number and type of Rx Modules that are installed. The progress will be indicated on the front panel screen and on the Monitor output.

During this time the software will be decompressed, files will be extracted and the hardware (FPGAs) will be reprogrammed. If an error is given during the installation, retry the installation and or download. Do NOT turn the instrument off until an installation has completed correctly

FTP Connection

Files may be uploaded or downloaded from/to the PHABRIX Sx by a remote PC using the Ethernet connection.

To connect to the instrument you will need to use a FTP client which may be a GUI based one such as FileZilla or that built into windows. Other FTP applications are available for other computer platforms.

Hostname   This is the IP address that the Rx instrument is using.

Username   "sxuser"

Password: "phabrixsx"

Once you have connected to the instrument, you should be able to see the instrument file structure below. When downloading software revisions to the Rx, instrument you must ensure that your FTP application is set to transfer binary files without corrupting them.

Some FTP clients, such as FileZilla, this requires you to go to the "Edit - Settings" menu and select the Transfers – File Types page. Make sure that the "Treat files without extension as ASCII file" check box is NOT checked or corruption will occur.

Rx File Structure

The Rx instrument uses Linux as its operating system and a number of directories within the file system are provided for user-specfic files.

Backups

The memory/presets that are backup-up using the "System Presets" - "Backup" function are saved as .mem files within the "Backups" folder. These can be copies to other Rx units and restored to copy presets from one Rx unit to another.

Patterns

The Patterns directory contains several sub-directories for the related video standards. Test pattern files should be placed in the correct directory for the video standard in use. i.e. if a 720p video standard is being used, only the test patterns in the 720yuv directory will be available. You may have a test pattern with the same name in different pattern directories but they should have the correct size and colour type (rgb/yuv) for the directory that they are in or they will be converted and may lose colour accuracy.

Patterns that are too large for the current standard will be clipped to fit; patterns that are too small will gain a black border and will be centred on the output image.

Test patterns are .pat files for the standard line based pattern files or user files. Supported user file formats are:

> Windows bitmap files (.bmp). We support 24bit uncompressed bitmap formats only.
>
> 10 bit video files (.dpx) We support 10bit RGB/YUV formats only in Left to Right orientation.
>
> Yuv and qnt files (8/10 bit packed yuv only)
>
> targa (.tg) files which are compressed or uncompressed 8bit RGB files. We support Left to Right orientation only.
>
> Phabrix specific .pat, .rgb, .yc4 files generated by the Phabrix pattern editor/convertor.

Note that bitmap files which are RGB will be converted to YUV internally as appropriate to the output standard. This will mean that not all valid YUV values can be output. If dpx YUV files are used then all valid values may be output.

Scripts

Command scripts may be downloaded into this directory. See FileFormats-Command Scripts for more details.

Setup

The Setup directory contains the installer files for different releases of the software. Each release is comprised of a .tar.gz file and is self contained. If a release of software is copied onto the instrument, the list of available releases will be updated within a minute.

Idents

The Idents directory contains bitmap idents as used by the generator. Supported user file formats are:

> .bmp (Windows bitmap files: 24bit only)
>
> .dpx files (10 bit video files)
>
> .yuv files (8/10 bit packed yuv)
>
> .tga (targa files)

Note that bitmap files are RGB and will be converted to YUV internally as appropriate to the output standard. This will mean that not all valid YUV values can be output. If YUV files are used(.dpx), then all valid values may be output.

Fonts

The fonts available for use by the generator to add text idents may be enhanced by downloading new True Type fonts (.ttf) into this directory.

Loudness

The loudness logs recorded by the system will be saved as CSV (comma separated value) files that can be used to plot loudness graphs over time.

These CSV files have the following columns:

Integrated	holding the integrated loudness values
Integrated Threshold	the level above which alarms are logged in the "Integrated Alarms" column.
Integrated Alarm	holding the integrated loudness values above the "Integrated Threshold" value.
Momentary	holding the momentary loudness values
Momentary Threshold	the level above which alarms are logged in the "Momentary Alarms" column.
Momentary Alarm	holding the integrated loudness values above the "Momentary Threshold" value.
Short Term	holding the short term loudness values
Short Term Threshold	the level above which alarms are logged in the "Short Term Alarms" column.
Short Term Alarm	holding the integrated loudness values above the "Short Term Threshold" value.