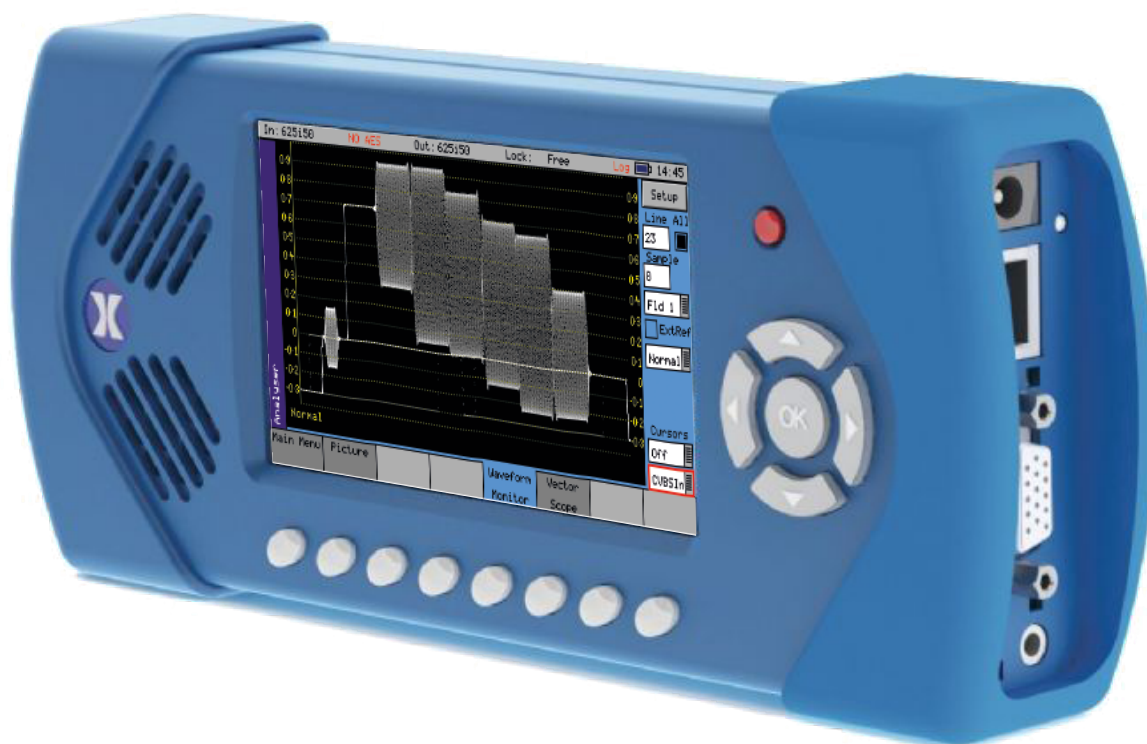




Sx TAG

USER MANUAL

Software Release 1.07



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	28/02/2014	0.12.0024	First release of manual
2	15/07/2014	1.01.12275	Full product release
3	12/11/2014	1.02.12980	Power management
4	11/02/2016	1.04.13933	AV Generator pattern
5	05/06/2016	1.05.14132	EDID Option
6	24/01/2018	1.05.14132	AV Delay description
7	29/05/2018	1.06	SMPTE ST 2022-6 IP SFP functionality
8	16/05/2019	1.07	AV Delay Analysis

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Getting Started

Package Contents

The shipping box should contain the following:

- 1 black carrying bag containing:

- PHABRIX Sx TAG unit: PHSXTAGC (with Generator functions. Includes SFP CAGE);

- Power Supply Unit;

- Mains lead;

- USB Manual;

The shipping box will also contain this Manual on a USB key. Note that the website 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.



Do not look directly into the fiber optic connections of cable as this may cause permanent damage to the eyes.

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.

The BNC connectors fitted on this unit are 75Ω type which are not compatible with 50Ω plugs.



The use of 50Ω plugs will permanently damage the connectors on the unit. The use of 50Ω plugs is considered to be misuse of the equipment and will therefore invalidate the unit's warranty.

SFP Cage



When the SFP cage is fitted, either an SFP or a bung must be fitted in the SFP cage at all times to prevent the Sx TAG overheating.

When Not in Use

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

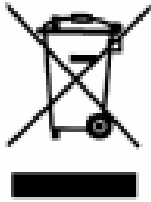
Maintenance

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.

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.

Contains hazardous substance information

Part number: PHSXTAGC

Description: PHABRIX Sx TAG



China RoHS is a two-step process that identifies concentration limits of certain hazardous substances in electronic information products that are sold into China. Per the deadline set by the Chinese government, March 1, 2007, PHABRIX Limited has implemented step one of China RoHS, self declaration of hazardous materials and marking of the product.

PHABRIX products that are sold into the China market have the required marking as indicated by the symbol shown left applied to the product designating that the product meets the China RoHS requirements.

Toxic or Hazardous Substances or Elements

Parts	Hazardous Substances in each Part					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chrome (Cr(VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Assembled board	○	○	○	○	○	○
Mainframe	○	○	○	○	○	○
LCD	○	○	○	○	○	○
Fan	○	○	○	○	○	○
Wire assembly	○	○	○	○	○	○
Enclosure	○	○	○	○	○	○
Accessory	○	○	○	○	○	○
Packaging	○	○	○	○	○	○
Battery	○	○	○	○	○	○
<p>O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.</p> <p>X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.</p>						

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PHABRIX®

1 Description

Description

Sx TAG Instrument

Overview

Configured as an entry level portable Analyzer, the TAG can be easily upgraded using a range of software options to provide a sophisticated instrument for testing broadcast infrastructures.

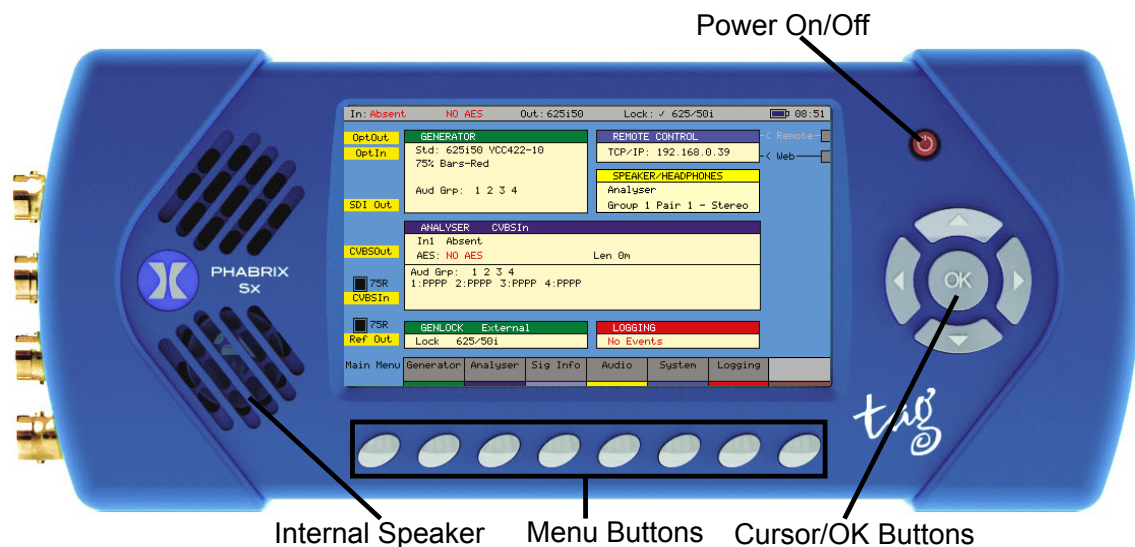
The PHABRIX® TAG has been created to incorporate new interfaces that appeal to customers looking for a cost-effective entry into professional test and measurement.

The PHABRIX® TAG includes support for SD-SDI and HD-SDI as standard with the option to upgrade to 3G-SDI (Level A and Level B), and SMPTE 2022-6 for SDI video over IP.

Composite analysis and generation have been incorporated to support those regions making the transition between analogue and digital television.

An SFP cage has been integrated into the design principally for optical infrastructure testing, and SMPTE 2022-6 encapsulation and decapsulation; however, the cage will support a wider range of SFPs as they become available. Composite locking reference generation and input reference waveform analysis have also been included.

For audio support the PHABRIX® TAG includes a D15 breakout connector providing both balanced analogue and AES input/output. AES waveform display allows a visual check of levels and reference lock. Advanced audio features including Dolby® E, Dolby® Digital and Dolby® Digital Plus are supported allowing TAG to be considered as a replacement for the discontinued Dolby® DM100.



Turning on and off the instrument

To turn on your PHABRIX Sx TAG Instrument press the red button at the top right-hand corner of the front panel.

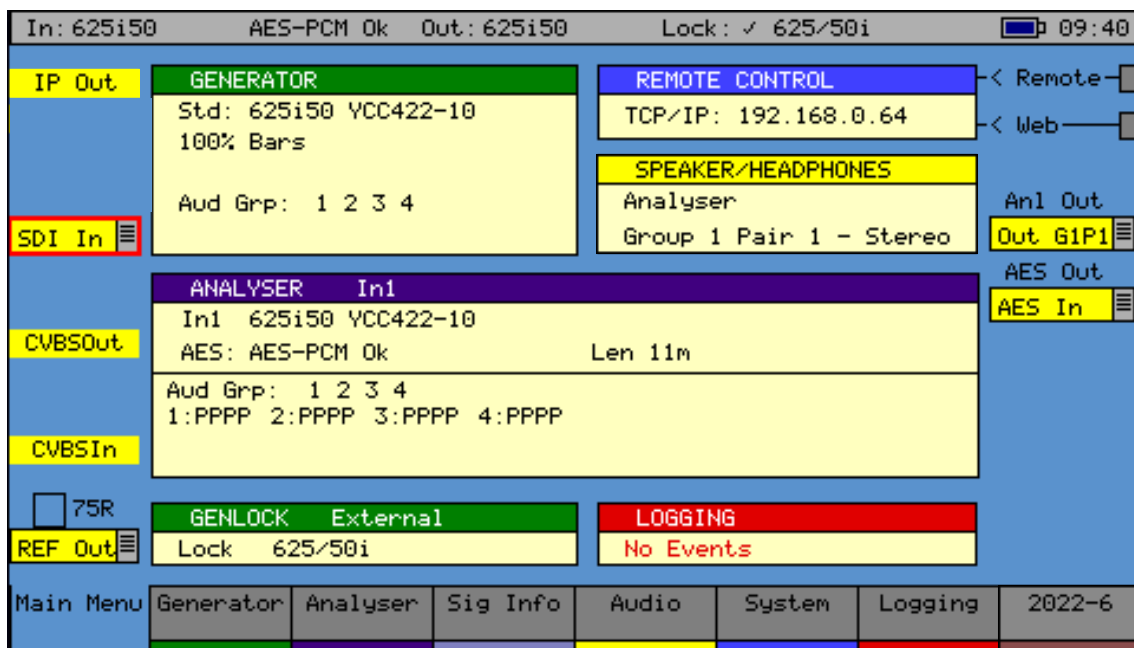
Once the system has started, pressing the button again will turn it off. If for some reason the instrument stops responding, pressing and holding the button for a few seconds will turn it off.

The unit is battery-operated, and the battery should last for between 3 and 6 hours dependent on which video standard is being used and whether the inputs and outputs are active. If the unit is turned ON and the battery is almost discharged, it will turn itself OFF. If the battery level starts to get too low for operation a dialogue will be displayed prompting the user to turn off the unit. The current settings will also be saved. The unit should then be connected to the power supply unit as soon as possible to recharge the battery. The battery should be fully charged in about 4 hours. The battery will charge faster if the TAG is turned off while charging.

Menu Operation

Main Menu

The Main Menu displayed on the OLED screen gives access to the software modules available on the Sx TAG instrument. The buttons beneath the screen correspond to the menu areas. Pressing on any of these buttons will display the corresponding menu.



The Main Menu view provides an overview of the system. It shows the video input and output standards and frame rate. The audio status for the generator shows which audio groups are being generated whilst the audio status for the input shows which groups are present and an overview of the channel status for each audio channel.

Audio channel status is displayed as:


- 'P' if PCM audio is present,
- 'N' if NON-PCM audio is present,
- 'E' if Dolby-E packets are present
- 'D' if Dolby-Digital packets are present
- '+' if Dolby-Plus packets are present
- V if the validity bit is set

Dolby-E program configuration and Timing status is also displayed if the Dolby-E analysis option has been purchased and a Dolby-E signal has been detected on the selected input. If the generator is generating errors, then the video standard is displayed in red. If the input detects errors, then the input standard will be displayed in red -if the Analyzer is monitoring the input.

If the unit is connected to the network, the current TCP/IP address of the unit is displayed in the 'Remote Control' box. If the unit is NOT connected to a network and is set to DHCP mode, it will show 'acquiring' to indicate that the connection hasn't been made yet. The model type is displayed on the chassis - to the bottom right corner of the screen.

Instrument Status

The top line of the menu shows the unit status and includes the Input Video status, Genlock status, battery status and current time. If the unit is being powered by the AC adaptor, the battery status will be yellow. If a command script is being run, this is shown on the top line to the left of the time as "Script". A red "Log" is shown on the status line if there are any events in the event log.

In: 525i59 AES Ok Out: 625i50 Lock: Free  16:34

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.

Using the Menus

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

Generator	Allowing the unit to be locked to an external reference and providing a fully populated Composite, SD-SDI, HD-SDI and Fiber video test pattern generator and audio tone generator if the Generator option is installed.
Analyzer	Allows the selected Composite, SDI or SFP input signal to be analyzed in the form of a Picture, Waveform monitor and Vectorscope.
Sig Info	Allows detailed signal information about the video and audio status for the SDI or SFP video input source to be displayed.
Audio	Gives access to the Audio Meters and Audio Status displays allowing the levels of the embedded SDI audio, AES audio and analogue audio to be displayed; and speaker/headphone setup to allow the selected audio to be heard.
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.
2022-6	Allows the setup of 2022-6 encapsulation or decapsulation on the unit, for IP packet transmission or reception.

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

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

When in a specific function e.g. 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. Checkboxes 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 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, selecting the third button will select “Analyzer”, etc.

Input / Output Selection

The Sx TAG has 2 bidirectional BNC connections, one for Reference input / output and the other for SDI video input / output.

The direction of SDI I/O connection is selected on the Main Menu using the drop-down lists as well as in the “Output” section of the “Generator” - “Video Out” menu. Note that if the Generator software option is not installed then this connection will be an input.

The direction of the “Ref I/O” connection is selected on the Main Menu using the drop-down list or in the “Reference Out” section of the “Generator” - “Genlock” menu where it is controlled by the “On” checkbox.

If the SMPTE 2022-6 IP SFP module PHSFP-10SR-IP is fitted, the mode of operation - “Encap” for output, “Decap” for input - can be selected via the “SFP MODE” button in the “2022-6” menu. The current mode (“Encap” or “Decap”) will be displayed on the “2022-6” menu page header.

The input to be monitored using the Analyzer can be selected in the drop-down list in the bottom right corner of the Picture, Waveform, Vectorscope, Signal Data and other Instruments.

If an SFP module is fitted the SFP Input can also be selected from this drop-down list to be monitored using the Analyzer.

Both AES and Analogue audio output can be enabled using the drop-down menus on the Main Menu.

Sx TAG Software Options

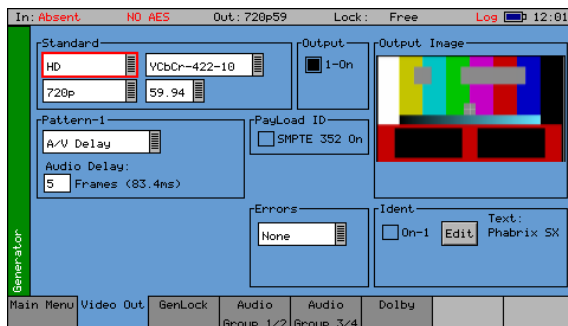
Overview

The Sx TAG instrument has a range of software options that can enhance its functionality for specific applications.

AV Delay Analysis (NEW!)

The AV Delay Analysis option (PHSXO-AVD) offers an end-to-end solution for the measurement of the Audio to Video differential delay through a broadcast system, when used in conjunction with the AV Delay Generator. The analyzer tool provides a real-time update of the differential delay between the video and the selected audio channel pair. When using the Sx TAG, this new tool can also be used to measure the propagation or pipeline delay of either video or audio.

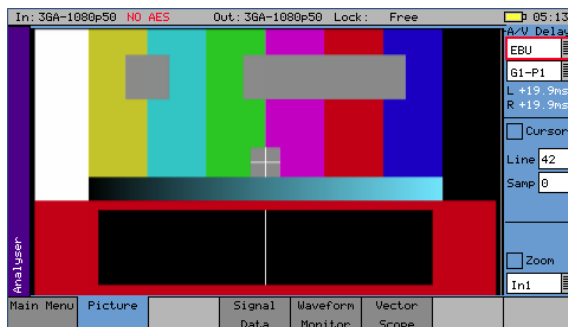
Both the AV Delay signal generator and analyzer can be used with all Sx supported video formats and frame rates on SDI and AES interfaces.



The AV Delay Generator produces an adapted EBU Tech 3305 AV Sync 'clapperboard' Test Pattern. This is compatible with third party AV delay Analyzers such as the LAWO V_pro8.

An audio delay offset with respect to video of up to ± 40 frames can be applied in increments of 1 frame.

The AV Delay audio pulse can be inserted on up to 16 embedded SDI audio channels, plus the AES out.



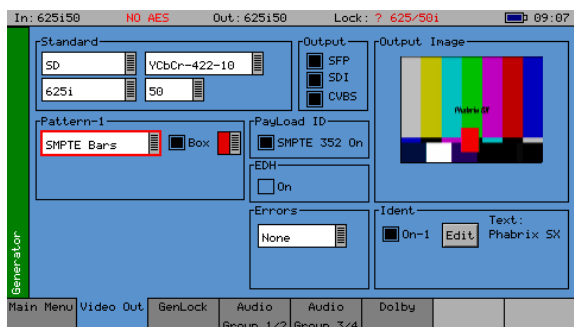
AV Delay measurement (PHSXO-AVD) is available in the Picture instrument. Measurement of two AV Delay test patterns is supported:

- EBU Tech 3305
- LAWO V_line AV Sync test pattern

The tool provides a real-time update of the differential delay between the video and the selected audio channel pair.

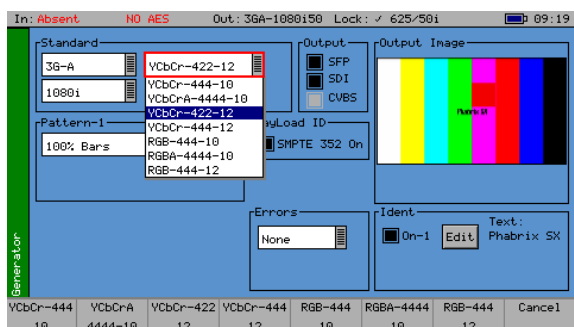
The source of the audio can be either an embedded SDI audio or AES channel pair. The differential delay between the video and the selected audio is measured in 0.1ms steps (to an accuracy of 1ms) with a measurement range of ± 400 ms.

Generator Option (Upgrades PHSXTAG to PHSXTAGC)



The Generator option (PHSXO-GEN) allows the creation of video test signals for analogue composite video, SD-SDI and HD-SDI video as standard; additionally, 3G-SDI (inc. Advanced formats) & 2K SDI, and Fiber video functionality too, if these options have been purchased. The Generator option also allows the generation of both analogue and digital audio test tones and allows the unit to be locked to an external locking reference.

3G-SDI, Advanced formats & 2K Support



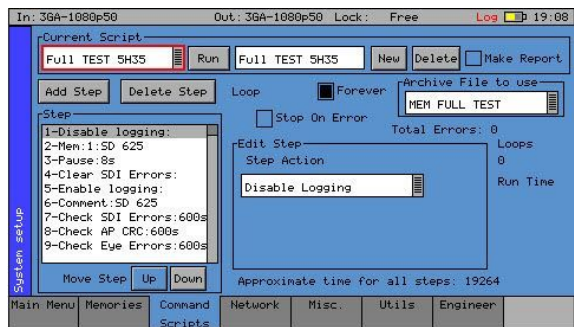
This option (PHSXO-3GADV) provides 3G-SDI Level A and B support including advanced formats: 4:2:2 YUV, 4:4:4 RGB and 4:4:4 YUV at 10/12 bit, and 2K advanced formats including: 4:2:2 YCbCr, 4:4:4 RGB' and 4:4:4 YCbCr at 10/12 bit as well as 4:4:4 XYZ at 12-bit. For broadcast manufacturers this option allows rigorous testing of many more formats beyond the standard signals used in traditional broadcasting.

The 2K-SDI support provides analysis of, and test pattern generation for, 2K Digital Cinema as defined in the SMPTE ST 2048-2:2011 standard ("2048 x 1080 Digital Cinematography Production Image FS/709 Formatting for Serial Digital Interface") and SMPTE 428-9 (D-Cinema Distribution Master - Image Pixel Structure Level 3 - Serial Digital Interface Signal Formatting).

Among the support for 3G Level B is the ability to generate and analyze signals such as SMPTE 425-B carrying 1 x 372M dual link payload.

Uniquely the PHABRIX units create three pathological signals in all formats which will be of great interest to broadcast manufacturers. The first is as defined in SMPTE RP198 and is the split field signal with the equalizer test in the first half and the PLL test in the second half. The second and third are separate full-frame EQ test and PLL tests signals. To maintain a regular parity distribution and mitigate any DC offset, the EQ part of the pattern inverts a bit at the start of the first line in each alternate frame. This is the form of 3G Level B Pathological signal that many video manufacturers are adopting as their test signal of choice as it stresses electronic circuits more thoroughly.

Command scripts with print report



The Command Script & Reports option (PHSXOS) allows a series of predefined actions to be run through within the PHABRIX Sx using a script stored in internal memory.

The command scripts option can be used to automatically step through a sequence of instrument states, controlling the generator, Analyzer and logging functions. If required, the instrument will prompt the user before going onto a subsequent state.

Applications include repeated test sequences as required by manufacturer Test Departments, R&D Departments, Systems Integrators and Commissioning/Support Engineers.

A script requires a set of memories to configure the unit, and then a script file which recalls those memories and specifies times and actions for each step. The process of creating a command script requires these two files to activate the sequence.

Additionally, a script can be created as a simple text file on a PC and then transferred to the unit via Ethernet and recalled at any time. A large number of named scripts and memories may coexist within the instruments store to be recalled as required.

Access to the Command Scripts functionality is via the “System” - “Command Scripts” menu. See chapter 2 for details.

SDI Data Display & VANC/ANC Inspector

In: 1080p50	Out: 1080p50	Lock	Free						
2635	2636	2637	2638	2639	0	1	2	3	4
36	V	040	3FF	000	000	2AC	040	040	040
37	C	200	3FF	000	000	2AC	200	200	200
38	V	040	3FF	000	000	2AC	040	040	040
39	C	200	3FF	000	000	2AC	200	200	200
40	V	040	3FF	000	000	2AC	040	040	040
41	C	200	3FF	000	000	2AC	200	200	200
42	V	040	3FF	000	000	2AC	040	040	040
43	C	200	3FF	000	000	2AC	200	200	200
44	V	040	3FF	000	000	2AC	040	040	040
45	C	200	3FF	000	000	2AC	200	200	200

The SDI Data Display & VANC/ANC Inspector option (PHSXOSD) 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 an R&D environment. Detail within the active SDI stream can be viewed with continuous update.

The SDI Data Display provides the following functional areas:

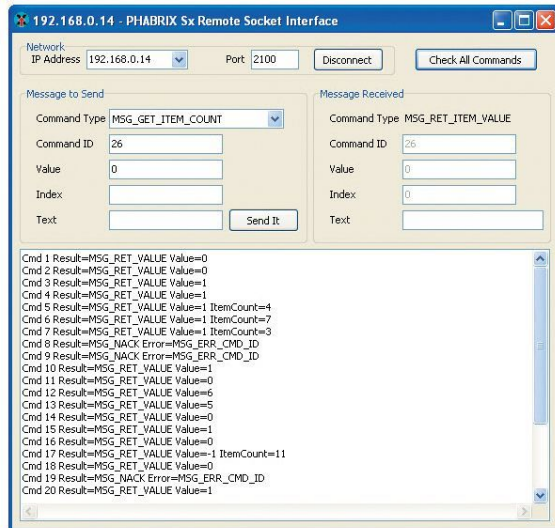
Grid	Displays the SDI data in the form of an array.
Stream	Allows the SDI continuous data stream to be viewed.
Component	Allows the video components to be displayed in separate columns.
Split	Allows the video components to be displayed individually.
Ancillary Data	Allows the user to capture whole Ancillary 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 Data Display functionality is via the Analyzer - Signal Data menu. See the “Analyzer - Signal Data” section in chapter 2 for full details.

This option also provides a VANC/ANC Inspector - allowing Ancillary data packets to be detected and checked for errors.

Access to this functionality is via the Signal Information - ANC Inspector menu. See the “Signal Information - ANC Inspector” section in chapter 2 for full details.

Enhanced remote control



The Enhanced Remote Control Integration option (PHSXOR) 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.

PHABRIX products 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 Sx 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; i.e. 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, i.e. closed loop communication.

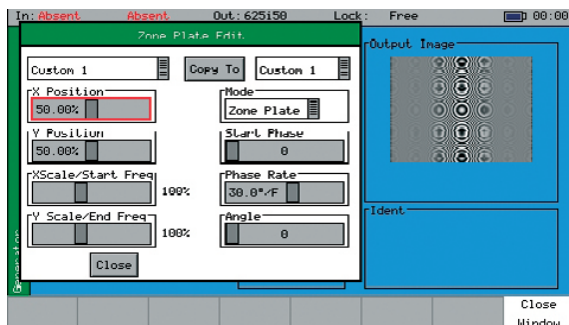
The control structure can be selected as Passive or Active. Passive control allows simple remote control where the host PC is in control and sends commands when it wants to change data or get information. It is this method which is the most popular use for remote control.

Active control is when the PHABRIX unit synchronizes with the host PC. Any changes on the PHABRIX unit will result in a message being sent to the host PC. This method is useful for controlling a PHABRIX 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, and can be downloaded from the PHABRIX website. A Windows™ application for testing the interface is also provided as part of this option.

See the Remote Control Guide for details.

Programmable zone plate



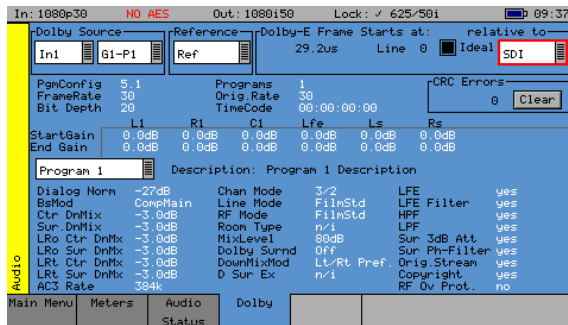
The Advanced Zone Plate Generator option (PHSXOZ) adds a range of preprogrammed zone plate patterns along with user-defined controls over several parameters which can be saved to custom buffers.

Using the System - Memories menu window, multiple saves of zone plates can be saved to the system by checking the video box and saving by name. In use the zone plate can be used to test a range of video processing requirements using horizontal, vertical and temporal (time) controls. Temporal control is particularly useful for testing up/down converters and applications which compress signals.

Aspect ratios can be tested using the horizontal and vertical controls. Frequency sweep is particularly useful and also available using this option. By feeding in the signal generated, the output of the device can be sent back into the Sx instrument's waveform monitor to determine the usable bandwidth of the system. Once purchased, the zone plate editor is reached by selecting the button next to the standard zone plate.

Dolby bit-stream Analyzer & Generator

The Dolby bit-stream analysis & generation option (PHSXO-DAG) displays Dolby E, Dolby Digital and Dolby Digital Plus metadata present in a selected audio stream and determines whether the Dolby E packet is timed correctly on the SDI video stream. It also uniquely adds significant Dolby E, Dolby Digital, and Dolby Digital Plus metadata generation features to the Sx range.



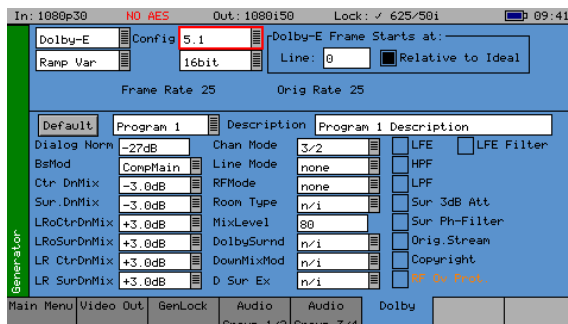
The Dolby audio may be monitored from any of the SDI input embedded audio channel pairs or the AES input. Peak audio levels are also displayed for Dolby E.

The start menu window displays both the V Bit information and PCM values along with a snapshot of the Dolby audio metadata if a Dolby is present. Using the Signal Information - Dolby menu will present the full analysis display which forms the major analytical tool for this option.

The Dolby metadata screen carries primary information including signal source, Dolby-E 'guard band' timing, CRC errors, program channel and metadata detail. The characters shown in white will only be presented when a Dolby signal is introduced into the unit.

Peak audio levels included in the Dolby E metadata packet are displayed, allowing the user to select the appropriate set of meters to display Dolby levels which will follow the selected Dolby source. Logging for Dolby errors, Dolby E Timing, Common metadata, and Program metadata can be also be controlled.

Note: This option does NOT decode Dolby audio



The Dolby generation capability provides broadcast engineers with a highly functional set of tools for Dolby E, Dolby Digital and Dolby Digital Plus streaming. It is unique in being the world's first metadata Dolby generator with editable profiles.

With a selection of Dolby streams to choose from, engineers can quickly enter and adjust parameters to check broadcast infrastructure.

This option allows the display of Dolby metadata present in a selected audio stream and determines whether the Dolby E packet is timed correctly on the SDI video stream.

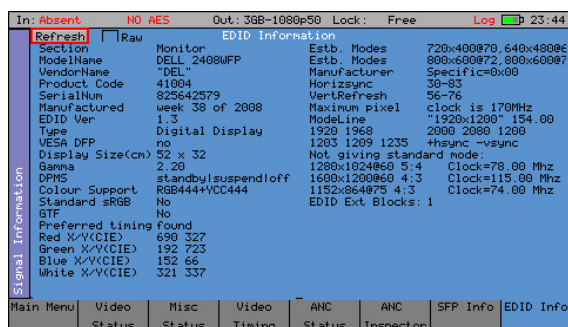
Dolby streams are provided for all program configurations with fixed audio data. Among the tools included in the Dolby E streaming option is the ability to adjust the 'start of frame' for Dolby E packets.

The generated Dolby audio follows the video generator reference source. There is also the ability to edit the program configuration and bit depth with fixed audio signal. The PCM stream can be carried on any embedded or AES pair. The option can set the video line number where the internally generated Dolby audio test stream begins. Metadata can be edited by the user and stored in memories.

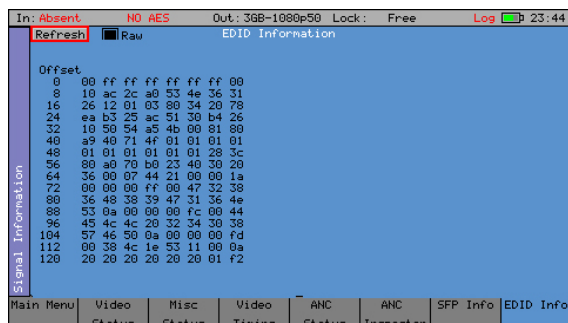
The option allows a closed loop test scenario with both generation and analysis toolsets.

Note: This option does NOT generate Dolby audio.

HDMI EDID Display (Requires PHSFP-HDMI-OUT)

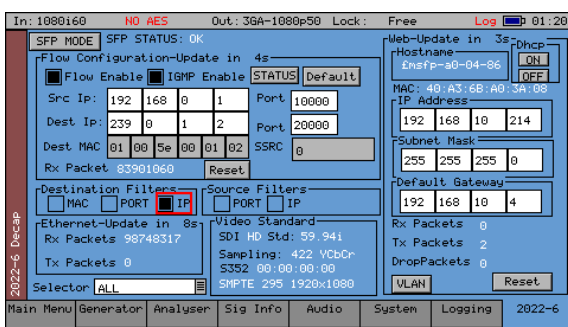


The HDMI EDID viewer option (PHSXO-EDID) displays both decoded EDID information and RAW ancillary data in a tabular display. It obtains the EDID information using a dedicated SFP and cable (PHSFP-HDMI-OUT), which must be purchased separately. For those customers requiring support for 3G formats, an additional license (PHSXO-3GADV) will be needed.



Additionally, the HDMI EDID display option can be used in conjunction with the generator, providing an SDI pattern which is generated through the HDMI SFP which can be used to test a monitor display.

IP 2022-6 Encap/Decap License (Requires PHSFP-10SR-2022)



This option provides SMPTE 2022-6 (SDI video over IP) modes for both encapsulation and decapsulation via the dedicated PHABRIX 2022-6 IP 10GE SFP (PHSFP-10SR-2022), and offers SDI-to-IP and IP-to-SDI conversion capability. The SFP can also be managed remotely.

Dependent on the mode selected, a network configuration menu for either Flow (IP media) packet transmission (2022-6 Encap) or reception (2022-6 Decap) is provided, supporting both multicast (IGMP) and unicast, including filtering by MAC address, UDP ports, and source IP.

SSRC is also supported. The windows additionally display the video standard in use, and transmit and receive packet information - with the option to monitor just Flow packets, Ethernet (Flow + wrappers), or web management packets only.

Remote setup and control of the SFP can be enabled via the web management settings, which include support for DHCP. Using Embrionix emSET control software to connect to your SFP further extends the configuration settings range available.

Via the "System - Engineer" menu, this option also includes an IP-to-SDI and SDI-to-IP convertor; providing a 'gateway' feature (that will bypass the generator). In Encap mode this routes the signal on the SDI I/O connector - which is configured as an SDI input to the TAG - to the input of the SFP. In Decap mode the output of the IP SFP is routed to the SDI I/O connector - which is configured as an SDI output.

Ancillary Data status (Now included as standard)

In: 1080p30 NO AES Out: 1080i50 Lock: ✓ 625/50i 09:39

Source	In1	Ancillary Packets	Status	Setup	Reset
RP165-EDH	S272-SD Audio	S272-SD Aux	S272-SD Ctrl		
S299-HD Audio	S299-HD Ctrl	S315-Cam. Pos.	S353-MPEG Recod		
S305-SDTI	S348-HDTI	S427-Lnk. Enc 1	S427-Lnk. Enc 2		
S427-Lnk. Enc	S352-Payload	OP47 Transport	OP47 Dist.		
ITU-R BT 1685	RP214-KLV-V	RP214-KLV-H	RP223-UMID-ID		
S2829-Audio	RP215 - Film	EIA-708 Caption	EIA-608 Caption		
RP287 - Program	RP288 - VBI	S2818-SCTE MSGS	S2816-3 AFD		
ARIB-B.22	ARIB-B.23-1	ARIB-B.23-2	ARIB-B.27 Capt.		
ARIB-B.35	ARIB-B.39	ARIB-B.37 Ana	ARIB-B.37 HD		
ARIB-B.37 Mob.	ARIB-B.37 SD	S2831-SCTE VBI	S2816-4 PAN		
RP196-HANC	S12H-2 V-TCODE	R008-MSS	RP196-VANC		
Mark Deleted	User-1	User-2	User-3		

Missing Present !Checksum >Stream *DBN ?Parity *Previous

Main Menu Video Misc Video ANC ANC SFP Info

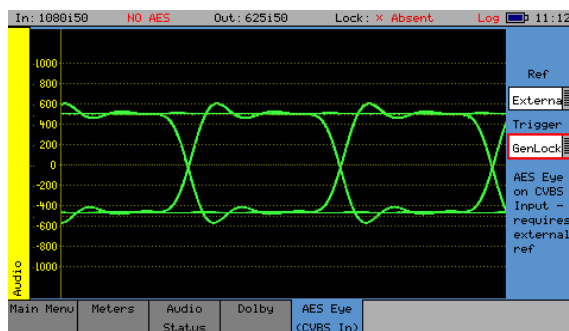
Status Status Timing Status Inspector SFP Info

The Ancillary Status option (PHSXOVNC) provides broadcasters, studios, OB and broadcast manufacturers with a detailed analysis of the ancillary data present in an SDI signal.

A simple grid layout provides a quick view check for an engineer of the available VANC/ANC ancillary data. The packet type is then displayed as present, absent or red if in fault. Simple icons next to the packet indicate the fault. Each ancillary packet available from the grid view can be set to enable logging and then presented together with other information in the events window of the logging menu.

This option further allows additional 'user-defined' selections with the appropriate DID or SDID code. Any ancillary packet code can be saved down for future recall. Please note, this option does not fully decode the ancillary data. It is used to identify if the packet is present in the signal.

AES Eye (Now included as standard)



It can be difficult to check that the AES audio signal is correctly locked to the studio reference. The AES Eye option (now as standard) allows the AES waveform to be displayed on the unit. If the studio locking reference is also connected to the unit, then the AES Eye waveform can be displayed locked to this reference.



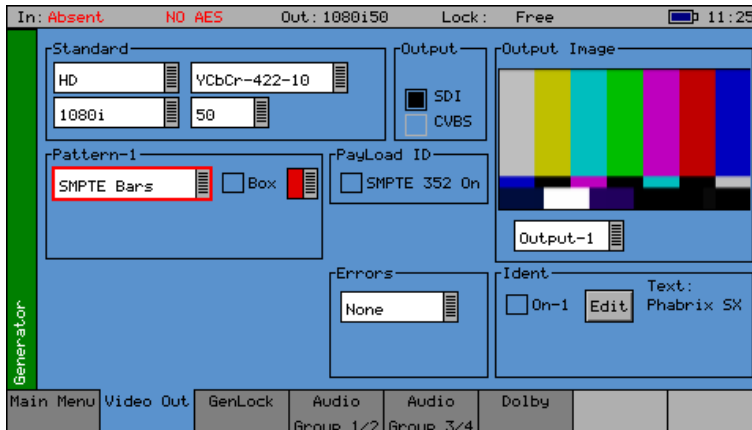
PHABRIX®

2 Menu Reference

Menu Reference

Generator Menu

Video Out (PHSXTAGC / PHSXO-GEN)



If the Sx TAG instrument has the Generator option (PHSXO-GEN) installed it 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,Cb,Cr formats as well as RGB formats.

Output

The checkboxes in the Output section enable the output of the generated test pattern.

SFP - Enables the SD, HD or 3G test pattern on a supported small form-factor pluggable device fitted in the SFP cage. If the PHABRIX PHSFP-10SR-IP SFP is fitted, and the video standard is not supported, the Standard menu fields will turn red.

SDI - Enables the SD, HD or 3G test pattern on the SDI I/O BNC connector, and turns off the SDI analyzer input.

CVBS - Enables PAL (625i 50) or NTSC (525i 59) test patterns on the PAL/NTSC Out BNC connector.

Standard

The menus in the Standard section are used to select the desired video output format. The top-left box selects the basic mode of the Sx instrument and determines the video format to be generated from the choice of SD-SDI, HD-SDI, 3G-Level A, 3G-Level B and SD-CVBS (PAL/NTSC)

When one of the SDI formats is selected only valid color formats and frame rates for the output standard may be selected.

When CVBS is selected, the menus in this section control the type of 625i and 525i line encoding of the generated Composite video output:

PAL-I - 625i @ 50 fps with 4.433 MHz color subcarrier

PAL-N 625i @ 50 fps with 3.582 MHz color subcarrier

PAL-N (ARG) - 625 @ 50 fps with 3.582 MHz color subcarrier

PAL-M - 525i @ 59.95 fps with 3.575 MHz color subcarrier

NTSC-M - 525i @ 59.95 fps with 3.579 MHz color subcarrier with 7.5 IRE setup

NTSC-M (Jp) - 525i @ 59.95 fps with 3.579 MHz color subcarrier without setup

Color Format

For SDI formats the Sx TAG supports the YCbCr 4:2:2 10 bit color format as standard.

A 3G-SDI Advanced Video Formats option (PHSXO-3GADV) may be purchased to enable the following color formats. Note that the available color formats are dependent on the selected picture format and frame rate:

- YCbCr 444 12bit
- YCbCr 444 10bit
- YCbCrA 4444 10bit
- YCbCr 422 12bit
- RGB 444 10bit
- RGBA 4444 10bit
- RGB 444 12bit
- XYZ 444 12bit

2K-SDI (part of 3G-SDI Adv. Video Formats Option)

The Sx TAG 3G-SDI, Advanced formats & 2K Support option (PHSXO-3GADV) allows the generation and analysis of 2K video formats for YCbCr, RGB and XYZ color spaces.

XYZ color space is a nonlinear format that requires additional treatment by the Sx generator and analyzer circuitry to convert between linear and nonlinear data formats. Only a limited number of nonlinear test patterns are provided for XYZ, as the traditional linear test patterns that are normally available in SD, HD and 3G are not applicable and will produce misleading results when analyzed.

100% Color Bars is generated in RGB color space and needs to be analyzed using the RGB color space selection in the Waveform monitor. This test pattern is provided to check the accuracy of the color paths through the equipment under test.

Legal Ramp is generated in XYZ nonlinear format and needs to be analyzed using the X'Y'Z' color space selection in the Waveform monitor. This test pattern is provided to check the accuracy of the data path through the equipment under test.

Multiburst is generated in XYZ nonlinear format and needs to be analyzed using the X'Y'Z' color space selection in the Waveform monitor. This test pattern is provided to check the frequency response and sample rate of the data passed through the equipment under test.

Color Field produces fixed level colors in RGB color space that are converted to equivalent XYZ color space values, and needs to be analyzed using the RGB color space selection in the Waveform monitor.

User File allows user-defined test patterns that have been created in XYZ nonlinear color space to be selected.

The XYZ, X, Y and Z settings in the Waveform monitor, display the XYZ color space in its native nonlinear form. Consequently, test patterns such as Legal Ramp will be displayed as curves rather than straight lines.

The X'Y'Z', X', Y, and Z' settings in the waveform monitor, display the XYZ color space with a reverse transform to convert it to linear form. As a result, test patterns such as Legal Ramp will be displayed as straight lines.

The Picture monitor and Vectorscope instruments will automatically apply the appropriate transforms to display the images in YCbCr, RGB and XYZ color spaces correctly. The color space transform to be applied is defined by the SMPTE 352 payload.

Pattern

This selects the video pattern that is output by the generator. Many standard patterns are provided by the Sx instrument. You may also upload your own test patterns to the Sx instrument into the 'Patterns' directory and then select them using the 'User File' option in

this field. See 'Sx File Structure - Patterns' in the 'Maintenance' section of this manual, 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.



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

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

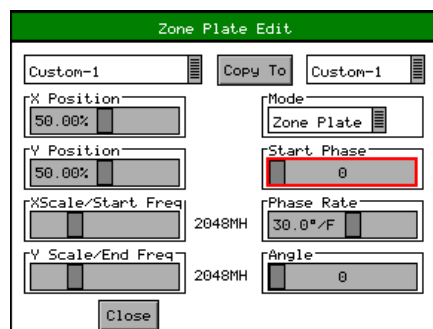
A bouncing Box may be overlaid on the current test pattern by selecting the 'Box' checkbox.

100% Bars	75% Bars	75% Bars + Red	SMPTE Bars
Checkfield Pathological	EQ Test	PLL Test	Luma Ramp
Legal Ramp	Valid Ramps	Multiburst	Pluge
Bowtie	Tartan Bars	Grey Bars - 5	Grey Bars - 5 -vertical
Grey Bars - 11	Grey Bars - 11 - vertical	SMPTE 219/ARIB-28 Bars - 3 variants	A/V Delay
	Black, Red, Green, Blue, Yellow, Cyan, Magenta, White, Custom	Downloadable files in bitmap(.bmp), 10bit DPX/YUV (.dpx, .yuv), Targa (.tga) and Phabrix .pat/.rgb/.yc4 compressed files	User File
Zone Plate	Color Field		

AV Delay

The AV Delay Test pattern and associated audio pulse provided by the Generator module can be used to check the differential delay between video and audio. This animated test pattern provides a constantly moving clapperboard and the corresponding AV Delay Audio pulse and video white line flash when the clapperboard reaches the center of the test pattern.

Color Field	If Color Field is the selected test pattern, another control selects which color to generate. Three user definable custom colors may be defined using the “->” button. Custom colors are edited using the Red-Green-Blue sliders. When setting the color using the RGB sliders, the YCbCr values will show the values for the current color space. When setting the color using the YCbCr sliders, the RGB values will show the values for the current color space.
Zone Plate	<p>A basic zone plate generator is supplied with all Sx instruments. The zone plate selector will contain 3 user customizable zone plates as well as several predetermined zone plates. The ‘->’ button displays a dialog which allows 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 for use.</p> <p>Moving Zone-2H - A moving zone plate centered on the screen.</p> <p>Static Zone-2H - A static zone plate centered on the screen from DC to the Nyquist frequency at left/right edges.</p> <p>Static Zone-2V - A static zone plate centered on the screen from DC to the Nyquist frequency at top/bottom edges.</p> <p>Sweep-Horiz - A horizontal sweep from DC to Nyquist frequency horizontally.</p> <p>Sweep-Vert - A vertical sweep from DC vertically.</p> <p>Grating-50kHz - A 50kHz frequency sine wave when using an HD output.</p> <p>Grating-1MHz@HD - A 1MHz frequency sine wave when using an HD output.</p> <p>Grating-5MHz@HD - A 5MHz frequency sine wave when using an HD output</p>
Custom	This allows editing of Custom zone plate settings. Three custom zone plates can be set up and can be copied from an existing preset 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

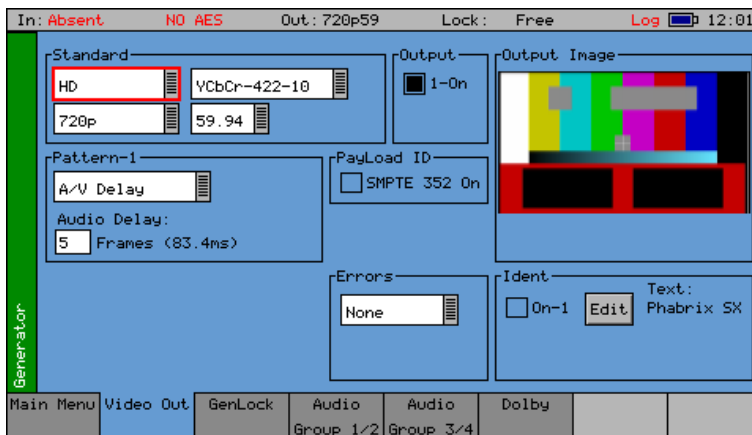
Phase Rate - is used to set the rate of change of phase of the sine wave and thus changes the speed that the zone plate moves at. It is specified in degrees per frame.

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.

AV Delay Generator



The AV Delay Generator produces an adapted EBU Tech 3305 AV Sync 'clapperboard' Test Pattern.

An audio delay offset with respect to video of up to +/-40 frames can be applied in increments of 1 frame.

The AV Delay test pattern and audio pulse provided by the Generator module can be used to measure the differential delay between the video and audio paths in a piece of equipment or an SDI or AES based system.

In the 'Video Out' menu page, the AV Delay test pattern and 'Audio Delay' offset can be selected.

In the 'Audio Group' menu pages, the AV delay audio pulse can be inserted on up to 16 embedded SDI audio channels, plus AES out.

When using the Sx TAG, this new tool can also be used to measure the propagation or pipeline delay of either video or audio.



Note: The AV Delay signal is compatible with third party AV delay analyzers such as the LAWO V_pro8

The AV Delay Generator creates an adapted EBU Tech 3305 AV Sync pattern. This provides a constantly moving 'clapperboard' that when it closes shows a vertical white 'flash' line for 1 frame with a corresponding audio pulse.

To access the AV Delay Generator option:

- Select 'A/V Delay' in the 'Pattern' drop-down menu

AV Delay can be used with all Sx supported video formats and frame rates on SDI and AES interfaces.



Note: The SxD is restricted to SDI as it has no dedicated AES interfaces

An 'Audio Delay' field will then appear.

Here you can offset the timing of the generated audio pulse relative to the central 'white flash' frame of the test pattern. An audio delay offset of up to +/-40 frames can be applied in increments of 1 frame. The delay value in milliseconds is displayed alongside the frame delay value.

- When 'Audio Delay' is set to a positive (+) value, the audio pulse will lag behind the video
- When 'Audio Delay' is set to a negative (-) value, the audio pulse will be ahead of the video

The 'Audio Delay' offset has several applications:

1. The differential delay of a system or device under test can be quickly measured in TV frames by adjusting the Audio Delay offset until the measurement reads less than a TV Frame
2. This can quickly confirm that the differential AV delay is an integer number of TV frames
3. The analyzer can measure AV differential delay up to +/-400ms. If the system under test has a propagation delay longer than this, setting an offset of up to -40 frames extends the overall measurement window

(On the AV Delay analyzer, a measured delay amount that is not accounted for by the generated Audio Delay offset, will indicate delay introduced by the system under test.)

To choose the AV Delay pulse audio channels, go to the 'Generator – Audio Group...' menu pages, and select 'AV Delay' in the drop-down menu for each audio channel as required.

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.

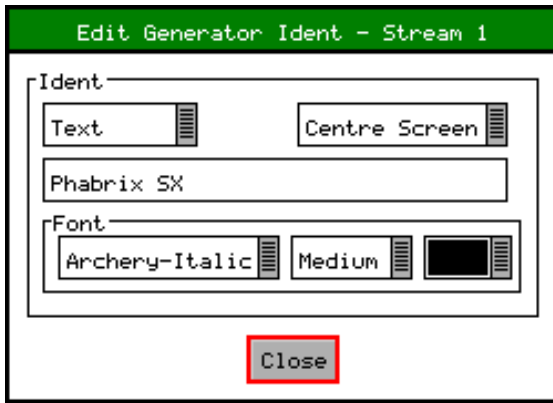
SMPTE 352

This checkbox allows the SMPTE 352 Payload ID field to be inserted into the video output stream. The state of this checkbox 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

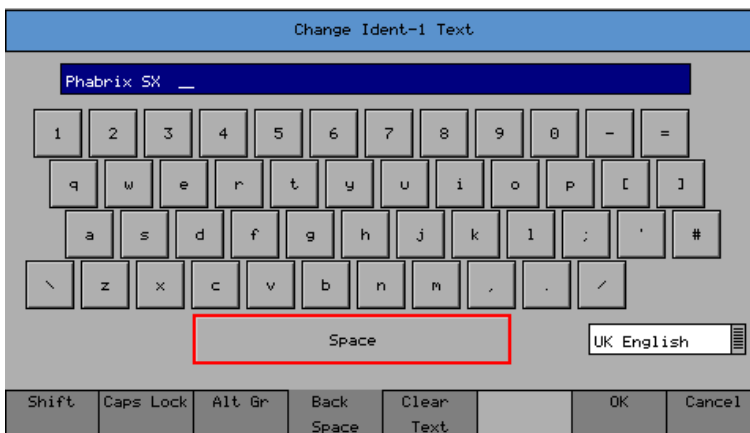
A picture or text 'Ident' may be set to identify an SDI source. This Ident can be turned on/off from this page, but changing the text/font/bitmap is performed by selecting the Edit button to bring up the Ident Dialog. An overview of what the Ident is can be seen beside the Edit button. Note: If Zone Plate or Color 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 dialog allows selection of either a user-defined bitmap picture which has been downloaded into the 'Idents' directory of the Sx instrument or user-defined text.

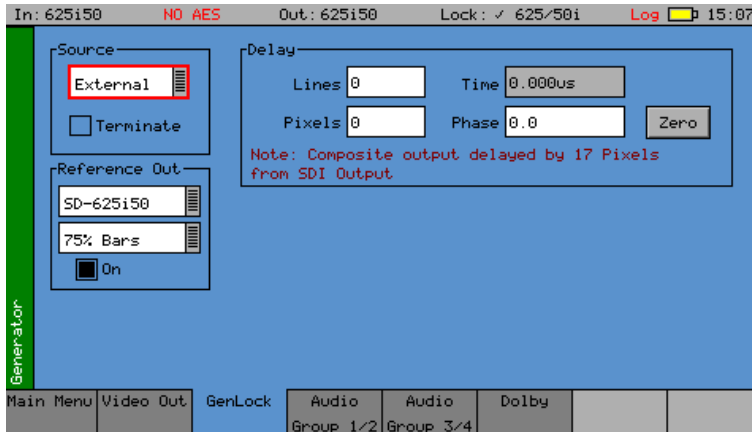
For both types, the position of the ident can be set to one of: Top-Left, Top-Center, Top-Right, Left-Center, Center-Screen, Right Center, Bottom-Left, Bottom-Center, or Bottom-Right. When text ident is used, the font, font size and color can be specified. Several fonts are built into the Sx instrument, other true-type (.ttf) fonts may be downloaded as required.



When editing text, the keyboard, left, is displayed to allow easy editing. Move the cursor to select a key to press, and then press 'Ok'. The Shift menu button reveals additional keys available on your current keyboard.

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

Genlock Menu



The unit 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 unit to free run.

Source

The unit may be locked to:

External - An external locking reference connected to the “Ref I/O” connector, such as a studio reference, which can either be black & burst or a Tri-Level sync

Input 1 - The SDI video input present on the “SDI I/O” connector.

CVBS In - The Composite video input present on the “PAL/NTSC (AES Eye)” connector.

Free-Run - The unit can operate using its own internal SPG

Note that the “On” checkbox in the “Reference Out” section controls whether the “External” source is from an externally connected source or from an internally generated source.

Reference Out

The Sx TAG can either accept an external locking reference signal or create a black & burst reference output for PAL (SD-625i50) or NTSC (SD-525i59). The drop-down menu box allows the selection of either “SD-625i50” or “SD-525i59”, and the “On” checkbox when selected changes the REF I/O connection from input to output.

The Reference output signal can either be black & burst or 75% color bars.

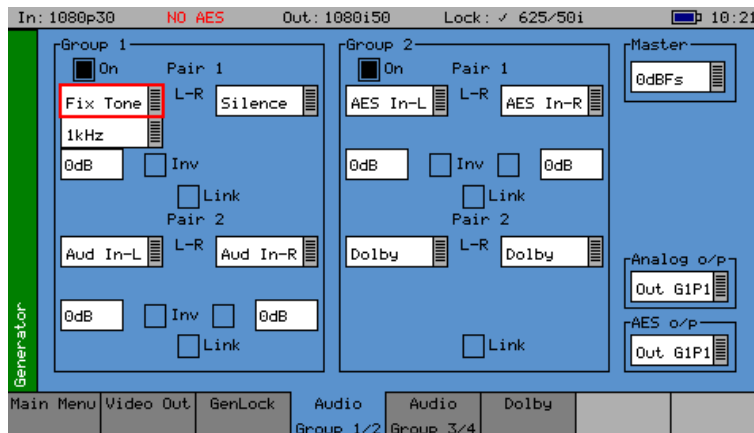
Delay

The Composite and SDI output generated by the unit can be advanced/delayed with respect to the currently selected locking reference. Controls are provided for line and pixel advance/delay for Composite and SDI output. For composite output the Phase control allows the subcarrier phase of the PAL/NTSC composite output to be adjusted with respect to the reference burst phase of the External locking reference black & burst signal.

Note that due to the difference in position of the synchronization pulse of the Composite video output compared to the equivalent SD-SDI synchronization pulse, there is a difference of 17 pixels. If the SD-SDI output needs to be exactly matched to the locking reference, then a value of 0 needs to be entered in the “Pixels” field. If, however, the composite output needs to be matched to the reference then a value of -17 should be entered in the “Pixels” field.

The Zero button is used to set the menu value for Phase back to zero once the exact subcarrier phase of the composite output has been setup for the currently selected locking reference signal. This can be used when comparative phase measurements are being made between the input and output of any equipment under test.

Audio Group Menu



The Sx instrument can embed an audio signal on all 16 embedded audio outputs.

The Audio Group menu controls which audio channels, pairs or groups have test tones applied and the type of tone.

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.

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, or AV Delay. The AES input or Balanced analogue audio 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.

The "Inv" checkbox phase-inverts the audio signal to allow checking of third-party audio mixing.

The "Link" checkbox 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.

AV Delay Audio Pulse

For AV Delay audio pulse generation, choose which audio channel should carry the AV Delay pulse, and then set the source to 'AV Delay' in the drop-down menu. (Make sure that the 'Group' checkbox for this channel is also enabled.)

The AV delay audio pulse can be inserted on up to 16 embedded SDI audio channels and an audio pair can also be routed to the AES Out.

To route an AV delay audio group pair to AES Out, select the embedded output pair in the 'AES o/p' drop-down menu.

If an 'Audio Delay' offset is required for the generated AV Delay pulse, this can be set on the 'Generator – Video Out' page after selecting the 'A/V Delay' test pattern. An offset of up to +/- 40 frames can be applied in increments of 1 frame.

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.

Analog o/p

The "Analog o/p" control selects the source audio for the Balanced analogue audio output available via the "Audio I/O" connector.

AES o/p

The “AES o/p” control selects the source for the AES output of the Sx 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.

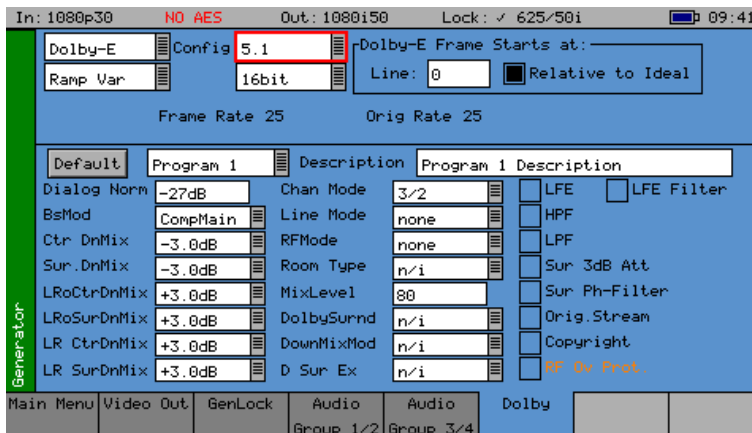
- One of the embedded input pairs on the SDI input to allow use as a de-embedder.

- 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.

The AES audio output is available via the “Audio I/O” connector.

Dolby (PHSXO-DAG)



The Sx instrument Dolby bit-stream Analyzer & Generator software option (PHSXO-DAG) allows generation of Dolby-E, Dolby Digital and Dolby Digital Plus pre-encoded test signals to check that they are transferred transparently through the broadcast chain unaffected by routers/switchers, satellite links, etc.

The Audio - Dolby menu controls the generation of Dolby test data.

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. The type of Dolby to be generated can be selected from the drop-down list in the top left corner of the menu:

- Dolby E
- Dolby Digital
- Dolby Digital Plus

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

Dolby 5.1 - involves five channels for normal-range speakers (20 Hz – 20,000 Hz - right front, center, 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 remaining two channels in an ancillary program (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), for a primary program (Program 1) and optional ancillary programs. These 8 channels are compressed (lossless) 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.

Dolby Digital

Dolby Digital (AC-3) is a 'perceptual audio' system for digital audio that allows the reduction of data needs to deliver high-quality sound. The system was developed primarily for DTV, DVD and HDTV. The format allows up to six channels of sound (mono, stereo or 5.1) in the form of a single 'program' that can be delivered at different bit rates. These 6 channels are compressed (lossy) into a digital stream that can be broadcast. The most elaborate mode in common use is Dolby 5.1 which uses all six channels to provide surround sound.

Dolby Digital Plus

Dolby Digital Plus (E-AC-3) is a more advanced version of Dolby Digital that provides a more efficient encoding algorithm offering enough bandwidth for up to 20 channels of audio (mono, stereo, 5.1, 7.1 up to 13.1), for a primary program (Program 1) and optional ancillary

programs that can be delivered at much lower bit rates than Dolby Digital. These 20 channels are compressed (lossy) into an independent digital data stream, plus up to 8 dependent substreams 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 eight channels to provide surround sound.

Dolby E Synchronization - Generator Reference

The Dolby audio test signal produced by the Sx instrument is affected by the use of a reference signal connected to the Sx instrument and by the following settings:

Free Run - If the generator is not locked to reference, the Dolby signal will be generated synchronous to the generator. If the generator is running at a fast progressive rate (50-60 fps) it will generate packets on every other frame.

External Reference/Ext SDI reference - If the generator is locked to an external signal, the reference signal MUST be of an appropriate standard. See the table below for examples.

Video Output Format	Valid Reference Formats
1080i50	1080i50, 625i50(PAL)
1080i59	1080i59, 525i59(NTSC)
1080p25	1080p25, 1080i50, 625i50(PAL)
1080p29	1080p29, 1080i59, 525i59(NTSC)
720p50	1080p25, 720p25, 1080i50, 625i50(PAL) – due to length of packet being over 1 frame long
720p59	1080p29, 720p29, 1080i59, 525i59(NTSC) – due to length of packet being over 1 frame long
1080p50	1080p25, 720p25, 1080i50, 625i50(PAL) – due to length of packet being over 1 frame long
1080p59	1080p29, 720p29, 1080i59, 525i59(NTSC) – due to length of packet being over 1 frame long

Editing Program Information

Stream type: Only Dolby-E streams can be generated with this software version.

Config, Bit Depth: The program configuration and Bit Depth can be changed to load the pre-encoded file.

Stream contents: The tones generated are of a fixed predefined frequency. Four sets of pre-encoded streams are provided:

Ramp Var - Each channel has a different frequency to allow checking of channels. The levels are ramped so that different channels have different levels.

-3dB Fixed - All the tones are at -3dB co-phased/timed and are at the same frequency.

-18dB Fixed - All the tones are at -18dB co-phased/timed and are at the same frequency.

-20dB Fixed - All the tones are at -20dB co-phased/timed and are at the same frequency.

Fixed Frequency values for “Fixed level” streams above:

Frame Rate	Normal Frequency	LFE Frequency
23.98	4.8kHz	211Hz
24	6kHz	240Hz
25/50	6kHz	240Hz
29.97/59.84	6kHz	133Hz
30/60	6kHz	240Hz

Dolby-E start line: The start line can be used to set valid or invalid ranges to allow checking of the Dolby-E guard band on downstream equipment. If the start line is set outside the valid range specified by Dolby, the line number will be displayed in RED.

Relative to Ideal: If this checkbox is checked, the line number displayed is relative to the Dolby specified ideal line. A value of '0' therefore starts the Dolby-E packet on the 'Ideal Line' for that video format.

Frame Rate: This is set by default to the currently generated frame rate but may be modified by the user to test downstream equipment.

Original rate: This is set by default to the currently generated frame rate but may be modified by the user to test downstream equipment.



Note that if generating a progressive fast rate video standard such as 720p50, 720p59 or 720p60 etc. the Dolby-E signal will always be generated at the related slower rate. This is a Dolby restriction, as the packets are over 1 frame in length for these video formats.

Program Metadata Editing

Many of the metadata fields may be edited to test downstream equipment. The Channel Mode field may be edited to invalid settings, but they will be displayed in RED to show that they are invalid. The settings currently being edited are for the selected program, but multiple program metadata values can be modified and the settings for all programs are stored in memories.

Metadata changes and line changes will happen cleanly so that no corruption to the Dolby signal will occur.

A maximum of 30 characters may be used for program description text. If the text is longer than this, extra characters will be ignored.

The “Generator” – “Dolby” menu allows the metadata for a Dolby E data stream to be setup for testing purposes. The main purpose of setting these metadata fields is to check that they are transferred transparently through the broadcast chain unaffected by routers/switchers, satellite links, etc. For any program, this metadata would be created as part of the Dolby E authoring process. Using the Dolby generator, the following metadata can be setup for Program 1:

Dialog Norm	Is the normal audio level for dialog. 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	(Center 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/center 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/center 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 (i.e. mono, stereo, 5.1 channels).
Line Mode	This is an Operational Mode / Dynamic Compression Mode used by consumer and professional decoder products that simplifies the implementation of Dialog 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 used by consumer and professional decoder products that simplifies the implementation of Dialog 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 optimize Center and Surround channel levels for use in stereo down mix mode for any two-channel programs.
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 set:

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 used 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 theater 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 Ov 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.

Default Program Metadata

Pressing the “Default” button will return program metadata settings to their default values.

Embedding Dolby on SDI Stream

To embed Dolby signals on an SDI stream, the Audio source for that channel should be set to ‘Dolby’. These source selections are found on the Generator – Audio Group 1/2, 3/4 pages. Selecting one channel of an audio pair to ‘Dolby’ will force the other channel in the pair to select ‘Dolby’ also. As the Dolby streams are data, the volume and phase controls are disabled. Changing a channel from Dolby to another source will cause the other channel in the pair to select silence.

Embedding Dolby Signals on AES Stream

To embed Dolby signals on the AES output, the Audio source for the AES output should be set to ‘Dolby’. This selection is found on the right-hand side of the Generator – Audio Group 1/2, 3/4 pages.

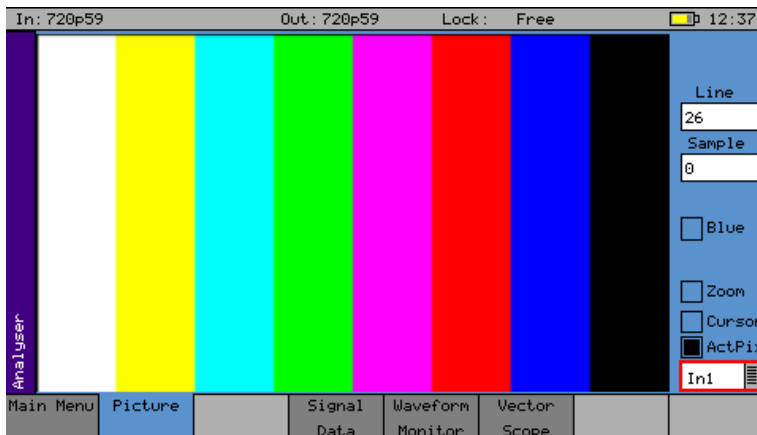
Menu Reference

Analyzer Menu

Overview

The Sx TAG signal analyzer displays the selected Composite, SDI or SFP video input or output signal. 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.

Picture



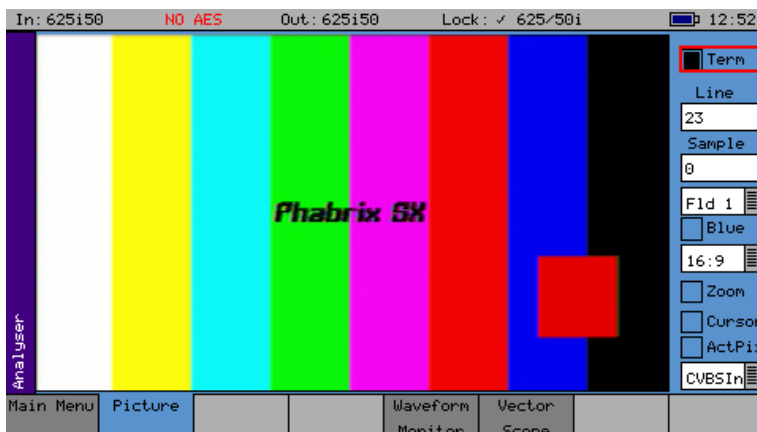
With Picture selected, the video picture is displayed in a window as a down-converted display.

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

The Picture monitor will automatically apply the appropriate transforms to display the images in YCbCr, RGB and XYZ color spaces correctly. The color space transform to be applied is defined by the SMPTE 352 payload.

Analyzer Source Selection

The Picture monitor can display the Composite input, the SDI input, the SFP video input or the generator test pattern. Selection is via the drop-down menu in the bottom right-hand corner of the menu.



The displayed options will be different depending on whether SDI or Composite video is being displayed.

Sample, Line and Field Selection

Sample: Specify the current sample for analysis.

Line: Specify the current line 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.

The picture will automatically view the horizontal or vertical blanking areas if the line or sample values are in the blanking area.

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.

Zoom

If the Zoom checkbox is not checked, the picture displayed is a down-converted picture to fill the window or the full screen as requested. If checked, then a pixel on the LCD display will reflect a pixel in the video signal. In zoom mode, no filtering is used.

Cursor

A cursor may be turned ON over the area of the picture specified by the specified line and sample.

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 center 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 in the 'Analyzer -Signal Data' view, if an option (PHSXOSD) is purchased.

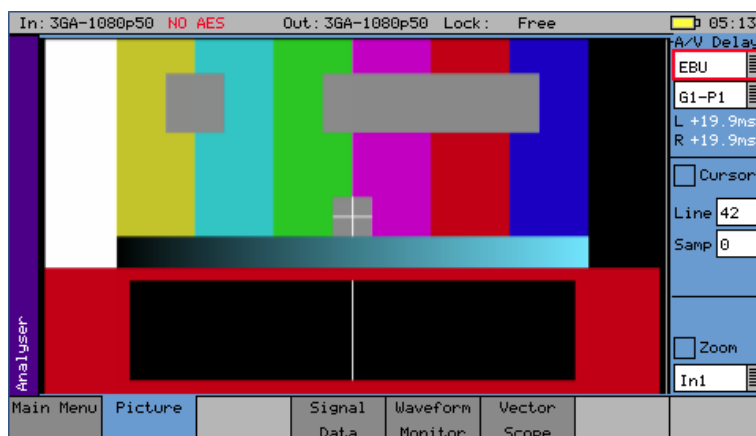


Note that the normal cursor menu keys may be used but are not visible. Press OK again to cancel cursor adjustment mode.

Composite Input Termination

The "Term" checkbox that is present when composite video is displayed, is used to terminate the composite video input. Un-terminating the composite input can be useful if the signal being monitored is terminated at the end of the cable run.

AV Delay Analyzer (AV Delay Option)



AV Delay measurement is available in the Picture instrument.

Measurement of two AV Delay test patterns is supported:

- EBU Tech 3305
- LAWO V_line AV Sync test pattern

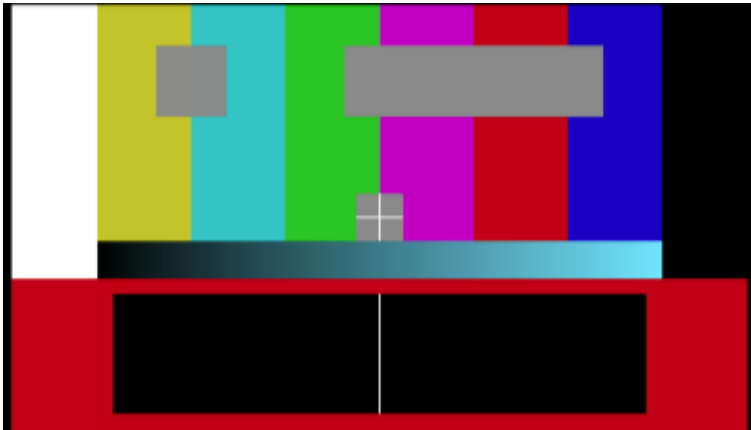
The tool provides a real-time update of the differential delay between the video and the selected audio channel pair.

When analyzing an AV delay video test pattern and audio pulse, the differential delay between the video and the selected audio channel pair will be measured and displayed – with the display updated in real-time.

- A positive (+) measurement indicates that the audio pulse is lagging behind the video
- A negative (-) measurement indicates that the audio pulse is ahead of the video
- When video and audio are completely in sync, zero delay will be measured

The differential delay between the video and the selected audio is measured in 0.1 ms steps (to an accuracy of 1 ms) with an operating range of +/-400ms.

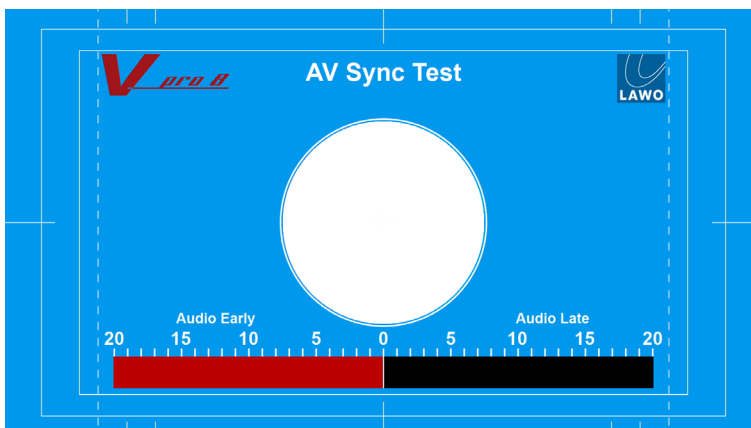
(An 'Audio Delay' offset can be applied to an Sx generated AV delay test pattern in 'Generator – Video Out'. In the AV Delay analyzer, any delay amount that is not accounted for by the generated 'Audio Delay' offset, will indicate delay introduced by the system under test.)



The Sx modified EBU Tech 3305 AV Sync test pattern provides a constantly moving 'clapperboard' that when it closes shows a vertical white 'flash' line for 1 frame.

When video and audio are in sync, the audio pulse will sound at the exact moment the 'white flash' appears.

If video and audio are out of sync, there will be a differential delay between the timing of these two events.



The LAWO V_line AV Sync test pattern provides a constantly moving progress bar. When the progress bar reaches the center frame of the test pattern a vertical white bar appears and a white flash appears in the center circle.

When video and audio are in sync, the audio pulse should sound at the exact moment the 'white flash' appears.

When video and audio are out of sync, there will be a differential delay between the timing of these two events.

To measure AV Delay in the 'Picture' instrument:

The Picture source should be set to the SDI input to analyze the incoming video signal.



Note: The Picture source can also be set to view the generator output

The 'A/V Delay' selection menus and measurements display are located in the top right-hand corner of the Picture instrument.

To measure the differential AV Delay, first ensure that a suitable test source is being used.

For the AV Delay measurement to be valid, the measuring Sx unit must be genlocked to a suitable reference.

A suitable reference is defined as either of the following:

- the SDI input being analyzed
- the external reference to which the AV Delay test signal source device is locked

If however, the measuring Sx is also the source device generating the AV Delay test signal in a loop, then a suitable reference is defined as either of the following:

- external reference
- free-run

Trying to lock the Sx unit to its own input signal is not valid.

The Sx unit reference input can be set in the 'Generator – GenLock' menu.

Switch on AV Delay measurement in the Sx by selecting the appropriate test pattern type from the first 'A/V Delay' drop-down menu:

- OFF, EBU, LAWO

Next, in the second drop-down menu, select the required audio group and pair carrying the AV delay audio pulse – the timing of which will be measured relative to the video test pattern.

The AV Delay pulse can be carried on either an embedded SDI audio or AES channel:

- AES In, G1-P1, G1-P2, G2-P1, G2-P2, G3-P1, G3-P2, G4-P1, G4-P2

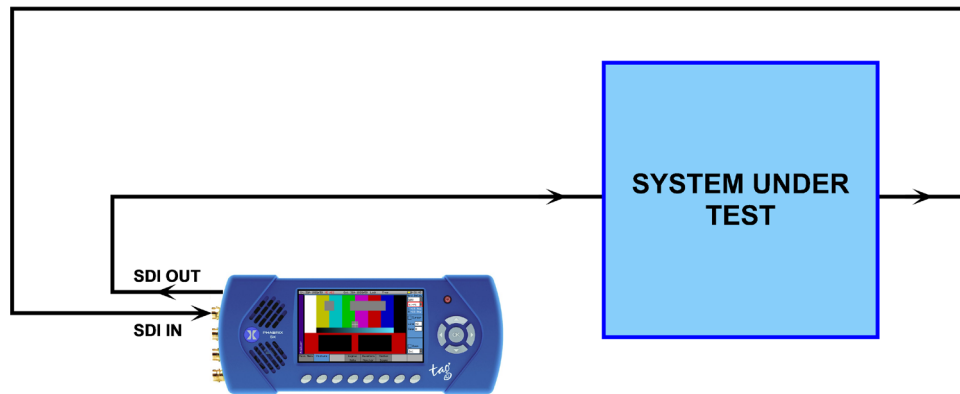
The Left (L) and Right (R) channel fields will display any measured differential delay between the video and that audio channel in milliseconds (ms).

The status of the AV delay measurement tool (when switched on) is shown by the color of the measurement display fields:

Red	The correct AV delay pattern has not been detected and/or no AV delay pulse has been detected
White	Measured differential delay. No errors detected.

Audio-to-Video Differential Delay Testing:

Objective: Measure the imposed differential delay of the audio and video paths in the system under test



- Use SDI SFP for SDI output or input
- Audio pulse carried on embedded SDI channel pair
- Genlock to external reference or free-run

Propagation Delay Testing (of either video or audio):

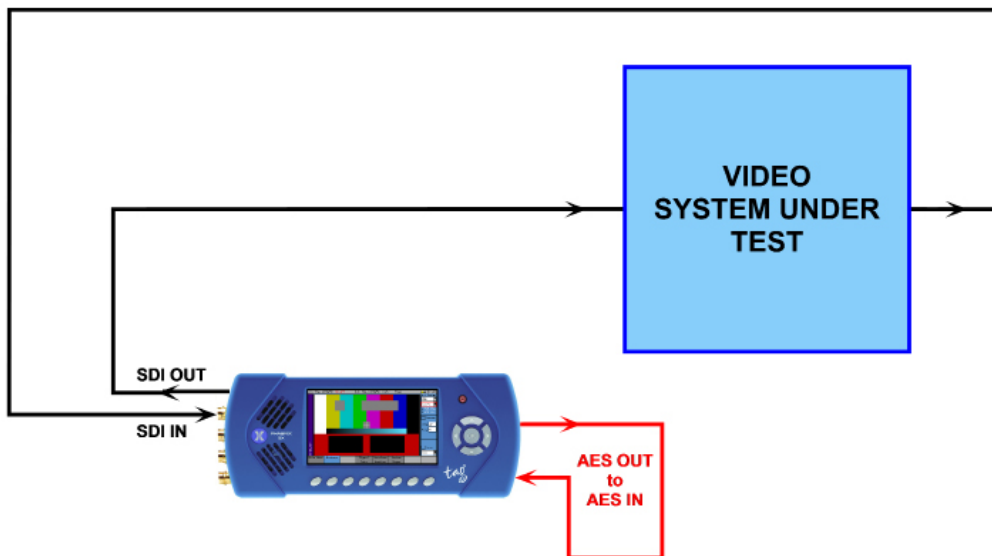
Objective: Measure the propagation delay imposed on the video or audio by the system under test



Note: Propagation delay testing is not available on the SxD as it has no dedicated AES interfaces

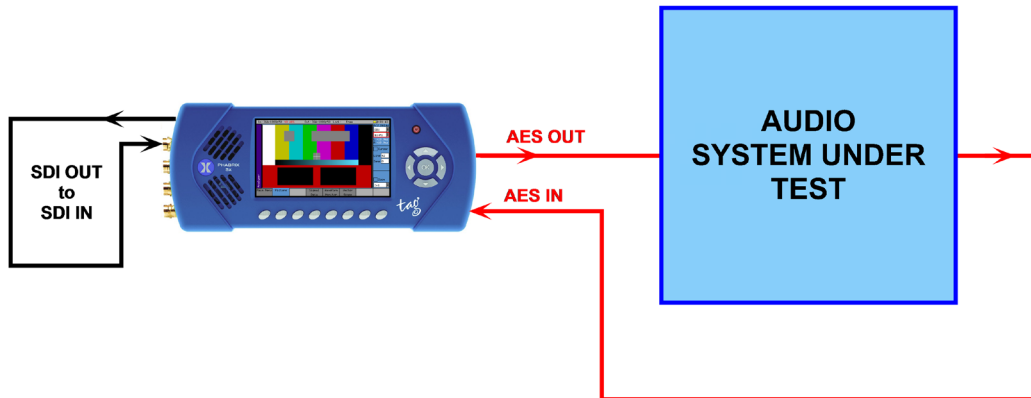


Note: The analyzer can measure delay up to $\pm 400\text{ms}$. If the system under test has a delay longer than this, setting an 'Audio Delay' offset of up to -40 frames will extend the analysis window.

Video Propagation Delay Testing

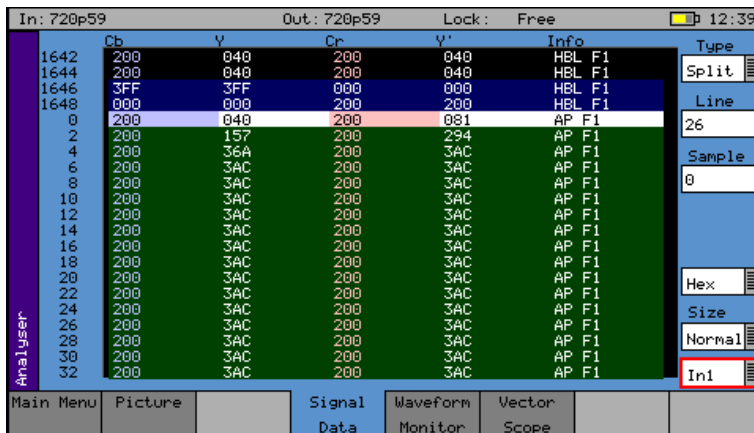
- Use SDI SFP for SDI output or input
- Use 'Audio I/O' connector to loop audio pulse carried on AES channel pair
- Genlock to external reference or free-run

Audio Propagation Delay Testing



- Use SDI SFP for SDI output or input
- Use 'Audio I/O' connector for audio pulse carried on AES channel pair
- Genlock to external reference or free-run

Signal Data (PHSXOSD)



The Signal Data menu option (PHSXOSD) 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. 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 color, 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.



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.

Analyzer Source Selection

The Signal Data display can view the SDI input (In1), the SFP video input (SFPIn), or the generator SDI test pattern (Out 1). Selection is via the drop-down menu in the bottom right-hand corner of the menu.

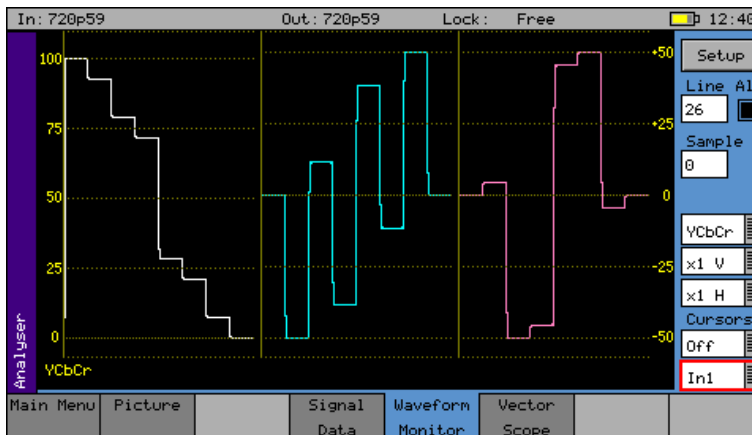


Note that when in Color modes other than YCbCr 422 10 bit, the pixel RGB or YCbCr values are packed into 10 bit values across the different streams and thus will give unfamiliar values. When the 'UnPack' checkbox is checked, the values in the active picture are unpacked to RGB or YCbCr values.

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' is 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 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 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.

Waveform Monitor

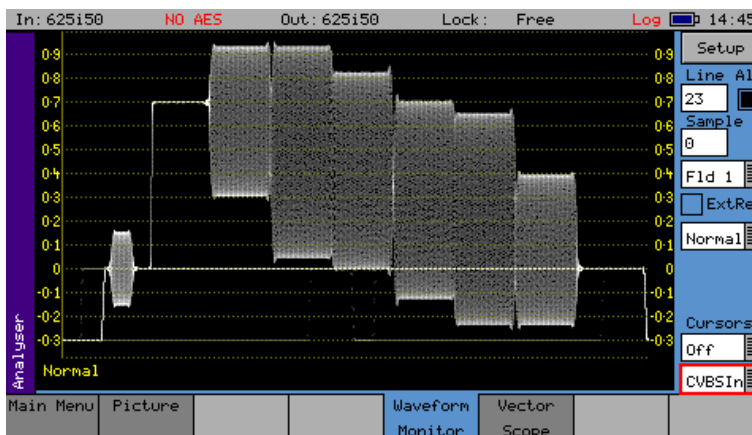


The Waveform menu displays the selected input in the form of a waveform monitor.

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.

Analyzer Source Selection

The Waveform monitor can display the Composite input, the SDI input, the SFP video input, the analogue locking Reference input, or the generator test pattern. Selection is via the drop-down menu in the bottom right-hand corner of the menu.



The displayed options will be different depending on whether SDI or Composite video is being displayed.

Sample, Line and Field Selection

The line, sample and field controls all track the related controls on other pages.

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

Sample: Specify the current sample for analysis.

Line: Specify the current line for analysis. This is useful when test patterns are transmitted as part of a program on specific video lines.

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.

The waveform will automatically view the horizontal or vertical blanking areas if the line or sample values are in the blanking area.

Waveform Type

The waveform monitor displays the selected signal in one of five 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 green chroma channel is shown
Blue	Only the blue chroma channel is shown
XYZ, X, Y, Z	Settings in the Waveform monitor display the 2K-SDI XYZ color space in its native nonlinear form; so test patterns such as Legal Ramp in 2K XYZ, will be displayed as curves instead of straight lines.
X'Y'Z', X', Y, Z'	Settings in the Waveform monitor display the 2K-SDI XYZ color space with a reverse transform to convert it to linear form; so test patterns such as Legal Ramp in 2K XYZ will be displayed as straight lines.
Normal	This shows the full composite video waveform.
Chroma	This shows the chrominance of the composite waveform.
Low Pass	This shows the low pass luminance of the composite waveform.

Magnification

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 waveform can be offset 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 magnification 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.



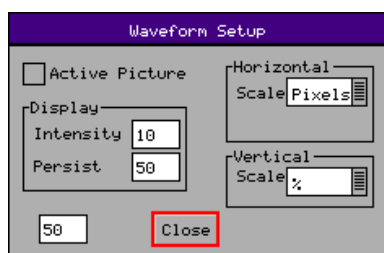
The navigation keys now move the selected cursor around the waveform display which will scroll if moved out of the visible area. The x10 and x100 buttons magnify the action of the navigation keys if held down.

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 Dialog



The Waveform Setup menu allows the vertical and horizontal scale of the waveform display to be set up, as well as controlling the intensity and persistence of the display.

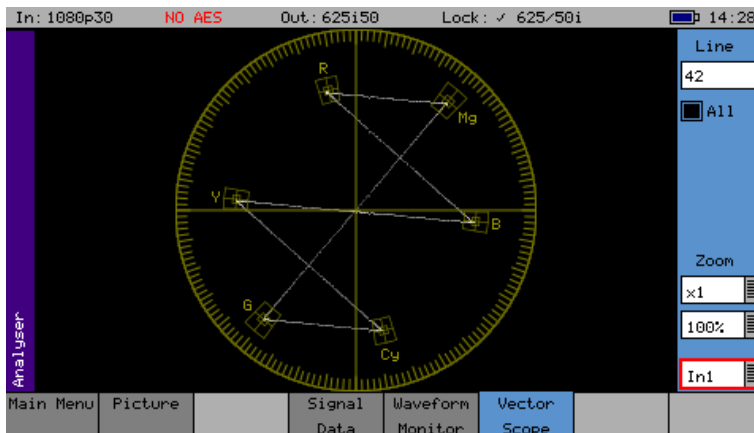
- Active Picture:** If checked, only active picture is displayed for Picture view and Waveform monitor; all other VBI data such as TRS words, ANC data, and audio is blanked. This control tracks the state of the ActPix control on the Picture.
- Vertical Scale:** The axes and measurements for the waveform 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)
- Intensity** Controls the brightness of the waveform.
- Persistence** Controls the amount of time each pixel sample of the waveform remains on the display before it is replaced by a new value.

When viewing the composite or reference input, the displayed waveform is a digital rendition of the actual analogue signal. This may have interference artefacts due to data sample rate differences between the display and the data itself. The value in the numeric box below Persistence can be used to control these artefacts without losing waveform resolution.

External Reference

Selecting the Ext Ref checkbox when a PAL or NTSC signal is being viewed, will horizontally reposition the waveform to show the difference in position between the composite input signal and the locking reference signal.

Vectorscope

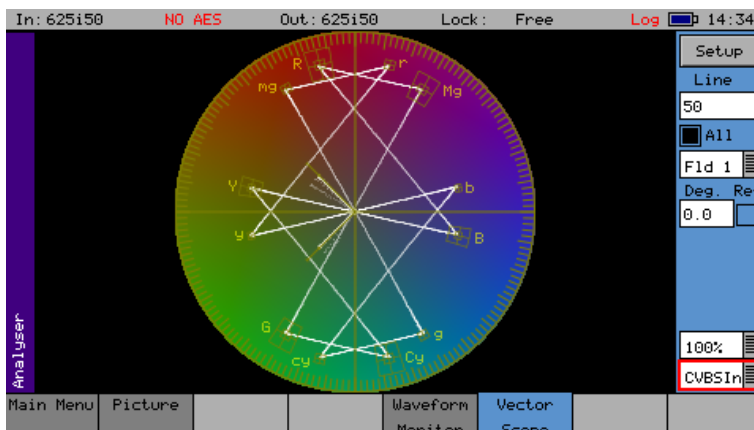


The Vectorscope menu displays the selected input in the form of a vectorscope. This may be set to show either the 100% bar positions or 75% positions. The color bar position boxes will change according to the color space, for the current input video standard.

The Vectorscope will automatically apply the appropriate transforms to display the images in YCbCr, RGB and XYZ color spaces correctly. The color space transform to be applied is defined by the SMPTE 352 payload.

Analyzer Source Selection

The Vectorscope can display the Composite input, the SDI input, the SFP video input, the analogue locking Reference input, or the generator test pattern. Selection is via the drop-down menu in the bottom right-hand corner of the menu.



The displayed options will be different depending on whether SDI or Composite video is being displayed.

Sample, Line and Field Selection

The line, sample and field controls all track the related controls on other pages.

The 'All' checkbox forces the Vectorscope to display all lines, overlaid on each other. Otherwise the specified line is displayed.

- Line: Specify the current line for analysis. This is useful when test patterns are transmitted as part of a program on specific video lines.
- Field: (Only for interlaced formats) This control selects the field for analysis. If the current line is in Field 1, changing the field will display the same line in Field 2. The field number will change to show the correct field for the current line number.

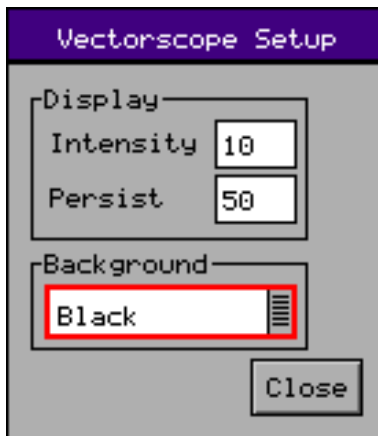
Magnification

The "Zoom" function allows the Vectorscope display to be zoomed-in to the Center, Cyan, Yellow, Green, Magenta, Red or Blue positions at x1, x2, x5, or x10 magnifications.

Graticule

The “100%”/“75%” drop-down selects the graticule scale to match the color bars being analyzed.

Setup Button Dialog



The Vectorscope Setup menu allows the intensity and persistence of the display to be adjusted. A color wheel background can also be added.

Intensity	Controls the brightness of the displayed signal.
Persistence	Controls the amount of time each pixel sample of the vectorscope remains on the display before it is replaced by a new value.
Background	Allows the selection of different intensities of the color wheel as the graticule background

Composite Subcarrier Phase Alignment

When viewing a PAL or NTSC signal, the Ref checkbox when selected will lock the Vectorscope to the subcarrier phase of the locking reference signal. The value entered into the Deg (degree) box to place the PAL or NTSC burst in the correct alignment is a measure of the subcarrier phase difference, between the input signal and locking reference.

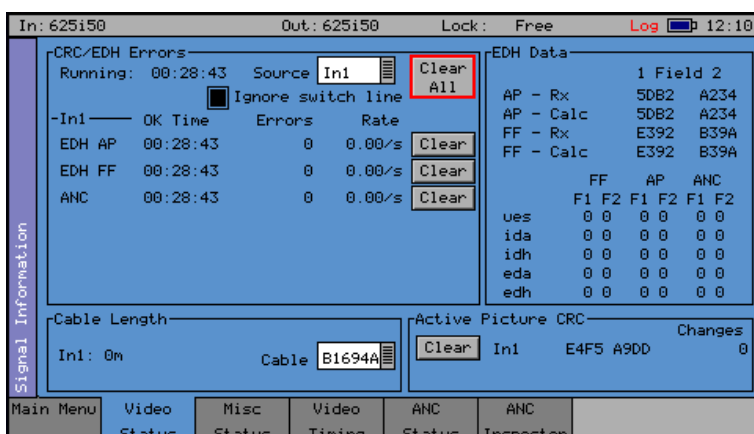
Menu Reference

Signal Information Menu

Overview

These pages give a detailed view of the status of the input (or generator output) signal. They are sub-divided into Video, Misc, and Ancillary (ANC) Status. An option (PHSXOSD) provides an ANC Inspector page. Where an SFP is present, an SFP Info page will be available. In the case of an HDMI output SFP, an EDID Info page will also be displayed, when the option (PHSXO-EDID) has been purchased.

Video Status



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

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' checkbox is checked.

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

When analyzing a 3G-Level B signal, the CRC status is displayed for each link or stream present according to the input video format. On an Sx instrument with a Dual-Link of 2 video inputs, only one 3G-Level B may be analyzed 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 an SDI error was detected. In the case of ancillary data, this means that one or more ANC data packet had an incorrect checksum.

eda: Error Detected Already - This is set to 1 if an 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 analyzed. On an Sx instrument with multiple video inputs, only the current input being analyzed can check for EDH errors.

Cable Length

The Sx instrument measures the cable length connected to the SDI input BNC. 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.

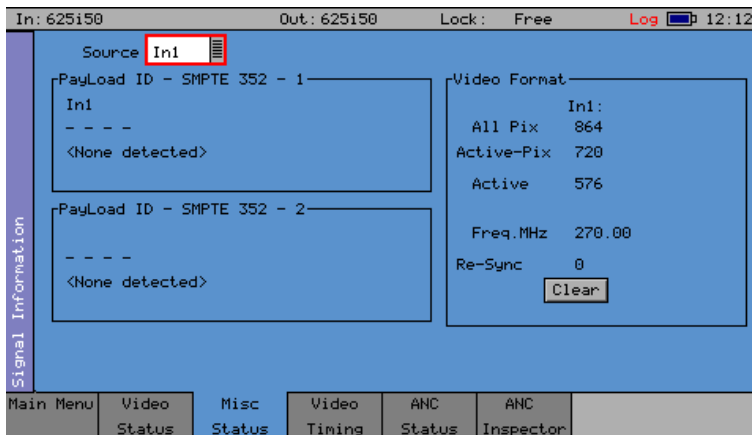
For example, the generated 1920x1080, 100% bars in YCC422-10 should always produce a luminance CRC of 0x0AB4 and a chrominance CRC of 0xB88E, no matter what scanning mode (interlaced, segmented frame or progressive) or frame rate is used.



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 this manual for details of CRC calculation.

Misc Status



The Misc Status menu displays the status of SMPTE 352 packets embedded in the selected video input and displays any errors that have been found.

Payload ID – SMPTE 352

If the Sx 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 color format, bit depth, dynamic range, and channel number. See the SMPTE 352 specification for further details.

When analyzing 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 Sx instrument with a Dual-Link of 2 video inputs, only one 3G-Level B may be analyzed 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.

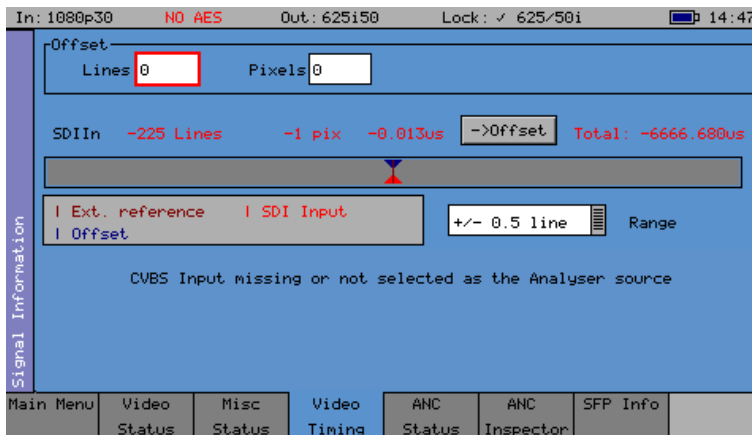


Note that the video frequency displayed is only correct if the Sx instrument has been calibrated and free running, or has been connected to an accurate reference input.

If the input signal is not a known signal (i.e. the line count or pixel count is not recognized) 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-synchronized, and can help detect intermittent SDI signal problems.

Video Timing



The Video Timing menu displays the relationship between the chosen input (SDI, SFP, or composite) with respect to the locking reference input.

The timing of the chosen input signal 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 signal 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 chosen input signal 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'.



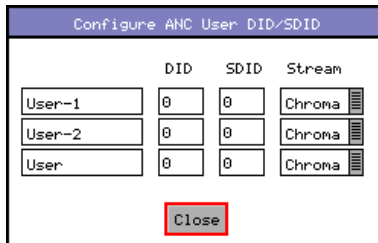
Note that all timing measurements are relative to Line 1 on the SDI signal and Line 1 on the reference signal. This can lead to different values compared to other test and measurement instruments that include an SD (PAL/NTSC) offset in their calculations. By comparing Line 1 timings, the Sx instrument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

ANC Status



The ANC status menu shows which ANC packets are present on the SDI input, and whether they have any errors. Each field is color coded according to whether the ANC packet is present (White), missing (Grey), has errors (Red), or has previously had errors (yellow).

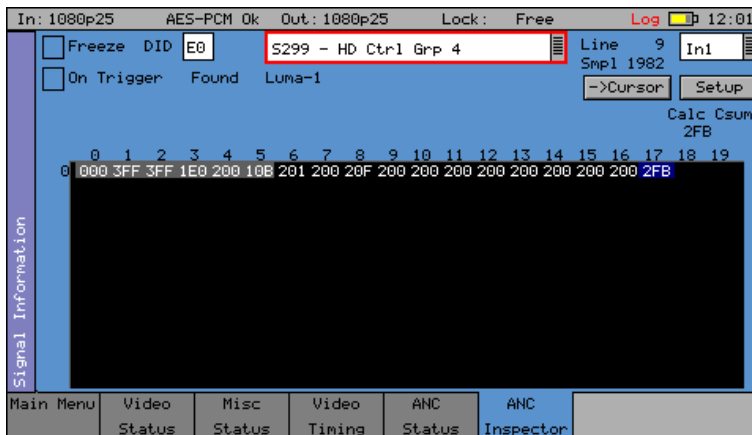
If the field has errors then a symbol beside the field shows which error type it is. The bottom of the page shows the symbol for each type of error. The Reset button resets the “Previous Errors” state.



The Setup button and dialog allow user-defined ANC packets to be configured.

The packet name, Data ID (DID), and Secondary Data ID (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.

ANC Inspector (PHSXOSD)



The ANC Inspector menu option (PHSXOSD) allows Ancillary data packets to be detected and checked for errors.

The ANC Inspector menu displays details of the ANC packets.

The packet type can be selected using either the drop-down list of known packets or the DID/SDID number fields. 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 checkboxes on the Setup dialog.

The Line and Sample number of the detected packet are 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' checkbox.

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

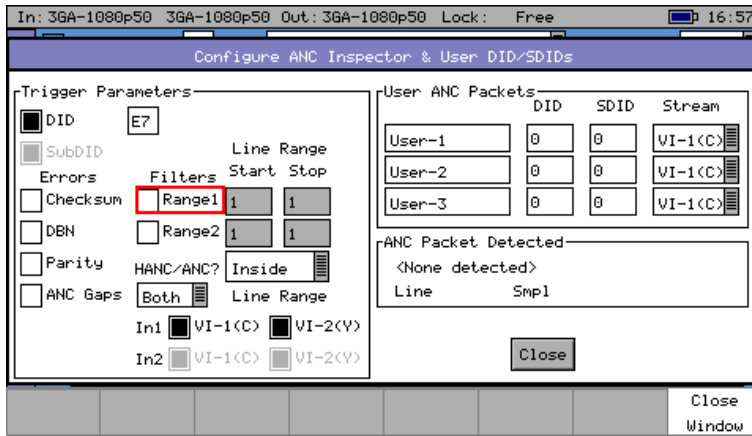
Several of the above flags may be displayed at the same time.

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

If the 'On Trigger' checkbox is checked, the data packet will cause the display to be frozen and the Freeze checkbox will turn red when a trigger condition is met. See the section that follows, on the ANC Inspector Setup dialog. Unchecking 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.

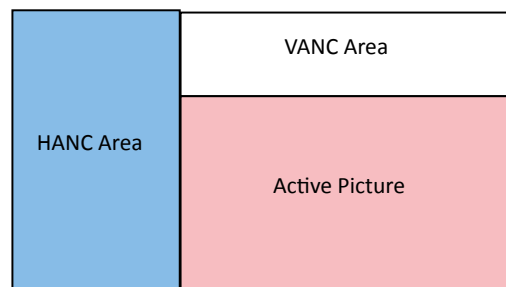
ANC Inspector Setup



If the Setup button is pressed, a dialog 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 Filter If either of the Line Range Filter checkboxes 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. Selection can be made here to search the HANC area, the VANC area, or both areas.



Error Triggers

If any of the “Errors” checkboxes 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. (Sum of data between DID and final User Data Words (UDW))
- 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 Data Count 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 dialog 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 dialog.


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

SFP Info



In: 1080p30		NO AES		Out: 625i50		Lock: ✓ 625/50i		14:45			
Signal Information	SFP Information										
	SFP Type	OPT Tx+Rx	Tx Power		0.0000mW		Rx Power		0.0001mW		
	Temp	45.55 C									
	ID	85h	Ext.ID	04h	Connector	07h					
	StdsCompl	41h	TxRxCod-1	00000000h	TxRxCod-2	00000003h					
	Encoding	03h	NomBitRate	3000Mbs	Len 9um	30000m					
	Len 50um	0m	Len 62.5um	0m	Len Copper	0m					
	Vendor	GENNUM	Vendor OUI	00h	Part Code	602929-31C					
	Vendor Rev	00h	Wavelength	1310	CC Base	6ah					
	Options	1ah	UprBitRate	5%	LwrBitRate	95%					
	SerialNo	Z112308MJ	MfgDateCod	110622	CC Ext	47h					
	Res-13	00h	Res-19	00h	Res-36	00h					
	Res-62	00h	Res-92-94	68f00547h							
	Main Menu		Video		Misc		Video		ANC		SFP Info
Status		Status		Timing		Status		Inspector			

The SFP Info menu displays details of the currently installed SFP module.

HDMI EDID display (PHSXO-EDID)

In: Absent		NO AES		Out: 3GB-1080p50		Lock: Free		Log  23:44	
Signal Information	<div>Refresh</div>	<div><input type="checkbox"/> Raw</div>	EDID Information						
	Section	Monitor	Estb. Modes	720x400@70.640x480@60					
	ModelName	DELL 2408WFP	Estb. Modes	800x600@72.800x600@75					
	VendorName	"DEL"	Manufacturer	Specific=0x00					
	Product Code	41004	Horizsync	30-83					
	SerialNum	825642579	VertRefresh	56-76					
	Manufactured	week 38 of 2008	Maximum pixel	clock is 170MHz					
	EDID Ver	1.3	ModeLine	"1920x1200" 154.00					
	Type	Digital Display	1920 1968	2000 2080 1200					
	VESA DFP	no	1203 1209 1235	+hsync -vsync					
	Display Size(cm)	52 x 32	Not giving standard mode:						
	Gamma	2.20	1280x1024@60 5:4	Clock=78.00 Mhz					
	DPMS	standby/suspend/loff	1600x1200@60 4:3	Clock=115.00 Mhz					
	Colour Support	RGB444+YCC444	1152x864@75 4:3	Clock=74.00 Mhz					
	Standard sRGB	No	EDID Ext Blocks: 1						
	GTF	No							
	Preferred timing found								
Red X/Y(CIE)	690 327								
Green X/Y(CIE)	192 723								
Blue X/Y(CIE)	152 66								
White X/Y(CIE)	321 337								
Main Menu Video Misc Video ANC ANC SFP Info EDID Info									
Status Status Timing Status Inspector									

The HDMI EDID viewer option (PHSXO-EDID) displays both RAW ancillary data and decoded EDID information in a tabular display. It obtains the EDID information using a dedicated SFP and cable (PHSFP-HDMI-OUT), which must be purchased separately. For those customers requiring support for 3G formats, an additional license (PHSXO-3GADV) will be needed.

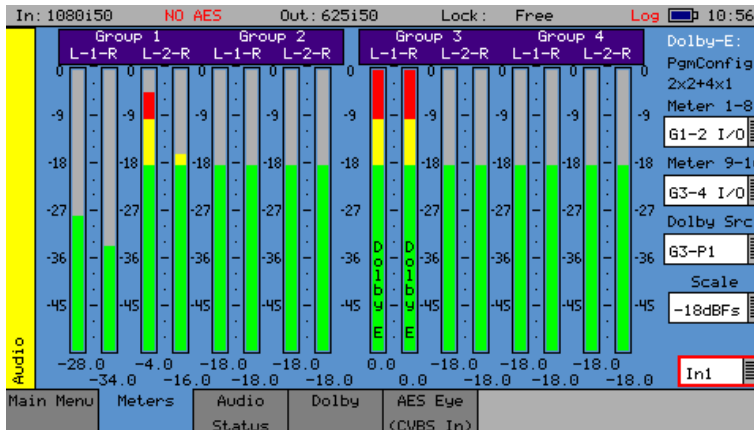
In: Absent		NO AES		Out: 3GB-1080p50		Lock: Free		Log  23:44	
Refresh		 Raw		EDID Information					
Signal Information	Offset								
	0	00	ff	ff	ff	ff	ff	ff	00
	8	10	ac	2c	a0	53	4e	36	31
	16	26	12	01	03	80	34	20	78
	24	ea	b3	25	ac	51	30	b4	26
	32	10	50	54	a5	4b	00	81	80
	40	a9	40	71	4f	01	01	01	01
	48	01	01	01	01	01	01	28	3c
	56	80	a0	70	b0	23	40	30	20
	64	36	00	07	44	21	00	00	1a
	72	00	00	00	ff	00	47	32	38
	80	36	48	38	39	47	31	36	4e
	88	53	0a	00	00	00	fc	00	44
	96	45	4c	4c	20	32	34	30	38
	104	57	46	50	0a	00	00	00	fd
	112	00	38	4c	1e	53	11	00	0a
120	20	20	20	20	20	20	01	f2	
Main Menu Video Misc Video ANC ANC SFP Info EDID Info									
Status Status Timing Status Inspector									

EDID display of RAW data.

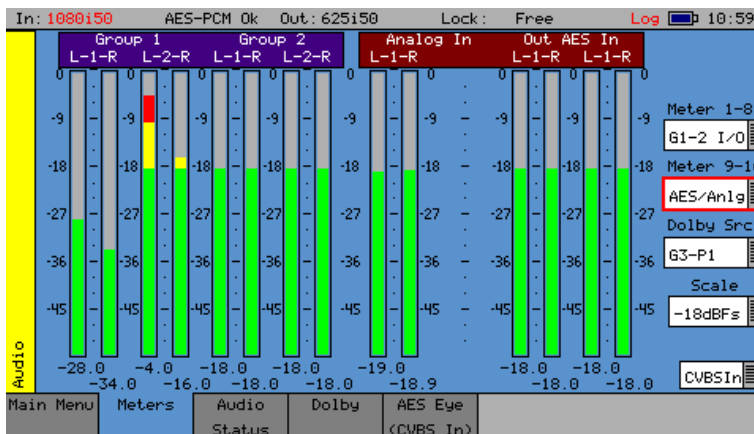
In addition, the HDMI EDID display option can be used in conjunction with the generator, providing an SDI pattern which is generated through the HDMI SFP which can be used to test a monitor display.

Audio Menu

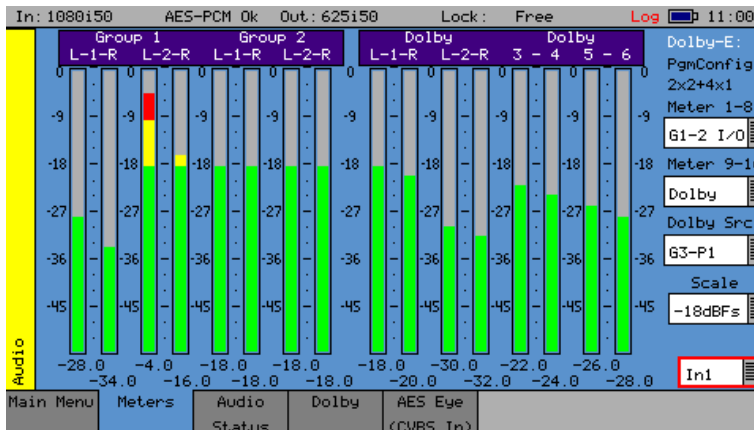
Meters



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.



If AES or analogue inputs or outputs 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).



If the Dolby metadata analysis option is installed then the audio levels defined in the metadata can be displayed on the meters.

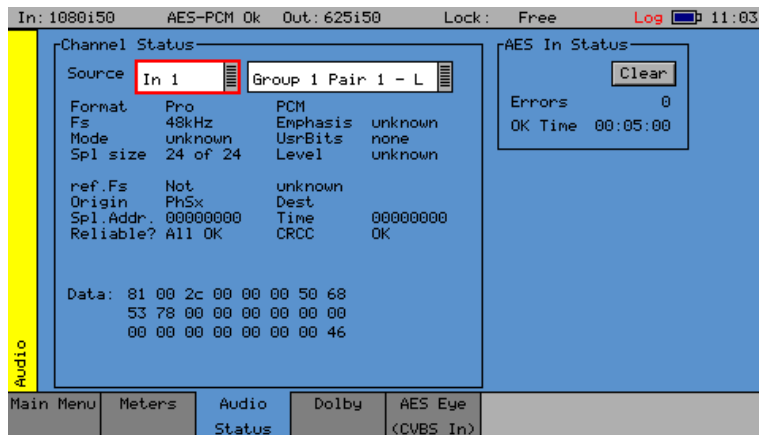
The scale used by the meters may be set to -18dB or -20dB according to the standard operating level used.

If the Dolby option has been purchased, the meters may be set to display the encoded Dolby levels for the specified audio pair or AES input.



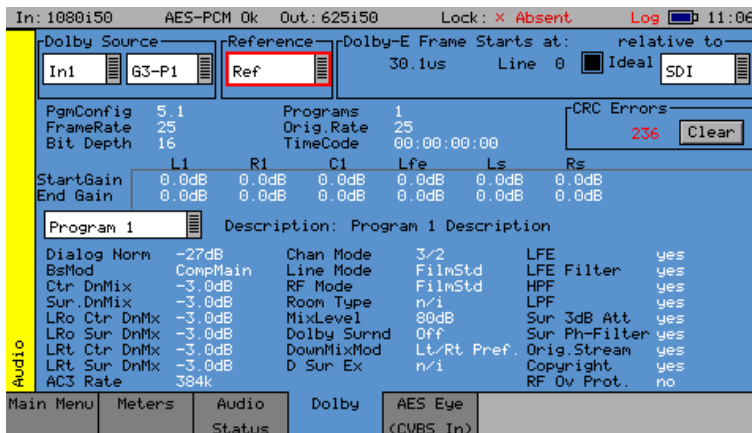
Note that Dolby audio cannot be heard on the speaker as a Dolby decoder is not present.

Audio Status



The Audio Status menu shows the Channel Status for the selected audio channel. It is displayed in decoded form as well as a hexadecimal dump of the bytes. The source may either come from the input signal or from the generator for comparison purposes.

Dolby Status (PHSXO-DAG)



The Dolby Analysis option allows display of the Dolby-E metadata 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 Dolby-E aspect of the signal to be timed correctly 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 a SMPTE 337M AES carrier with a 48kHz sample rate:

- Dolby E

- Dolby Digital

- Dolby Digital Plus

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

Dolby 5.1 - involves five channels for normal-range speakers (20 Hz – 20,000 Hz - right front, center, left front, right rear, left rear) 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 remaining two channels in an ancillary program (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 eight channels of audio (mono, stereo, 5.1 or 7.1), for a primary program (Program 1) and optional ancillary programs. These eight channels are compressed (lossless) 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.

Dolby Digital

Dolby Digital (AC-3) is a 'perceptual audio' system for digital audio, that allows for the reduction of data needed to deliver high-quality sound. This system was developed primarily for DTV, DVD and HDTV. This format allows for up to six channels of sound (mono, stereo or 5.1) in the form of a single 'program' that can be delivered at different bit rates. These 6 channels are compressed (lossy) into a digital stream that can be broadcast. The most elaborate mode in common use is Dolby 5.1, which uses all six channels to provide surround sound.

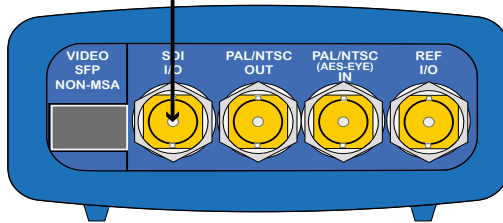
Dolby Digital Plus

Dolby Digital Plus (E-AC-3) is a more advanced version of Dolby Digital that provides a more efficient encoding algorithm offering enough bandwidth for up to 20 channels of audio (mono, stereo, 5.1, 7.1 up to 13.1), for a primary program (Program 1) and optional ancillary programs that can be delivered at much lower bit rates than Dolby Digital. These 20 channels are compressed (lossy) into an independent digital data stream, plus up to 8 dependent substreams 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 eight channels to provide surround sound.

Analyzer 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 therefore **MUST 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



In this example, the SDI signal contains embedded audio with Dolby-E present on one or more audio pairs. The Sx 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.

If the AES signal contains a Dolby-E stream, the Sx TAG needs to lock its internal audio clock to the external reference signal, and the Dolby Timing source should be set to Ext.Ref. The AES source **MUST** be locked to the same reference as the Sx TAG.

Source selection

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

Dolby E 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).

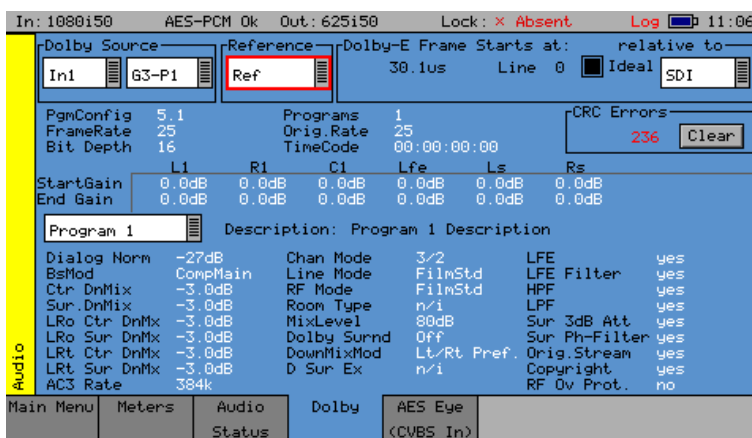
Dolby E Timing source

Dolby-E timing may be measured relative to the SDI input or the External reference. If the 'Ideal' checkbox is checked, the Dolby-E Frame timing is relative to the normal position that it should be, i.e. 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 an 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.

Dolby E Program configuration



This displays the Program configuration (5.1 + 2 etc.), the number of programs in the metadata, the frame rates and bit depths, and timecode if any is present.

- CRC Errors:** This displays the number of CRC errors detected in the Dolby-E metadata.
- 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 metadata 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.
- Program Metadata:** The metadata is displayed in a Dolby specified order. Any data not required for the Program Configuration specified is greyed out, and the data hidden.

Dolby Digital Program configuration

In: 625i50 Absent Out: 625i50 Lock: ? 625/50i 10:18

Dolby Source: In1 G1-P2 Dolby-D CRC Errors: 0 Clear

Dialog Norm -23dB	Chan Mode 1+1	LFE no
BsMod CompMain	BSID 6	Dialog Norm 2 -23dB
Ctr DnMix	Pa Spacing 1536	
Sur DnMix	Room Type small/flat	Room Type2
LRo Ctr DnMix	MixLevel 105dB	MixLevel2
LRo Sur DnMix	Dolby Surnd n/1	Orig.Stream yes
LRT Ctr DnMix	DownMixMod n/1	Copyright yes
LRT Sur DnMix	D Sur Ex	ExtPgmScaleLFE
Mix Meta Data	ExtPgmScaleL	ExtPgmScaleA1
Pgm Scale	ExtPgmScaleR	ExtPgmScaleA2
Ext Pgm Scale	ExtPgmScaleC	Pan Mean
Mix Def	ExtPgmScaleLs	Pan Mean 2
Pre Mix Compr	ExtPgmScaleRs	

Audio

Main Menu Meters Audio Dolby Status

When Dolby Digital metadata is analyzed, this displays channel configuration and limited metadata that is sent with Dolby Digital.

Dolby Digital Plus Program configuration

In: 625i50 Absent Out: 625i50 Lock: ? 625/50i 10:31

Dolby Source: In1 G1-P2 Dolby+ Stream Source: Main-1 Indep CRC Errors: 0 Clear

Dialog Norm -23dB	Chan Mode 1+1	LFE no
BsMod CompMain	BSID 16	Dialog Norm 2 -23dB
Ctr DnMix	Pa Spacing 1536	
Sur DnMix	Room Type small/flat	Room Type2
LRo Ctr DnMix	MixLevel 105dB	MixLevel2
LRo Sur DnMix	Dolby Surnd	Orig.Stream yes
LRT Ctr DnMix	DownMixMod	Copyright yes
LRT Sur DnMix	D Sur Ex	ExtPgmScaleLFE
Mix Meta Data yes	ExtPgmScaleL	ExtPgmScaleA1
Pgm Scale 2dB	ExtPgmScaleR	ExtPgmScaleA2
Ext Pgm Scale 8dB	ExtPgmScaleC	Pan Mean
Mix Def no	ExtPgmScaleLs	Pan Mean 2
Pre Mix Compr	ExtPgmScaleRs	

Audio

Main Menu Meters Audio Dolby Status

When Dolby Digital Plus metadata is analyzed, this displays the Main, Dependent, and Independent program stream configuration; and limited metadata that is sent with Dolby Digital Plus.

Program Metadata

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

Dialog Norm	Is the normal audio level for dialog. 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	(Center 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/center 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/center 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 (i.e. mono, stereo, 5.1 channels).
Line Mode	This is an Operational Mode / Dynamic Compression Mode used by consumer and professional decoder products that simplifies the implementation of Dialog 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 used by consumer and professional decoder products that simplifies the implementation of Dialog 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 optimize Center and Surround channel levels for use in stereo down mix mode for any two-channel programs.
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 used 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 theater 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 Ov 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

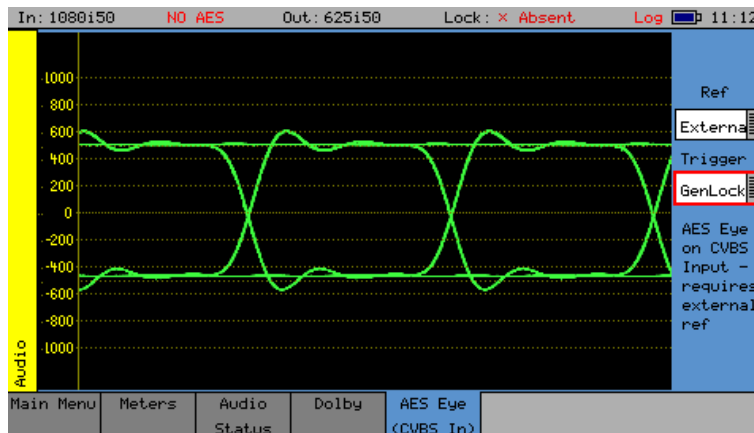
The peak audio levels are included in the Dolby-E metadata packet and may be displayed on the 'Audio - Meters' page. Select the appropriate set of meters to display Dolby levels, and then they will follow the selected Dolby-E source.



Note that audio cannot be decoded by the Sx range of products, and so you will NOT be able to listen to the Dolby-E signal.

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

AES Eye (CVBS In)

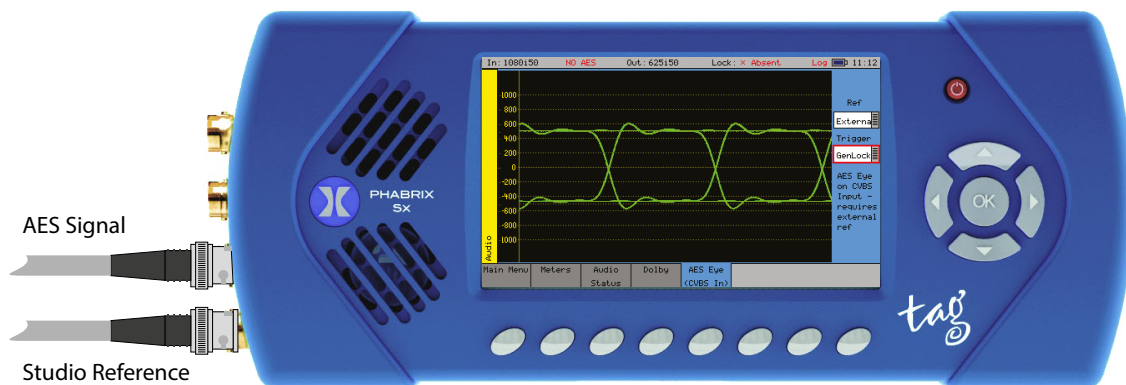


AES Eye menu allows an AES signal of 75Ω impedance connected to the “PAL/NTSC (AES Eye) In” BNC connector to be displayed as an Eye pattern. This allows the amplitude and quality of the AES waveform to be seen and allows, AES to reference locking, to be checked.

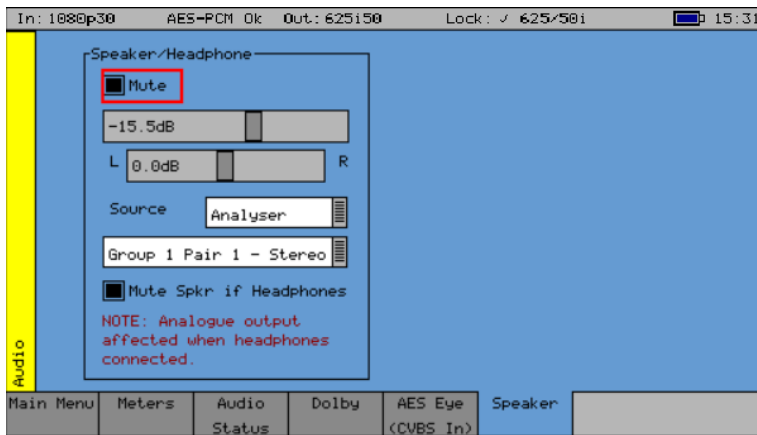
It can be difficult to check that the AES audio signal is correctly locked to the studio reference. The AES Eye menu allows the AES waveform to be displayed on the unit. If the studio locking reference is also connected to the unit, then the AES Eye waveform can be displayed, locked to this reference. If the AES signal is not correctly locked to the reference, then the Eye waveform will run through the display.

- | | |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ref | This drop-down list allows the reference source to be selected for the AES waveform locking |
| Trigger | This drop-down list allows the Eye waveform to be triggered either from the AES signal itself (showing the level of jitter), or from the regenerated AES clock itself (showing the waveform without jitter). |

The graticule displays ± 1 Volt in 100mV increments



Speaker



The Speaker menu controls which audio pair can be heard on the loudspeakers and headphone output of the unit.

The Sx instrument contains a loudspeaker and associated stereo headphone socket, which can be connected to any of the audio input or output channels, or pairs.

The “Mute” checkbox allows both signals to be muted.

A volume control is provided to adjust the level of both the speaker and headphones. 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 Sx TAG and the input and output sources can be set independently to either a stereo pair or single audio channel.

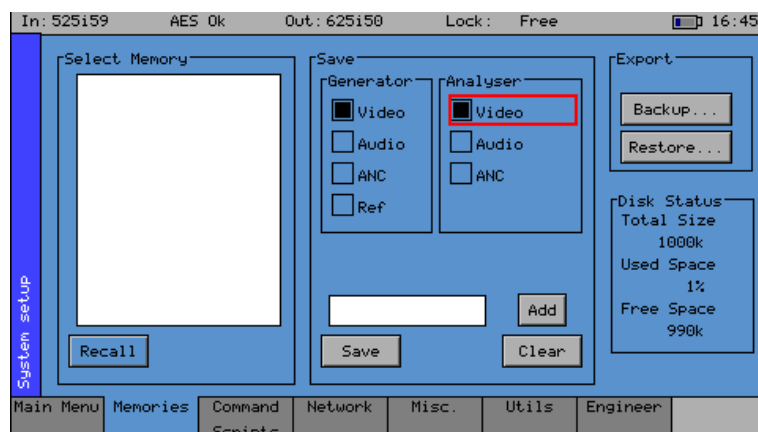
The “Source” is used to select the specific input that is to be heard.

The speaker can be muted when headphones are plugged in by checking the “Mute Spkr if Headphones” control.

Note that when listening to an audio source, the Sx instrument needs the audio to be synchronous with that of the Sx Generator. If this is NOT the case, ‘clicks’ will be heard on the speaker. Either connect the Sx 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.

System Menu

Memories



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

The checkboxes on the right-hand side determine what is saved in the memory. Nonoverlapping memories may then be combined.



Note that if log-in has been enabled for an Sx 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 Sx instrument are to be saved in the memory using the checkboxes 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’. A keyboard for editing the name of the memory will appear. Select ‘Shift’ to reveal additional keys. Multiple language keyboards are available from the drop-down menu in the bottom right corner of the keyboard screen. 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 new memory will as a starting point be based on the current memory name and settings.

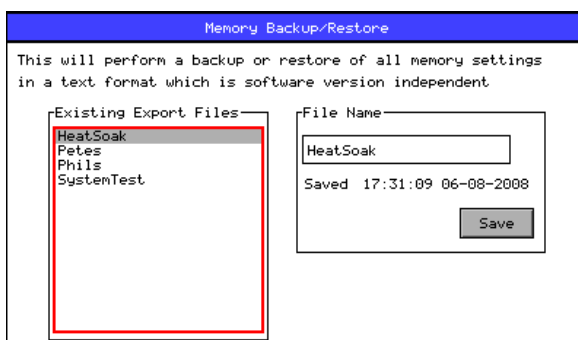
Clearing Memories

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 Sx instrument via FTP or USB.



To export memories, select the 'Backup...' button which will open a window for saving a new backup file. 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.

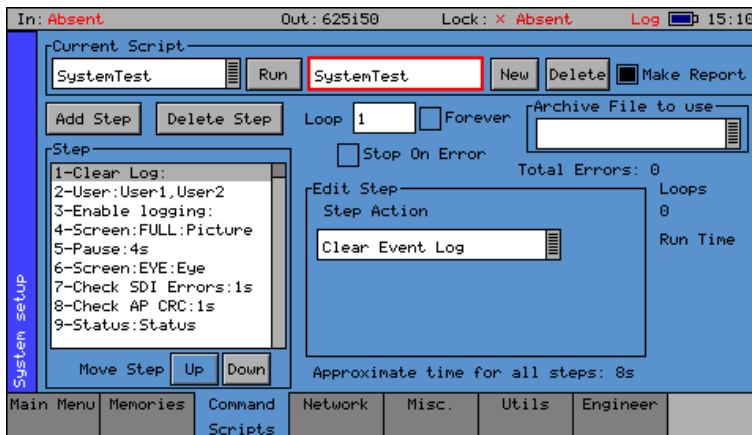


Note that when importing a backup file, all existing memories are deleted before the backup file is loaded; so make sure that they are backed up first.

Disk Space

The Disk Status section shows the total size of the internal flash disk, how much of it is being used as a percentage, and how much is free.

Command Scripts



The Command Scripts menu allows the Sx instrument to run predefined scripts.

This can be used to automate testing of signals.

Steps, Actions, and Parameters

Command scripts are text files with a file extension of .cmd. They are formatted with one step per line. The line is formatted as StepTime, StepAction, StepParameters

StepTime is a numeric value in seconds 0....n

StepAction is one of:

ARCHIVE	This is used to specify the archive file to be loaded when the script is run. This makes sure that all the memories required for the test have been loaded. This archive file is loaded EVERY time the script is run, so if you make changes to any memories, you MUST use the Export/Archive section on the System - Memories tab to backup the current memories.
LOADMEM,	Loads the memory specified in the StepParameters field – must be a numeric value 1...num memories.
CHECKERRS,	Check for CRC/EDH/ANC checksum errors in StepTime seconds. If there are any errors, an event is added to the event log, and the sequence pauses with a message to continue or abort. If the SDI input signal is missing, this is treated as an error.
CHECK_AP_CRC	Check for changes to the active picture CRC value in StepTime seconds. An event is added to the event log.
PROMPT	This will put a short prompt on screen in a dialog asking the operator a question, and waiting for OK to be pressed, to continue. The time field is ignored, and the parameter following is the text displayed.
CLEARLOG	This clears the Event Log
DISABLEEVT	This disables Event logging
ENABLEEVT	This enables Event logging
CLEARERRORS	This clears all error counts (EDH/CRC etc.)
LOGCOMMENT	Add the specified comment to the log file – useful to document the stage in the test process
PAUSE	Pause for the specified number of seconds to allow another process such as loading test patterns to complete.
SAVESTATUS	Save the current system status as an XML file.
SAVEIMAGE	Save the selected image as a bitmap file in the current scripts directory. Filename must be specified.

SELECTTAB	Show the selected tab to allow the user to view something.
SEL_USER	Select user – users are comma separated
CHECK_EYE	Checks that the eye amplitude, overshoot, undershoot, rise/fall, and difference between rise and fall times are within the SMPTE specifications for the time period specified.
CHECK_JITTER	Checks that the jitter levels are under those set in the logging jitter threshold fields for the time period specified. See the “Logging - Log Setup” section in chapter 2 for further details.
CHECK_METER_OFF_LEVEL	This action checks that the level for any visible meters is at the level set by the meter scale. This level may be -18dB or -20dB. If the level is over 1 dB greater or less than that value, an error will be inserted in the log and report files. If any groups are missing, these will be ignored by the test. Testing may be limited to specified audio pairs as set up on the Log Setup page.
CHECK_METERS_OFF	This action checks that the level for any visible meters is below -70dB. If the level is above that value, an error will be inserted in the log and report files. If any groups are missing, these will be ignored by the test. Testing may be limited to specified audio pairs as set up on the Log Setup page.
CHECK_AES_INP	This action checks that the AES input signal is present and has no errors for the specified time period.

Creating Command Scripts

To create a new script:

1. Select the ‘New’ button. This will create a blank script with the title “NewScript1”. Select this title in the name edit field and a keyboard will be displayed. Enter the title you require and then select OK to save this title.
2. Select the ‘Add Step’ function to add a step to the Script. The first step in the script will be displayed in the ‘Step’ editor window. Use the ‘Edit Step’ section to select the required ‘Step Action’.
3. Select the Add Step function to add a new step to the Script. This will add a new step directly below currently highlighted Step in the Step editor window.

Editing Command Scripts

To rename a script, select the script from the ‘Current Script’ drop-down, select this name in the name edit field, enter the title you require, and then select OK to save this title.

To change the order of the steps within the script, highlight the step to be reordered and then use the ‘Move Step’ Up/Down functions.

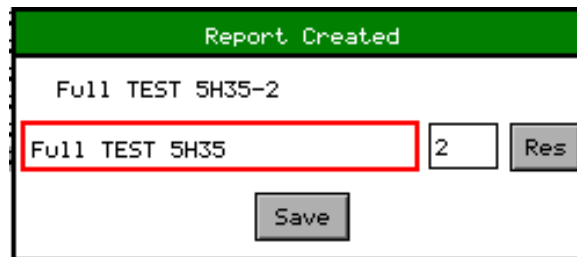
Unwanted steps can be removed by highlighting them and then selecting the ‘Delete Step’ function.

An unwanted Command Script can be deleted by selecting the script (to make it the current script) and then selecting the Delete function.

Running a Script

To run an existing Command Script, select it so that it is the Current Script, and then select the Run function.

- Loop If the 'Forever' checkbox is selected, the Command Script will run repeatedly until it is stopped. If the checkbox is not set, the number of repeats can be set.
- Stop on Error If the 'Stop on Error' checkbox is selected, the script will stop if an error is encountered.
- Make Report If the 'Make Report' checkbox is selected, a report will be generated with the results of the Command Script when it is run.

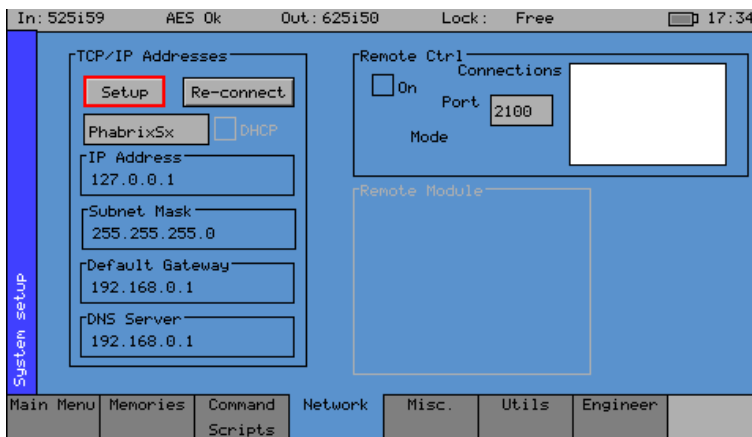


When the report is created, its title can be edited by selecting the title and using the keypad.

The report can also be numbered automatically using the auto-increment value, to the right of the report title. Subsequent reports will use the same title, but with an incremented number suffix.

The Res (reset) button can be used to reset the number to 1.

Network



PHABRIX Sx is fully network compatible and has a complete network interface to allow control of any Sx instrument from external computers on the network.

The Network menu allows the Sx instrument to be configured as part of a network.



Note that if the Sx 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 autosenses whether it has to swap the cable over, which means that you can use any Ethernet cable with the Sx instrument, but it also requires the Ethernet connection to be present when starting up.

If the DHCP checkbox is enabled, then the Sx 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 the network.

If your network has 'static' (nonchanging) 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. Select the 'Setup' button to edit the settings. These details can then be entered in the corresponding boxes in the menu. Note that if the DHCP checkbox is enabled, these values will not be editable. Select each numeric box in turn, and use the up and down cursors to pick the required value.

When the IP Address, Subnet Mask, Default Gateway and DNS Server values have been set up, use the 'Re-connect' button to attach the Sx instrument to the network.

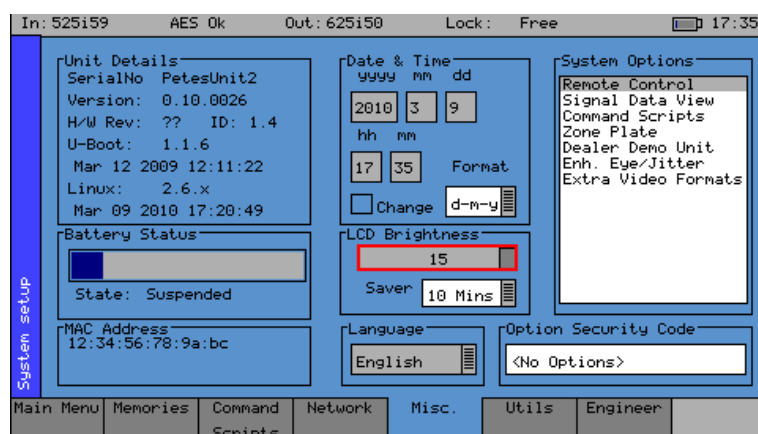
Remote Automation Control of Sx Instrument (PHSXOR)

To allow remote control of an Sx instrument for automation, you must have set, the TCP/IP address of the instrument, and the 'Remote Ctrl' 'On' checkbox 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 Sx instrument uses a default Port number of 2100 for remote control access. (See Remote Control SDK documentation on the Support -> Software Downloads -> PHABRIX Utilities section of the PHABRIX website.) This port number may now be changed if it conflicts with other applications in your system.

Misc.



The Misc. menu shows serial numbers, Sx instrument MAC address, version information, and battery state. 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.

Changing the Date/Time

Check the 'Change' checkbox under the Date & Time fields and then use the cursor to modify the date and time. Press 'OK' to edit a field, and again to complete the change. When all fields have been edited, uncheck the 'Change' checkbox, 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: Day-Month-Year (d-m-y), Month-Day-Year (m-d-y), and Year-Month-Day (y-m-d).

Setting LCD Brightness

Use the 'LCD Brightness' slider to set the LCD brightness. Using a lower brightness will reduce the current drawn from the battery, and thus lengthen battery life.

Setting Screensaver Mode

When the unit is battery-powered, the screensaver will operate after a user-defined time period, and reduce the LCD brightness down to its lowest level. This will lengthen battery life. Pressing any key will restore the previously set LCD brightness. The screensaver start time for when the screen is not in use, can be adjusted in the 'Saver' drop-down menu.

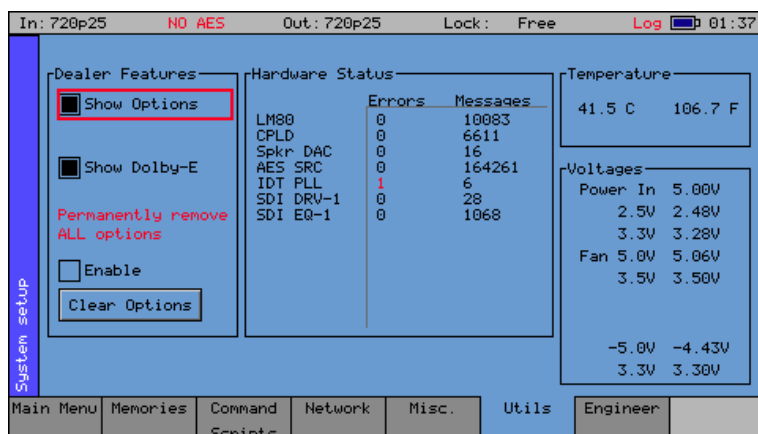
Setting User Language

The language used to display the menus in may be changed to one of the supported languages in the 'Language' drop-down menu. (Currently only English is supported.)

Changing Options Security Code

When new options are purchased for the Sx instrument, a new Security Code will be supplied. This is specific to the unit and cannot be used on other units. The security code is entered using the 'Option Security Code' edit field below the 'System Options' list, and is edited by pressing OK and then using the keypad and function buttons. If an incorrect Security code is entered, a dialog 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 of memories and system settings.

Utils



The Utils menu displays details of the Sx instrument's operating status, and details the temperature and individual voltages. This menu also allows you to disable selected options.

Dealer Features

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

Show Options

This checkbox, if selected, will enable all the available options throughout the menu system. (Options can be enabled/disabled on an individually basis below this.)

Enable

This checkbox, if selected, makes the 'Clear Options' button available.

Clear Options

This function, when pressed, will permanently remove the selected options from the Sx instrument.

Hardware Status

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

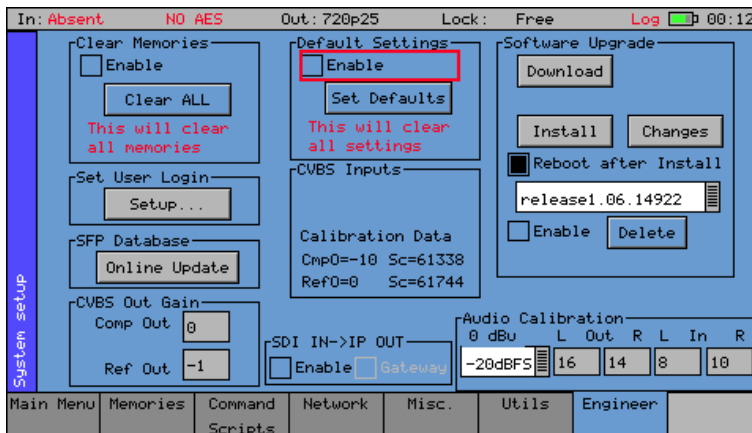
System Temperature

The 'Temperature' section of the menu displays the current Sx 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 'Voltages' section of the menu. This information is provided for diagnostics purposes only.

Engineer



The Engineer menu is used to manage the Sx TAG, and among other things allows user access to be setup, and the installation of new versions of software.

Clear Memories

This section of the menu allows the defined users who can access the Sx instrument to be cleared. To use this function, select the 'Enable' checkbox and press the 'Clear ALL' button. All of the user's memories will be deleted.

Default Settings

This section of the menu allows you to reset the Sx instrument back to its default settings. To do this, select the 'Enable' checkbox 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.

SDI In - SFP Out

If an appropriate SFP output module is installed, the 'Loop' checkbox in the "SDI IN -> SFP OUT" section of the Engineer menu, allows the video signal on the 'SDI In' BNC to be looped through to the SFP Output connector. In this mode the Generator menu will be disabled.

Select 'Enable' followed by 'Loop' to select this mode of operation.

For a transceiver SFP module, "SDI IN -> SFP OUT" should first be selected from the drop-down menu.



For this mode of operation, make sure that the SDI BNC in Main Menu is set to 'SDI In'.

SFP In - SDI Out

If an appropriate SFP input module is installed, the 'Loop' checkbox in the "SFP IN -> SDI OUT" section of the Engineer menu, allows the video signal on the SFP Input connector to be looped through to the 'SDI Out' BNC. In this mode the Generator menu will be disabled.

Select 'Enable' followed by 'Loop' to select this mode of operation.

For a transceiver SFP module, "SFP IN -> SDI OUT" should first be selected from the drop-down menu.



For this mode of operation, make sure that the SDI BNC in Main Menu is set to 'SDI Out'.

Gateway Mode

Gateway mode is an important system feature of the Sx TAG IP that provides a convenient bridge between IP and SDI.

When Gateway mode is enabled, all instrument sources are locked to 'In1' and are greyed out.

Encap: SDI In - IP Out

If the PHABRIX IP SFP module (PHSFP-10SR-IP) is installed in 'Encap' mode, the 'Gateway' checkbox in the "SDI IN -> IP OUT" section of the Engineer menu, allows the video signal on the 'SDI In' BNC to be looped through to the 'IP Out' SFP connector. In this SDI-to-IP conversion mode, the Generator menu will be disabled.

Select 'Enable' followed by 'Gateway' to select this mode of operation.



For this mode of operation, first make sure that the SDI BNC in Main Menu is set to 'SDI In'.

Note that the 'Output – SFP' checkbox in the 'Generator – Video Out' menu, is tied to the 'Flow Enable' checkbox in the '2022-6 Encap' menu, and can be used to enable or disable the flow.

Decap: IP In - SDI Out

If the PHABRIX IP SFP module (PHSFP-10SR-IP) is installed in 'Decap' mode, the 'Gateway' checkbox in the "IP IN -> SDI OUT" section of the Engineer menu, allows the video signal on the 'IP In' SFP connector to be looped through to the 'SDI Out' BNC. In this IP-to-SDI conversion mode, the Generator menu will be disabled.

Select 'Enable' followed by 'Gateway' to select this mode of operation.



For this mode of operation, first make sure that the SDI BNC in Main Menu is set to 'SDI Out'.

Note that the 'Output – SDI' checkbox in the 'Generator – Video Out' menu, is tied to the SDI I/O control in Manu Menu. These can be used to enable or disable the SDI output.

SFP Database

This function allows the Sx TAG to download SFP Database updates for new SFPs that are not yet recognized by the unit.

When an SFP module type unknown to the unit is inserted, a prompt window will state that the SFP is not recognized, will display the vendor ID and SFP type, and tell the user to contact PHABRIX Support.

Contact PHABRIX Support with the vendor ID and SFP type details.

For an internet connected Sx TAG with the SFP inserted, pressing the 'Online Update' button will prompt the unit to contact the PHABRIX website to check for any updates. This process will be displayed in a prompt box. If a database update for the SFP type is found, the unit will automatically download and install it. The prompt box will indicate once the SFP Database update is complete and the SFP will be ready to use.



Installing a newer version of Sx TAG software will also update the unit to recognize any new SFP types now supported by PHABRIX.

Set User Login

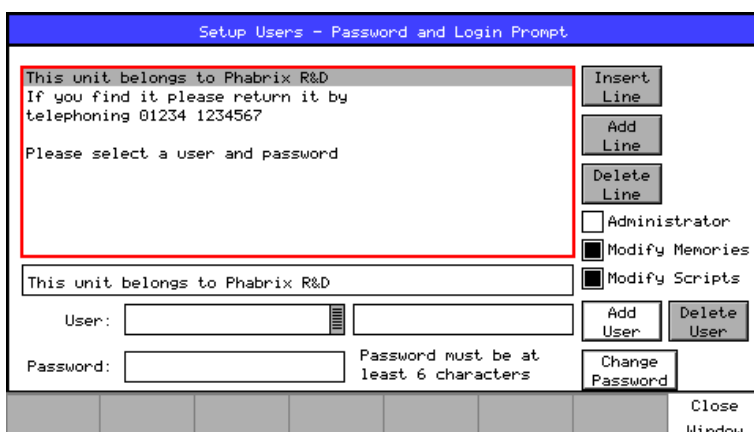
User access can be setup for the Sx instrument by adding users to the system. With User Login enabled, a login screen will be displayed when the Sx instrument is turned ON. This will then require a valid user and password to be entered. Each user has an encrypted password and permissions which may be set.



Using the User Login feature allows the Sx to be protected from unauthorized operation of the Front Panel controls. The prompt feature can allow a message to be displayed so that if the Sx instrument gets lost or stolen, someone finding it knows where to return it.

Adding/Deleting Users

Add a user by entering a new name in the User edit field next to the “Add User” button, and then entering a new password. Once the password is of 6 characters or longer, the “Add User” button will become enabled and may be pressed. Make sure that your password is memorable. If all passwords to an Sx instrument are forgotten, you can contact Phabrix for an override password. Users with administrator permission may add/delete users.



Once user login has been set up on your Sx, a “Log Out” button is added to the Main Menu which causes the login screen to be displayed. This may be used to protect a system’s settings from being modified by other users. The system is still fully running while the login screen is visible.

The permissions are:

Administrator: This user may add/delete users and may also edit the Login prompt text.

Modify Memories: This user may create, save, and delete memories and Archives.

Modify Scripts: This user may create, save, and delete script files (if the command scripting option, PHSXOS, has been purchased)

Each user may modify their own password by entering a new password (6 or more characters) and pressing “Change Password”.

If all users are deleted, the Sx instrument reverts to starting up without a login screen.

Editing the Prompt Text

The simplest way to edit the prompt text, is to FTP a prompt text file onto the Sx instrument. This file should be called “loginprompt.txt” (it MUST be all lowercase). The instrument should then be restarted for the new file to be used.

Users with administrator permissions may also edit the prompt text, by first selecting a line in the prompt text list and pressing the OK button, and then selecting this text in the edit field below; pressing OK once more to reveal an on-screen keyboard for editing it.

Add a new blank line AFTER the selected line by pressing the “Add Line” button.

Insert a new blank line BEFORE the selected line by pressing the “Insert Line” button.

Software Upgrade

This section of the menu allows new software versions to be installed. The Sx instrument may download and install new versions of software when available. This 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 Sx 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 website. This will take a short time dependent on the connection to the Internet. Once the download is complete, the software will be checked for errors before being stored on the Sx instrument for future installation. If the latest software is already present on the Sx instrument, no software will be downloaded and a message will be shown.



Note that the unit should be connected to the AC adaptor so that the battery state does not affect the installation process.

Note that multiple releases of software may be stored on the Sx instrument so a previous release can be reinstalled if required.

2. To install the downloaded software on the Sx instrument, select the release using the field with releases listed. The largest number is the latest release. Select the ‘Install’ button and a confirmation dialog 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 occurs during the installation, retry the installation and/or download. Do NOT turn the Sx instrument off until an installation has completed correctly.

Once the installation is complete, if “Reboot after Install” is checked, the Sx instrument will restart 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.

CVBS Out Gain

This section is used to calibrate the analogue composite and reference video output levels.

These levels are factory set.

CVBS Inputs

This section is used to calibrate the analogue composite and reference video input levels.

These levels are factory set.

Audio Calibration

This section is used to calibrate the balanced audio input and output levels.

These levels are factory set.

The dBFS level with reference to 0 dBu, can be adjusted in the drop-down menu.

Logging Menu

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 Sx TAG 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

In: 720p59		Out: 720p59	Lock: Free	12:46
Time	Date	Event	0 of No Events	
C 12:17:49	29-08-2012	Signal OK state changed: 0■		
E 12:17:49	29-08-2012	Input 1 Std: Absent		
E 12:17:51	29-08-2012	Ref. Unlocked Absent		
C 12:17:53	29-08-2012	RemCtrl: Client Connection		
E 12:17:55	29-08-2012	Ref. Unlocked Inp-1		
E 12:17:55	29-08-2012	Input 1 Std: 1080p25 VCC422-1		
C 12:17:55	29-08-2012	Signal OK state changed: 0■		
C 12:17:55	29-08-2012	Signal OK state changed: 0■		
C 12:17:55	29-08-2012	Signal OK state changed: 0■		
E 12:17:56	29-08-2012	Input 1 Std: Absent		
E 12:17:58	29-08-2012	Ref. Unlocked Absent		
E 12:18:01	29-08-2012	Ref. Unlocked Inp-1		
E 12:18:01	29-08-2012	Input 1 Std: 1080p25 VCC422-1		
C 12:18:01	29-08-2012	Signal OK state changed: 0■		
C 12:18:01	29-08-2012	Signal OK state changed: 0■		
C 12:18:01	29-08-2012	Signal OK state changed: 0■		

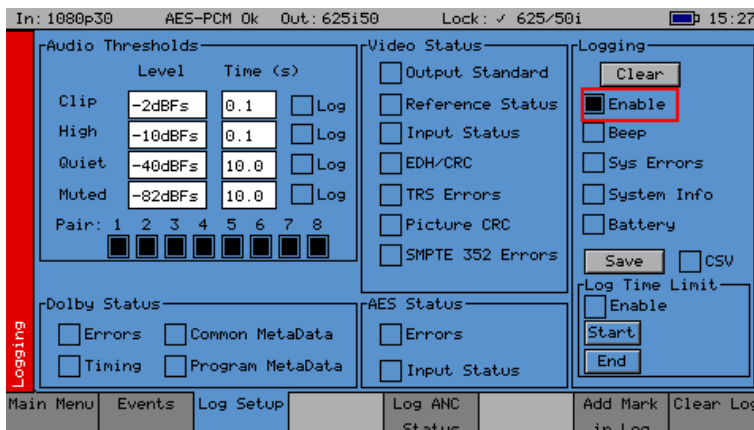
The Events menu displays a list of events, with a timestamp showing when they occurred.

Pressing the OK button on the 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 date format may be changed using the date 'Format' control on the 'System - Misc.' page. The event log may be cleared by pressing the 'Clear Log' button; a dialog box 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. Understanding 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 Sx instrument.

The events to be logged are set up on this page by checking the appropriate 'Log' checkboxes.

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 in the 'Clip' or 'High' fields, for the of 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 in the 'Quiet' or 'Muted' fields, then an 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 an 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 will be logged. If the signal continues 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/Pathological 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 CRC 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 Status (PHSXO-DAG)

This section allows Dolby errors to be logged:

Errors	Will add an event to the event log when a Dolby input stream is detected or lost. An event will also be added if a CRC error is detected in the Dolby metadata stream. If an error is detected in the Dolby stream, it may mean that the Dolby stream has not been synchronized 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 metadata (Program Configuration, Bit Depth, Frame Rates)
Program Metadata	Will log any changed program metadata. This can be useful for following changes to a program stream over a long period of transmission.

SFP

This section allows specific SFP information to be logged:

Status	A log event will be added when a user changes an IP SFP parameter on a 2022-6 Menu. For example, if a user changes the Flow Source IP address, an event log will be added detailing the new IP address. A log event will also be added when there is a change of the video format being processed by the IP SFP.
Pkt Counts(1 Minute)	Log events are added each minute for the sent or received Flow packet count, and the IPv4 Ethernet packet count.

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 for turning off ALL logging temporarily.
Beep	Causes the Sx to 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 Sx, 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 Sx instrument, checking

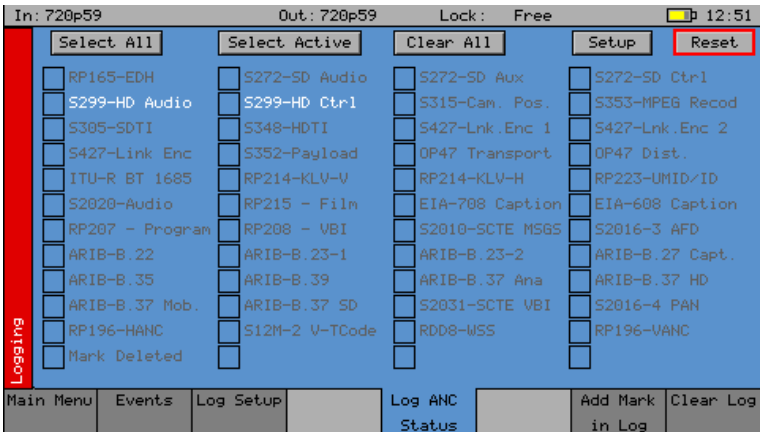
this box can add events that can help PHABRIX determine the nature of the problem.

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 an FTP connection. If the CSV box is checked then a comma separated value file will be created

Log Time Limit

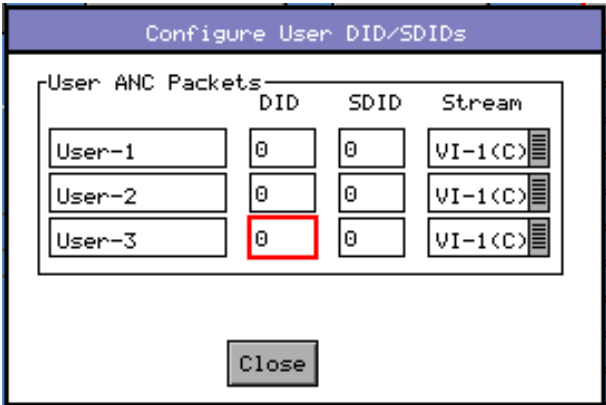
The time when logging is enabled may be limited by time of day. Logging will start at the specified start time and end at the specified end time. The specified times must be after the current time. Uncheck the box to log at all times. Logging must be enabled using the checkbox above for this to work.

Log ANC Status



The Log ANC Status menu allows customization of which ANC packets to log for changes in status (e.g. Present, Checksum Error, Missing, Parity Error). Individual checkboxes are provided to determine which packet DID/SDID combinations are logged.

- Select All Pressing this causes the checkboxes for all packets to be checked.
- Select Active Pressing this causes the checkboxes for all packets currently present to be checked.
- Select All Pressing this causes the checkboxes for all packets to be unchecked.
- Setup This allows the user to define and name their own DID/SDID values for an ANC packet type.

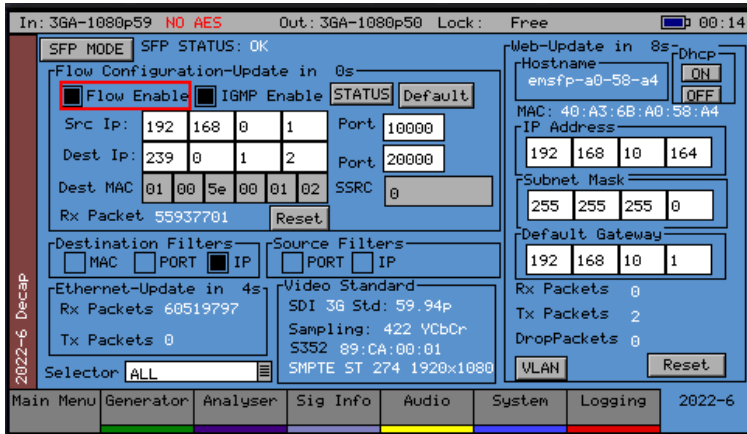


Reset Clears the state for all packet types, and thus a packet that was displayed as previously in error is shown as OK.

2022-6 Menu

Overview

This section covers the two modes available on the Sx TAG for SMPTE 2022-6 IP Encapsulation (transmission), or Decapsulation (reception). The section also includes information on remote management of the IP SFP, and details of the SDI-to-IP and IP-to-SDI Gateway function using the Sx TAG.



If the Sx TAG instrument has the IP 2022-6 License option (PHSXO-IP) installed in conjunction with the PHABRIX IP 2022-6 SFP (PHSFP-10SR-IP), it can transmit or receive 2022-6 IP Flows and convert from SDI-to-IP or IP-to-SDI. See the “System - Engineer” section for details on how to control SDI-to-IP or IP-to-SDI Gateway function.

The 2022-6 menu window contains Flow Configuration, Ethernet, and Video Standard sections related to IP transmission or reception settings on the Sx TAG.

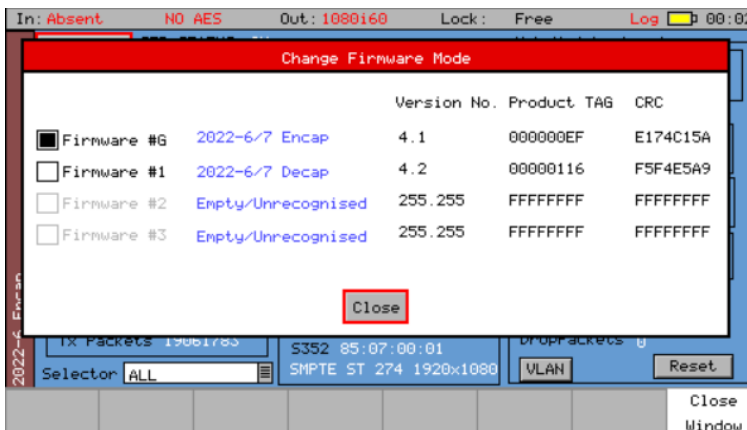
This screen provides both control and a monitor overview of the status of the SFP. When information in a section is being processed (status read or command write), the following status indicators will be displayed: Waiting, Updating, Ns (where N is a countdown in seconds indicating how long before the current update is complete).

The right side of each 2022-6 menu window contains a section called Web, containing the network settings for the control of the SFP. These settings are used for web-browser, JSON, emSET connection and response to ARP enquiries.

SFP MODE

In the top left side of each 2022-6 menu is a button labeled ‘SFP Mode’ that allows selection of the operational mode of the SFP.

To change the operational mode of the IP SFP module in the Sx TAG, from encapsulator to decapsulator (or visa versa) select the SFP Mode button. This will reveal the Change Firmware Mode window.



The current SFP firmware mode will be displayed. To change mode, select the checkbox next to the mode required.

A prompt window will appear asking for confirmation of the mode change request. Select ‘Yes’ to complete change. This change will take about 2 minutes to complete. Select ‘No’ to remain in the current mode.

The SFP is shipped with four firmware slots, of which two are populated. The empty slots are available for future upgrades. Note that the slots are labeled: #G, #1, #2, #3. Slot #G is known as the 'Golden Slot' and cannot be over-written. Only slots #1, #2, and #3 are available for in field upgrade.

SFP Management

If required, the IP SFP can be remotely controlled by JSON controls, via a web browser, and with the custom control available using Embrionix emSET configuration, monitoring and control software available from the Embrionix website.

Each 2022-6 menu provides a section for SFP management.

Hostname Hostname of SFP

MAC SFP MAC address

Dhcp Dynamic Host Configuration

ON – Switch ON, to have the network automatically assign IP address details to the SFP module (in DHCP enabled networks)

OFF – Switch OFF DHCP, in order to manually set web management IP details (IP Address, Subnet Mask, Default Gateway).

Where DHCP is not used, a static IP address for the SFP management will need to be entered manually. Consult your network administrator for a suitable IP Address, Subnet Mask and Default Gateway.

Rx Packets Counter showing the number of management packets received

Tx Packets Counter showing the number of management packets transmitted

DropPackets Counter showing the number of management packets dropped

Reset Resets all management packets counters

VLAN Virtual Local Area Network

It is possible to set VLAN parameters for:

Web Controller Set the SFP Web Controller on a VLAN. Select the checkbox to enable.

Flow: Set Flow traffic (transmitted and received IP video/media packets) on a VLAN

Selecting the VLAN button opens a VLAN ID window.

Set appropriate VLAN ID values, ranging from 0 up to 4095.

Ethernet

Rx Packets	Counter showing the number of Ethernet packets (Flow + wrappers) received
Tx Packets	Counter showing the number of Ethernet packets (Flow + wrappers) transmitted

Selector

The GUI update to the three sections: Flows, Management, and Ethernet, rotates in turn; in a sequence that takes approximately 35 seconds to complete a cycle. If a more frequent status update is required for a particular section, it is possible to select which of the status windows to monitor continuously.

A drop-down window allows the user to activate only one section for updates to the section they choose to monitor:

ALL	Update all packet counters
FLows	Only update Flow packet counters
WEB MANAGEMENT	Only update Web management packet counters
ETHERNET	Only update Ethernet packet counters

Video Standard

Displays the video format currently being processed by the SFP.

SDI	SDI type HD 3G
Std	Standard - Frame rate of current video standard and image scan (progressive or interlaced)
Sampling	Luma/Chroma Sampling ratio and Color format See the “Generator Menu – Video Out – Color Format” section for full list of formats supported
S352	SMPTE 352 Payload ID information in the video output stream

If the video format is not supported, the Video Standard field value will turn red.

Flow Configuration

IP Flow transmission network settings are configured and displayed here. The Sx TAG can be configured for multicast or unicast transmission or reception. The flow configuration settings are outlined below:

Src Ip	Source IP address	This is where the IP address of the source of the Flow is entered or displayed.
Dest Ip	Destination IP address	The IP address of the receive device or multicast group
Dest MAC	Destination MAC address	<p>The MAC address of the receive device or multicast group.</p> <p>In unicast, the TAG recognizes that the Destination IP address is a unicast address and allows the MAC address to be edited.</p> <p>In Multicast the TAG recognizes that the Destination IP address is Multicast. In this case it is essential that the Dest MAC and IP address match. The TAG automatically calculates the MAC address from the IP address and does not allow the Multicast address to be entered separately.</p>
Port	Port Number	Port number for the source and destination IP addresses
SSRC	Synchronization source identifier	<p>This can be set as an identifier for the transmit source. A receiver can then filter for this SSRC and subscribe to the particular transmit source.</p>

2022-6 Encap (PHSXO-IP)

If the Sx TAG instrument has the IP 2022-6 Encap/Decap License option (PHSXO-IP) installed along with the PHABRIX IP 2022-6 SFP (PHSFP-10SR-2022) it can encapsulate a 2022-6 IP Flow.

Encap Flow Control

Flow Enable This checkbox enables IP transmission. It must be selected in order to transmit.



When troubleshooting a transmission issue, ensure that this checkbox has been enabled.

Tx Packet This counter shows the number of transmitted flow packets (not including wrappers)



When troubleshooting, this counter increasing gives an indication that your Sx TAG unit is transmitting video packets

Reset Resets the Tx Packets counters

Default Returns Flow Configuration to default settings

The Sx TAG can be configured for multicast or unicast transmission. The flow configuration settings in each case are outlined below:

Multicast

For Multicast Transmission the required settings will depend on the parameters that destination devices are using to filter the flow. The minimum required is the destination IP address, all other parameters are optional.

Src IP The management IP address is the only address on which the SFP will respond to an ARP request. If you wish to ping or ARP the flow source address, then the Source IP address needs to be set to be the same as this management address.

Src Port Required source port number

Dest IP Enter the Multicast Destination IP address. For Multicast operation this needs to be within the range 224.0.0.0 to 239.255.255.255

Dest MAC This cannot be edited in Multicast operation but is calculated automatically by the TAG

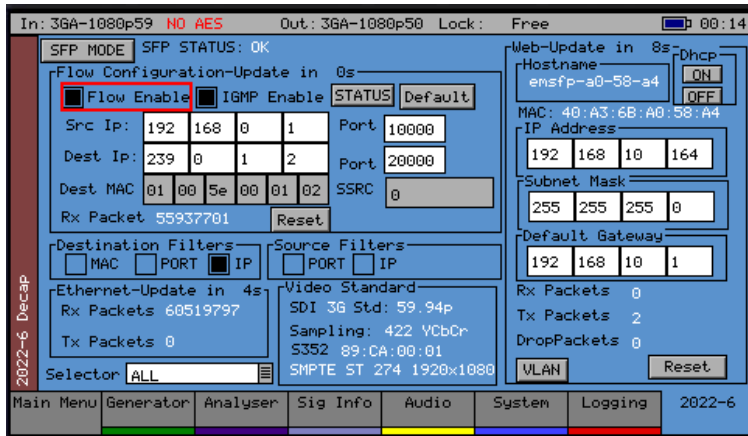
Dest Port Required destination port number

Unicast

For Unicast Transmission the required settings will depend on the parameters that destination devices are using to filter the flow. The minimum required depends on whether you are connecting directly to the target device, or connecting via a Switch with or without IP routing, using a VLAN or connecting via a Router. Typically, the destination MAC address and IP address will be required.

Src IP	The management IP address is the only address on which the SFP will respond to an ARP request. If you wish to ping or ARP the flow source address, then the Source IP address needs to be set to be the same as this management address.
Src Port	Required source port number
Dest IP	Enter the IP address of the destination device
Dest MAC	Enter the MAC address of the next device at the end of the link. Direction connection without a switch: Set to the MAC address of the target device. Indirect connection via switch or a router: This will vary depending on switch or router type and configuration
Dest Port	Required destination port number

2022-6 Decap (PHSXO-IP)



If the Sx TAG instrument has the IP 2022-6 Encap/Decap License option (PHSXO-IP) installed along with the IP 2022-6 SFP (PHSFP-10SR-2022) it can receive a 2022-6 IP flow.

An Sx TAG with an IP SFP in decapsulation mode can be setup to receive an IP 2022-6 flow by configuring the appropriate Flow Configuration and Filters settings in the 2022-6 Decap menu window.

The example above shows configuration for a multicast flow. The Sx TAG can be set up for multicast or unicast reception. The configuration settings in each case are outlined below.

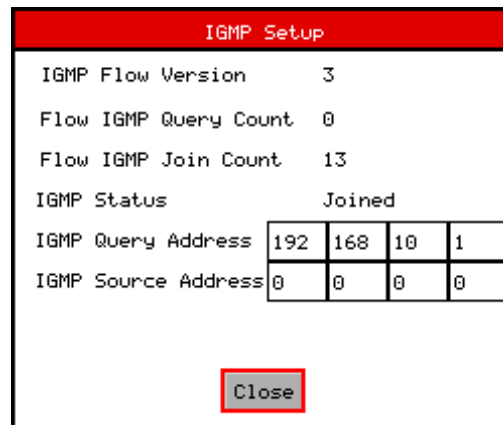
Decap Flow Control

Flow Enable This checkbox enables IP reception. It must be selected in order to issue an IGMP request, and enable the flow. The IGMP Enable flag is slaved to Flow Enable and cannot be set independently.



When troubleshooting a reception issue, ensure that this checkbox has been enabled.

STATUS Displays IGMP status information



Rx Packet This counter shows the number of received flow packets (not including wrappers)



When troubleshooting, this counter increasing gives an indication that your Sx TAG unit is receiving IP packets

Reset Resets the Rx Packets counters

Default Returns Flow Configuration to default settings

Filters

The key thing is to set appropriate filters to pick up your desired transmission.

There are 5 available Filters checkboxes that can be chosen either individually, or in any combination to filter the choice of flow.

Where multiple incoming streams share some of the same parameters (as in the case of transmission sources on the same multicast), the appropriate filters e.g. port number, can be set on the receive Sx TAG to select the correct stream for decapsulation.

The following filters are available:

Destination Filters

MAC	to filter on Destination MAC Address
PORT	to filter on Destination Port Number
IP	to filter on Destination IP Address

Source Filters

PORT	to filter on Source Port Number
IP	to filter on Source IP Address

Multicast

For Multicast Reception the required settings will depend on the parameters that are being used to filter the flow. The minimum required is the destination IP address, all other parameters are optional.

Src IP	If you wish to ping or ARP the flow source address, then the Source IP address needs to be set to be the same as this management address.
Src Port	Required source port number
Dest IP	Enter the Multicast Destination IP address. For Multicast operation This needs to be within the range 224.0.0.0 to 239.255.255.255
Dest MAC	This cannot be edited in Multicast operation but is calculated automatically by the Sx TAG
Dest Port	Required destination port number

Unicast

For Unicast Reception the required settings will depend on the parameters that are being used to filter the flow. The minimum typically requires the source MAC address and IP address.

Src IP	The IP address of the source device
Src Port	Required source port number
Dest IP	Enter the management IP address (this is the address from which the Sx TAG SFP will respond to an ARP query).
Dest MAC	Enter the management MAC address of the SFP. This can be found in the management section of the GUI, under hostname.
Dest Port	Required destination port number
Default	Returns Flow Configuration to default settings

Menu Reference



PHABRIX® A Glossary

Glossary

Glossary of Terms

2K-SDI	2K digital cinema can be transmitted via SDI as defined in the SMPTE ST 2048-2:2011 standard ("2048 x 1080 Digital Cinematography Production Image FS/709 Formatting for Serial Digital Interface") and SMPTE 428-9 (D-Cinema Distribution Master - Image Pixel Structure Level 3 - Serial Digital Interface Signal Formatting).
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).
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.
AES Eye	This is the facility unique to the Sx TAG that allows the AES waveform to be displayed as an Eye Pattern and allows the AES signal locking to be checked.
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.
DID	(Data ID) is part of the Ancillary Data that is transmitted with the SDI data.
Dolby Digital	(AC-3) is a 'perceptual audio' system for digital audio that allows the reduction of data needs to deliver high-quality sound. This system was developed primarily for DTV, DVD and HDTV.
Dolby Digital Plus	(E-AC-3) is a more advanced version of Dolby Digital that provides a more efficient encoding algorithm that provides enough bandwidth that allows up to 20 channels of audio (for a primary program (Program 1) and optional ancillary programs that can be delivered at much lower bit rates than Dolby Digital.
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.
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.
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.
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.
MSA (SFP)	(multi-source agreement) is an industry agreed connection system for small form-factor pluggable package fiber optic connection for a range of communication and video transport formats employing a Datacom Pinout.
Navigation Buttons	These are the up, down, left, right arrow buttons available on the Sx and Rx Ranges.
Non-MSA (SFP)	This is an SD-SDI, HD-SDI and 3G-SDI small form-factor pluggable package, for fiber video connection, which provides an SDI output employing a Video Pinout. SMPTE 297-2006 compatible.
OLED	Organic Light-Emitting Diode
PHABRIX Rx 500	is a 1U height half rack mount Rasterizer 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, analyzer and monitor supporting AES audio.
PHABRIX SxD	is a 3G-SDI, HD-SDI and SD-SDI handheld SDI test signal generator, analyzer and monitor supporting dual link.
PHABRIX SxE	is a 3G-SDI, HD-SDI and SD-SDI handheld SDI test signal generator, analyzer and monitor supporting eye and jitter measurement.
PHABRIX Sx TAG	Configured as an entry level portable analyzer, the TAG can be easily upgraded using a range of software options to provide a sophisticated instrument for testing broadcast infrastructures.
Preset Buttons	These are the set of 8 buttons below the Video Confidence display on the Rx 2000 that are used to select predefined inputs for display.
PSU	Power Supply Unit

SDI	(Serial Digital Interface) capable of transferring SD or HD broadcast video and broadcast audio between compatible devices.
SDI <-> IP Gateway	This feature of the Sx TAG IP provides a convenient bridge between IP and SDI, bypassing the Generator. In Encap mode it routes the signal on the SDI I/O connector – which is configured as an SDI input, to the input of the IP SFP. In Decap mode the output of the IP SFP is routed to the SDI I/O connector – which is configured as an SDI output.
SFP	Small form-factor pluggable package typically providing fiber optic connection and employing an MSA Datacom Pinout or a Non-MSA Video Pinout
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.

Glossary



PHABRIX®

B Specification

Sx TAG Instrument

Operating Environment

Operating Temperature 0-40 °C

Operating Humidity <85% RH (no condensation)

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°C Centigrade a warning dialogue will be given. If the temperature rises above 65°C Centigrade the unit will be turned OFF.

Under both conditions, an event will be added to the event log to show what happened.

Expected Behavior

LCD Monitor

The LCD may have some pixels that are always turned ON or always turned OFF. This is normal and should not affect normal operation.

LCD Flicker

The unit supports many video standards. The input SDI signal is displayed asynchronously and may flicker on the waveform display or picture display. The unit stores the input SDI signal internally, and then reads the internal frame using the LCD sync signal, which is asynchronous to the input SDI signal. LCD flickering may occur if a frame is skipped or repeated.

Remote Network Operation

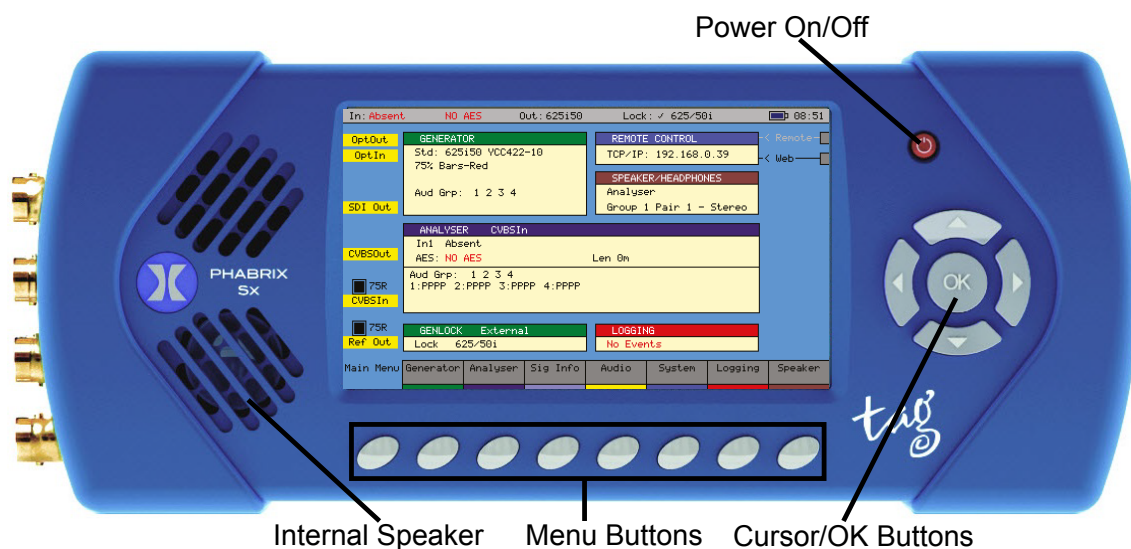
Remote network operation is only guaranteed when connected to a local machine.

Dimensions

Dimensions 230 (L) x 93(H) x 45(D) mm

Weight 2kg

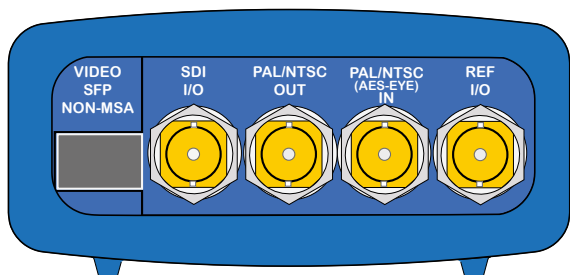
Front Panel



The front panel provides access to the TFT Display and menu system.

Display Type	4.3 inch TFT color
Display Format	480 x 272 24 bits
Backlight	Variable brightness
Screen Saver	Reduces brightness after user adjustable time.

BNC Panel



The Sx TAG BNC panel provide the following connections.

SDI I/O

This connection is a bidirectional SDI interface. The Sx TAG can work as Analyzer or Generator but not both at the same time.

When working as an Analyzer this connector functions as follows:

Supported Standards	SD-SDI or HD-SDI. See Supported formats
Connector	BNC 75Ω type
Input Impedance	75 ohm terminated
Input Return Loss	> = 15dB (5MHz to serial clock frequency)
Maximum Input Voltage	+/- 2V

When working as a Generator this connector functions as follows:

Supported standards	SD-SDI or HD-SDI. See Supported formats
Connector	BNC 75Ω type
Output Impedance	75 ohm terminated
Output Level	+/- 400mV

PAL/NTSC Out

Supported Standards	PAL-I, PAL-M, PAL-N, NTSC
Connector	BNC 75Ω type
Output Impedance	75 ohm terminated
Output Level	1V into 75Ω
Frequency Response	DC to 5.8Mhz $\pm 1\%$
Waveform Accuracy	$< 1\%$
Vector Accuracy	$\pm 1^\circ$

PAL/NTSC (AES Eye) IN

Supported Standards	PAL-I, PAL-M, PAL-N, NTSC
Connector	BNC 75Ω type
Input Impedance	75 ohm terminated
Input Return Loss	$> = 35\text{dB}$ (100Hz to 10MHz)
Maximum Input Voltage	+/- 2V

REF I/O

The Ref I/O connection is bidirectional. When operating as a reference input it has the following characteristics:

Label	REF I/O
Input Signal	Tri-level or Bi-Level (black burst) syncs 50/59.94/60Hz
Connector	BNC 75Ω type
Input Impedance	75 ohm terminated
Maximum Input Voltage	+/- 2V
Specification	Tri-level syncs (SMPTE274M and SMPTE296M) 600 mV pk-pk PAL Black Burst (ITU624-4/SMPTE318) 1V pk-pk, Composite NTSC (SMPTE 170M) 1V pk-pk

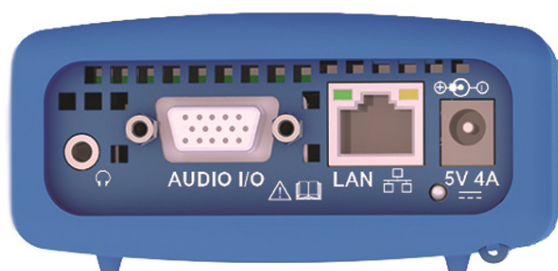
When operating as a reference output it has the following characteristics:

Supported Standards	PAL-I, PAL-M, PAL-N, NTSC
Connector	BNC 75Ω type
Output Impedance	75 ohm terminated
Output Level	1V into 75Ω
Frequency Response	DC to 5.8Mhz $\pm 1\%$
Waveform Accuracy	$< 1\%$
Vector Accuracy	$\pm 1^\circ$

SFP Cage (Option)

Interface	Single Tx, Single Rx or Transceiver
Module Types	Non-MSA Video Pinout conforming to SMPTE 297-2006 Supporting Fiber SD-SDI, HD-SDI and 3G-SDI PHRXM-OPTAG (G02929-31CM) Transceiver (See www.phabrix.com for supported modules)

Control Panel



The Sx TAG Control panel provide the following connections.

Power Connection

Voltage	5V +/- 5%. (DC Power adapter provided)
Power Requirements	AC 90-250V 50/60Hz 10W max

Networking

Ethernet	IEEE802.3 10/100Mb/s (10/100-base-T connection)
Ethernet Connector	RJ45
Purpose	Browser control of instrument and FTP access to system files and allowing the instrument to be connected into a network and accessed via TCP/IP so that it can be controlled remotely.

Audio I/O Connector

Connector Type	15-way D-type, High Density, Female
1	Analog balanced audio input Left +
2	Analog balanced audio input Right +
3	Analog balanced audio output Left +
4	Analog balanced audio output Right +
5	AES Audio Input
6	0V analog
7	0V analog
8	0V analog
9	0V analog
10	0V AES
11	Analog balanced audio input Left -
12	Analog balanced audio input Right -
13	Analog balanced audio output Left -
14	Analog balanced audio output Right +
15	AES Audio Output

Analog Balanced Audio Input (15-Way Connector)

Input Impedance	10K ohm terminated
Input Type	Differential, AC coupled
Frequency Response	50Hz to 18kHz $\pm 1\%$
Maximum Input Voltage	?V at 0dBfs

Analog Balanced Audio Output (15-Way Connector)

Output Impedance	10K ohm terminated
Output Type	Differential, AC coupled
Frequency Response	50Hz to 18kHz $\pm 2\%$
Maximum Output	?V at 0dBfs

Analyzer AES Input (15-Way Connector)

Input Impedance	75 ohm 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

Generator AES Output (15-Way Connector)

Input Impedance	75 ohm terminated
Output Voltage	1V
Sample Rates	48kHz
Specification	Conforming to AES3-2003 and SMPTE-276M

Headphone Output

Connector	Miniature 3.5mm Stereo Jack
Level	Adjustable
Purpose	Local monitoring of audio

Local Control

USB	USB 1
USB Connector	Mini A/B
Purpose	Software installation

Supported Video Formats

SD 270 Mb/s

Standard	Resolution	Color 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	Color 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	Color 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	Color 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

2K-SDI Formats (part of PHSXO-3GADV Option)

Standard	Resolution	Color Space	Rate
SMPTE ST 2048-2	2048 x 1080	4:2:2 (Y'C'B'C'R) 10 bit	60.00, 60/1.001, 50, 48 and 48/1.001 P
SMPTE ST 2048-2	2048 x 1080	4:4:4 (Y'C'B'C'R) 10 bit	30, 30/1.001, 25, 24 and 24/1.001 PsF
SMPTE ST 2048-2	2048 x 1080	4:4:4 (Y'C'B'C'R + A) 10 bit	30, 30/1.001, 25, 24 and 24/1.001 PsF
SMPTE ST 2048-2	2048 x 1080	4:4:4 (R'G'B') 12-bit	30, 30/1.001, 25, 24 and 24/1.001 P
SMPTE ST 2048-2	2048 x 1080	4:4:4 (Y'C'B'C'R + A) 12 bit	30, 30/1.001, 25, 24 and 24/1.001 P
SMPTE ST 2048-2	2048 x 1080	4:4:4 (R'G'B') 12-bit	30, 30/1.001, 25, 24 and 24/1.001 PsF
SMPTE ST 2048-2	2048 x 1080	4:4:4 (Y'C'B'C'R + A) 12 bit	30, 30/1.001, 25, 24 and 24/1.001 PsF
SMPTE ST 2048-2	2048 x 1080	4:2:2 (Y'C'B'C'R) 12 bit	30, 30/1.001, 25, 24 and 24/1.001 P
SMPTE ST 2048-2	2048 x 1080	4:2:2 (Y'C'B'C'R + A) 12 bit	30, 30/1.001, 25, 24 and 24/1.001 P
SMPTE ST 2048-2	2048 x 1080	4:2:2 (Y'C'B'C'R) 12 bit	30, 30/1.001, 25, 24 and 24/1.001 PsF
SMPTE ST 2048-2	2048 x 1080	4:2:2 (Y'C'B'C'R + A) 12 bit	30, 30/1.001, 25, 24 and 24/1.001 PsF
SMPTE ST 428-9	2048 x 1080	4:4:4 (X'Y'Z') 12-bit	24 and 24/1.001P
SMPTE ST 428-9	2048 x 1080	4:4:4 (X'Y'Z') 12-bit	24 and 24/1.001Psf
SMPTE ST 428-19	2048 x 1080	4:4:4 (X'Y'Z') 12-bit	25, 30 and 30/1.001 P
SMPTE ST 428-19	2048 x 1080	4:4:4 (X'Y'Z') 12-bit	25, 30 and 30/1.001 Psf



PHABRIX®

C Maintenance

Maintenance

Warranty

Overview

The Sx range benefits from a 1 year warranty including telephone and email support.

3 and 5 year warranties are available at additional cost.

Each Sx leaves our UK factory with its own unique list of quality-controlled settings which are recorded by our manufacturing department. Should the Sx 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 within 3 months ensures a further year of support.

Maintenance

Maintenance

General Maintenance

The Sx instruments have been designed to need minimum maintenance. The use of low power components means that there is no need for large amounts of cooling and therefore there are no 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 Sx instrument please take the following precautions:

Install the Sx 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 they 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 Sx instrument, i.e. 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 Sx instrument using 2 different techniques that take into account the location of the Sx instrument, the type of network access that the Sx instrument has and your company's IT policy.

Note that during the installation process the instrument will not be available for use.



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 a new version of software.

Software Download from Internet

Using the Sx instrument's LCD screen (access via a web browser - see chapter 1 for details), and the Sx instrument has Internet network access, you can download and install directly into the Sx 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 the 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 website.

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 Sx instrument, no software will be downloaded and a message will be shown.



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

3. To install the downloaded software on the Sx 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 completed, 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.



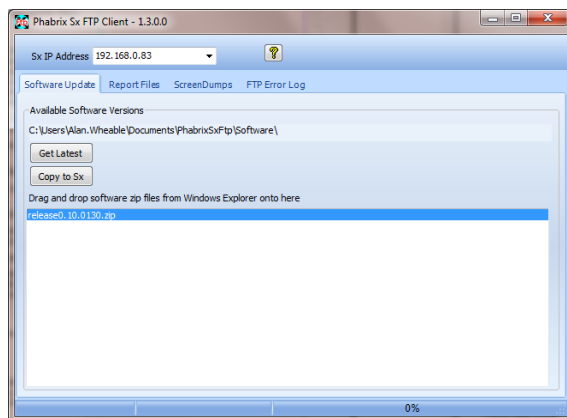
Note that as part of the installation procedure, all memories are archived to a backup file and then deleted. They can be restored from the System-Memories page using the Restore button and selecting the '_Before_Upgrade' archive.

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 Sx instrument does not have Internet access, you can transfer the software files directly to the Sx instrument's Setup folder using the PHABRIX FTP client:

1. Download the latest Sx software version from the PHABRIX website then drag the zip file to the PHABRIX FTP client (also available from the PHABRIX website).



To connect to the instrument you will need to use the PHABRIX FTP client available from the PHABRIX website. This connects to the Sx unit using unit's IP address (as host name) with:

Username "sxuser"

Password: "phabrixsx"

2. In the PHABRIX FTP client enter the IP address of the Sx unit to be updated.



Note: If a static IP address has been assigned to your Sx unit, be sure also to set a valid default gateway address. Contact your network administrator for these. If connecting directly between the Sx and your PC, you must set the default gateway to the IP address of your PC. See 'System – Network' section in chapter 2 for details on how to configure network settings on the Sx.

3. In the PHABRIX FTP client select the zip file for the new software and press the 'Copy to Sx' button.

This will copy the new software files to the Sx instrument's 'Setup' folder, updating the existing files as necessary. This can take up to 20 minutes depending on the connection speed.

4. Once the PHABRIX FTP client has finished copying the files to the Sx unit, use 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. The progress will be indicated on screen.

During this time the software will be decompressed, files will be extracted and the hardware (FPGA) will be reprogrammed. If an error is given during the installation, retry the installation and/or download. Do NOT turn the unit off until an installation has completed correctly.

Reverting to an Earlier Version of Software

If you need to revert to an earlier version of software:

1. Using the 'System - Engineer' menu find the version of software you require in the 'Software Upgrade' section of the menu then select 'Install'.
2. Wait for the new software to be installed. The progress will be indicated on the front panel screen and on the Monitor output.
3. During this time the software will be decompressed, files will be extracted and the hardware (FPGA) 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.

Sx File Structure

The Sx instrument uses Linux as its operating system and a number of directories within the file system are provided for user-specific files.

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 color type (rgb/yuv) for the directory that they are in or else they will be converted and may lose color 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 centered 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 File Formats - 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.



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