X1200 Series Routers

Instruction Manual

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INFORMATION TO USERS IN EUROPE

NOTE

CISPR 22 CLASS A DIGITAL DEVICE OR PERIPHERAL

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

INFORMATION TO USERS IN THE U.S.A.

NOTE

FCC CLASS A DIGITAL DEVICE OR PERIPHERAL

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

Changes or Modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment.

Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must be used

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	Original Version	Oct 01
1.1	Changes for X1201 routers and SoftSwitch™ routers	Jan 02
1.2	More descriptions added re SoftSwitch™ timing set-ups, Chapter 7 added	Jan 02
1.2.1	Corrections to table 2-2, 2-4 and 2-5, Table 2-6 Added	Feb 02
1.2.2	Features current for firmware version 1.1 build 23 Added *Input Label File* menu item for uploading Label Text files	May 02
1.3	Added information about Embedded SoftSwitch™ Added information about SoftSwitch™ on HD routers	Jan 03
1.3.1	Added clarification of Video switch line for HD routers	Feb 03
1.3.2	Changed Block diagrams, added diagrams for Embedded SoftSwitch™	Feb 03
1.3.3	Added SMPTE 310M in non-reclock modes for HD versions	Feb 05
1.3.4	Added information on installation and setup	May 08

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CHAPTER 1: OVERVIEW

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1. OVERVIEW

The X1200 series twelve input routing switchers provide a convenient, low cost way to route Standard and High definition serial digital signals. The X1200S routers are used for 270, 360 & 540Mb/s standard definition serial digital signals, while the X1200H routers are used for 1.5Gb/s HDTV serial digital signals.

The router is available in video only or video with AES configurations. The X1202S-AES and X1202H-AES units come with 2 levels of AES audio routing for each of the two video buses. The X1202S-AES4 and X1202H-AES4 units come with 4 levels of AES audio routing for each of the two video buses. The X1201 routers have only one video bus and similar audio configurations. The AES output buses can be used in an audio follow video mode, or can be broken away from their associated video bus. Table 1-1 shows the model numbers of the basic routers and the capabilities of each.

Model	Video		Audio	
			Configuration	Breakout Panels
X1201S	SDI	12 x 1	None	0
X1201S-AES	SDI	12 x 1	2 12 x 1	1
X1201S-AES4	SDI	12 x 1	4 12 x 1	2
X1202S	SDI	12 x 2	None	0
X1202S-AES	SDI	12 x 2	2 12 x 2	1
X1202S-AES4	SDI	12 x 2	4 12 x 2	2
X1201H	HD	12 x 1	None	0
X1201H-AES	HD	12 x 1	2 12 x 2	1
X1201H-AES4	HD	12 x 1	4 12 x 2	2
X1202H	HD	12 x 2	None	0
X1202H-AES	HD	12 x 2	2 12 x 2	1**
X1202H-AES4	HD	12 x 2	4 12 x 2	2

Table 1-1: Basic Router Models and Features

**Some early versions of the X1202H-AES models were shipped with two audio breakout panels. On these units, the AES audio router sections can also be configured as four 12 x 1 AES audio buses. (The assignment of which mode the AES section of the router operates and which AES buses are associated to the Video buses is programmable from the *Setup* menu.)

The router electronics is housed in a 1RU rack mount frame with breakout panels for the audio connections. The standard router has built-in front panel controls, but can also be purchased with a rack mount remote control panel that replaces the built-in control panel (RCP version). An additional remote control panel (X1202S-REMOTE or X1202H-REMOTE) can also be ordered for any version. All units can also be controlled by contact closures on the GPI control port or through the RS-232 serial remote control port using industry standard switcher protocols.

The SoftSwitch™ versions (referred to as SS versions throughout this manual) of the router have the following additional features. The Video 1 output has adjustable vertical timing with respect to the genlock input, and line synchronizers on the video inputs can accommodate differences in timing up to approximately +/- one half line for the V1 output. All the AES outputs will have a continuous AES carrier locked to either the video genlock or DARS reference (when the DARS reference is used, Z bit alignment of the AES outputs is also guaranteed). The audio outputs that follow the Video 1 bus use Evertz patent pending SoftSwitch™ technology to eliminate audible pops when switches are performed.

For the SoftSwitch™ technology to function correctly, the audio sources must be synchronous with the chosen *Audio Reference* for the router (see section 3.6.4). Table 1-2 shows the model numbers of the SoftSwitch™ equipped routers and the capabilities of each.

Model	Video		Audio	
			Configuration	Breakout Panels
X1201S+SS	SDI	12 x 1	None	0
X1201S-AES+SS	SDI	12 x 1	2 12 x 1	1
X1201S-AES4+SS	SDI	12 x 1	4 12 x 1	2
X1202S+SS	SDI	12 x 2	None	0
X1202S-AES+SS	SDI	12 x 2	2 12 x 2	1
X1202S-AES4+SS	SDI	12 x 2	4 12 x 2	2
X1201H+HSS	HD	12 x 1	None	0
X1201H-AES+HSS	HD	12 x 1	2 12 x 2	1
X1201H-AES4+HSS	HD	12 x 1	4 12 x 2	2
X1202H+HSS	HD	12 x 2	None	0
X1202H-AES+HSS	HD	12 x 2	2 12 x 2	1**
X1202H-AES4+HSS	HD	12 x 2	4 12 x 2	2

Table 1-2: SoftSwitch™ Router Models

The Embedded SoftSwitch™ (referred to as ESS versions throughout this manual) versions of the router have all the features of the SS versions as well as the following additional features. The embedded audio on the Video 1 bus uses Evertz patent pending SoftSwitch™ technology to eliminate audible pops when switches are performed. For the Embedded SoftSwitch™ technology to function correctly, the AES sources must be synchronous with the *Video Reference* and the *Audio Reference* for the router must be set to *video* (see section 3.6.4). If Embedded SoftSwitch™ functionality is not required (e.g. Dolby E in the embedded stream) then the DARS reference can be used with the AES portions of the router. Table 1-3 shows the model numbers of the Embedded SoftSwitch™ equipped routers and the capabilities of each.

Model	Video		Audio	
			Configuration	Breakout Panels
X1201S+ES	SDI	12 x 1	None	0
X1201S-AES+ES	SDI	12 x 1	2 12 x 1	1
X1201S-AES4+ES	SDI	12 x 1	4 12 x 1	2
X1202S+ES	SDI	12 x 2	None	0
X1202S-AES+ES	SDI	12 x 2	2 12 x 2	1
X1202S-AES4+ES	SDI	12 x 2	4 12 x 2	2
X1201H+HES	HD	12 x 1	None	0
X1201H-AES+HES	HD	12 x 1	2 12 x 2	1
X1201H-AES4+HES	HD	12 x 1	4 12 x 2	2
X1202H+HES	HD	12 x 2	None	0
X1202H-AES+HES	HD	12 x 2	2 12 x 2	1**
X1202H-AES4+HES	HD	12 x 2	4 12 x 2	2

Table 1-3: Embedded SoftSwitch™ Router Models

Features:

- Standard definition units support SMPTE 259M (270Mb/s,360Mb/s,540Mb/s) video signals.
- High definition units support SMPTE 292M (1.5 Gb/s) video signals.
- High definition units can be operated in a non-reclock mode to pass SMPTE 259M and SMPTE 310M video signals.
- Units can be genlocked to an external source so that a “clean switch” can be achieved.
- Auto-timing of V1 bus inputs to perform a clean video switch when SoftSwitch™ or Embedded SoftSwitch™ option is installed.
- Optional SoftSwitch™ technology eliminates hot-switch audio pops on AES outputs following V1 bus.
- Optional Embedded SoftSwitch™ technology eliminates hot-switch audio pops on embedded audio on V1 bus.
- With embedded SoftSwitch™ option, SoftSwitch™ is performed on all 4 audio groups.
- Switch point is fully controllable from the front panel.
- Video input presence detection displayable on the front panel.
- Front panel or remote control panel versions available. Second control panel can be ordered for either version.
- Parallel GPI and RS-232 serial control.
- Programmable source input names available on the front panel.
- Optional video and audio input relay bypass for power failure bypass protection.
- Optional dual power supplies.
- Field upgradeable firmware as new features become available.

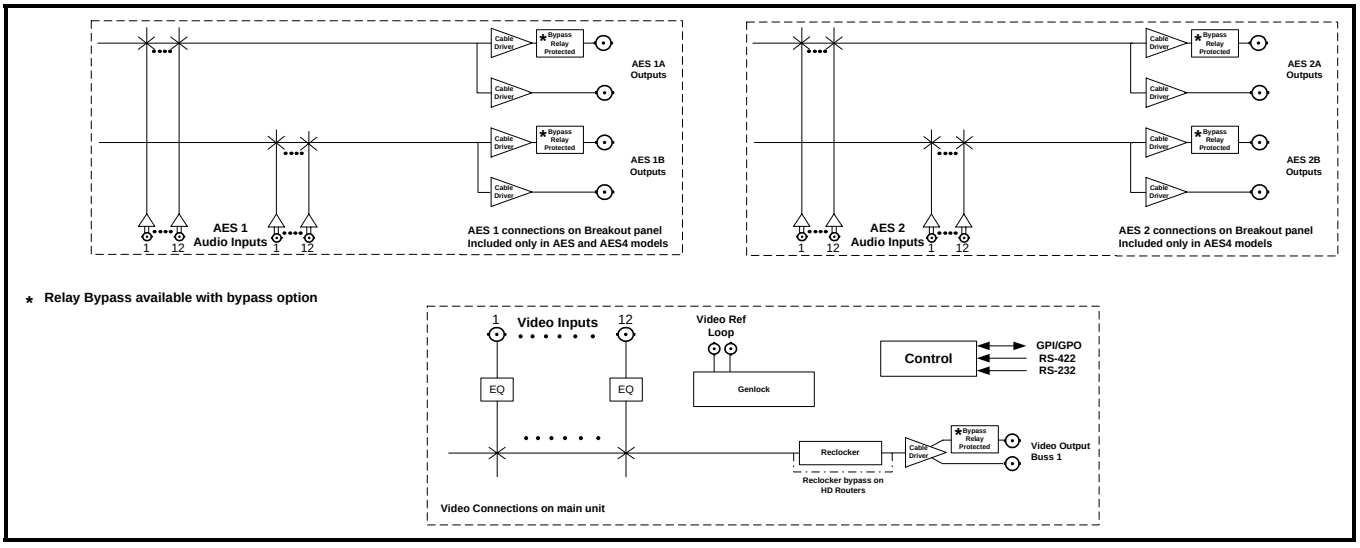

Figure 1-1: X1201 Block Diagram

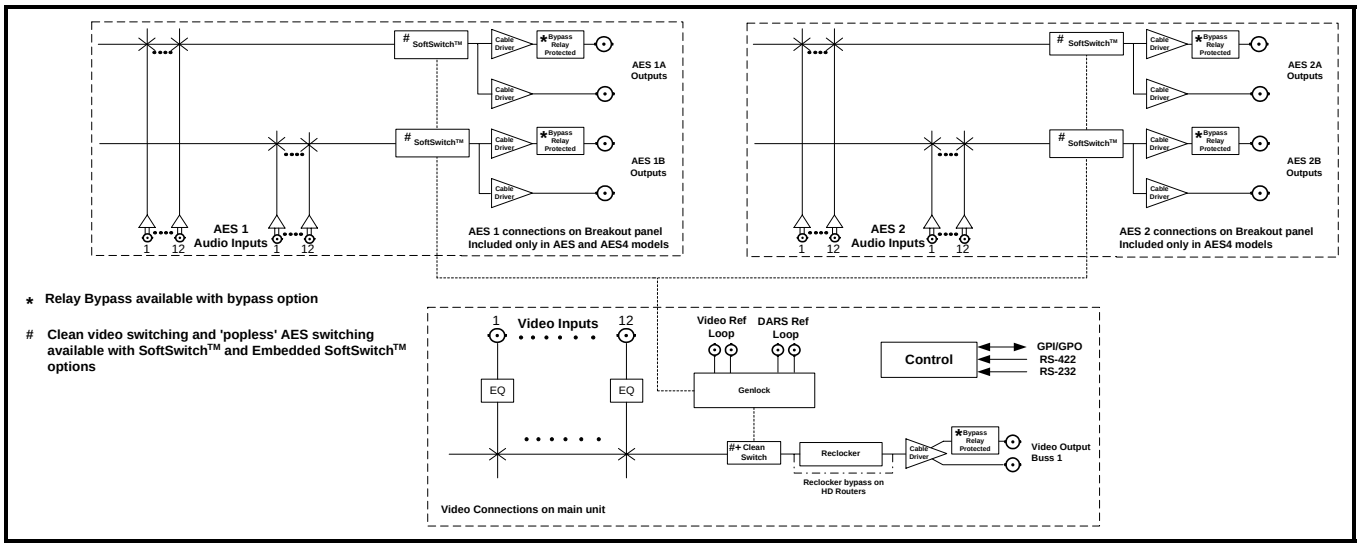

Figure 1-2: X1201 SoftSwitch™ Block Diagram

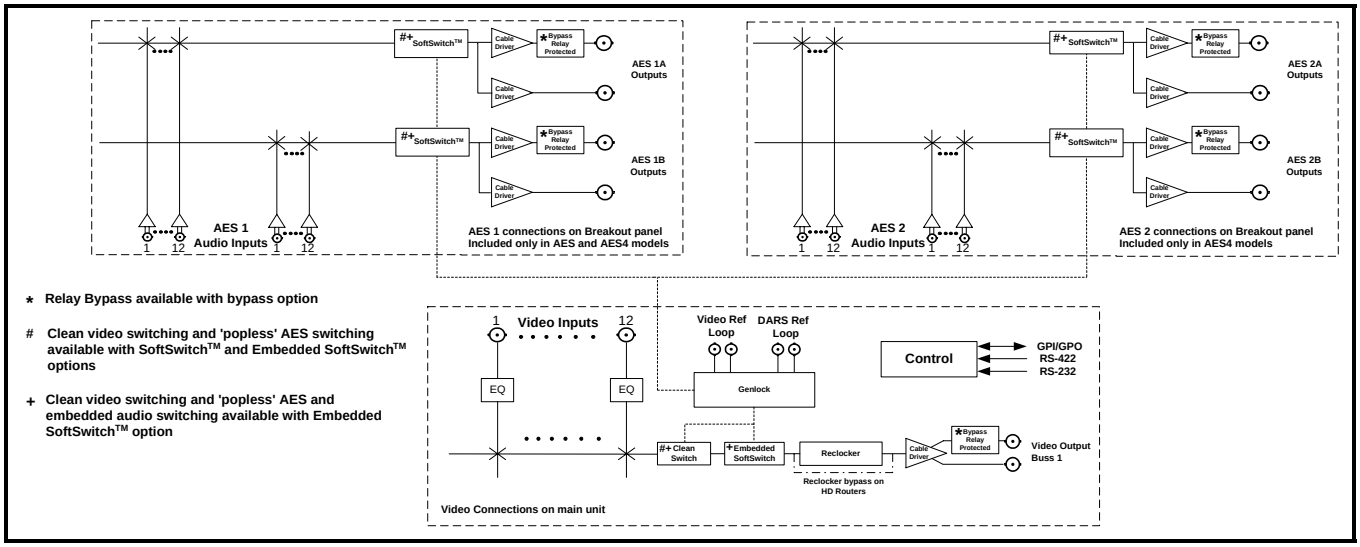

Figure 1-3: X1201 Embedded SoftSwitch™ Block Diagram

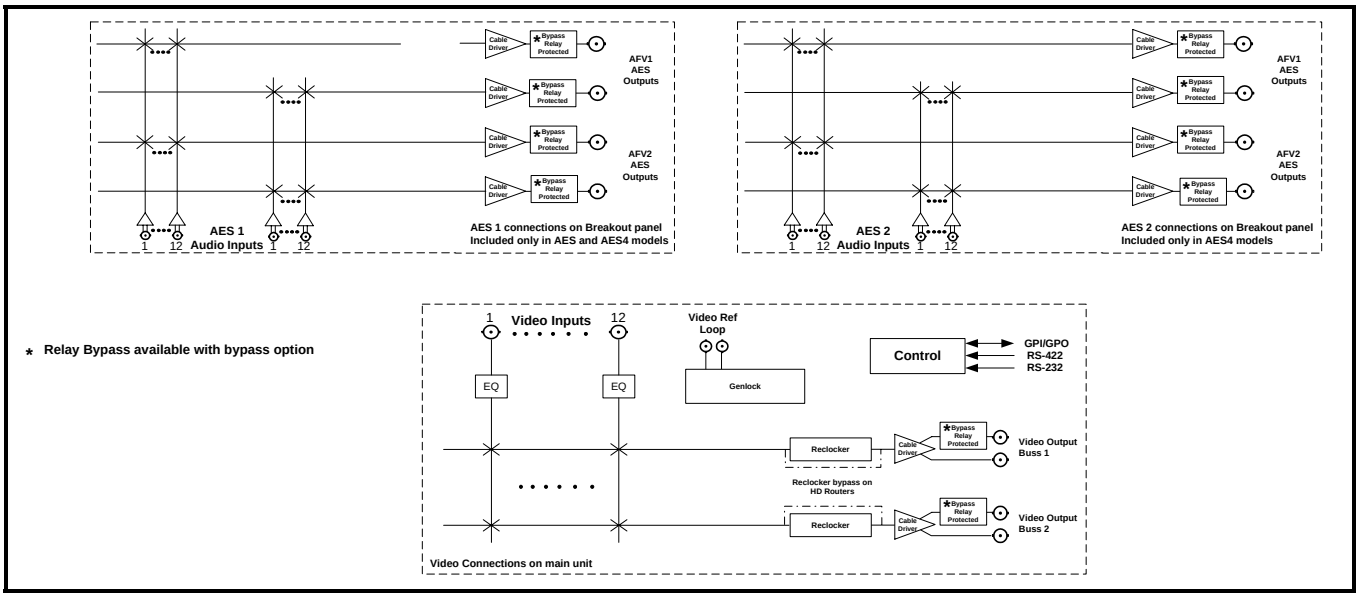

Figure 1-4: X1202 Block Diagram

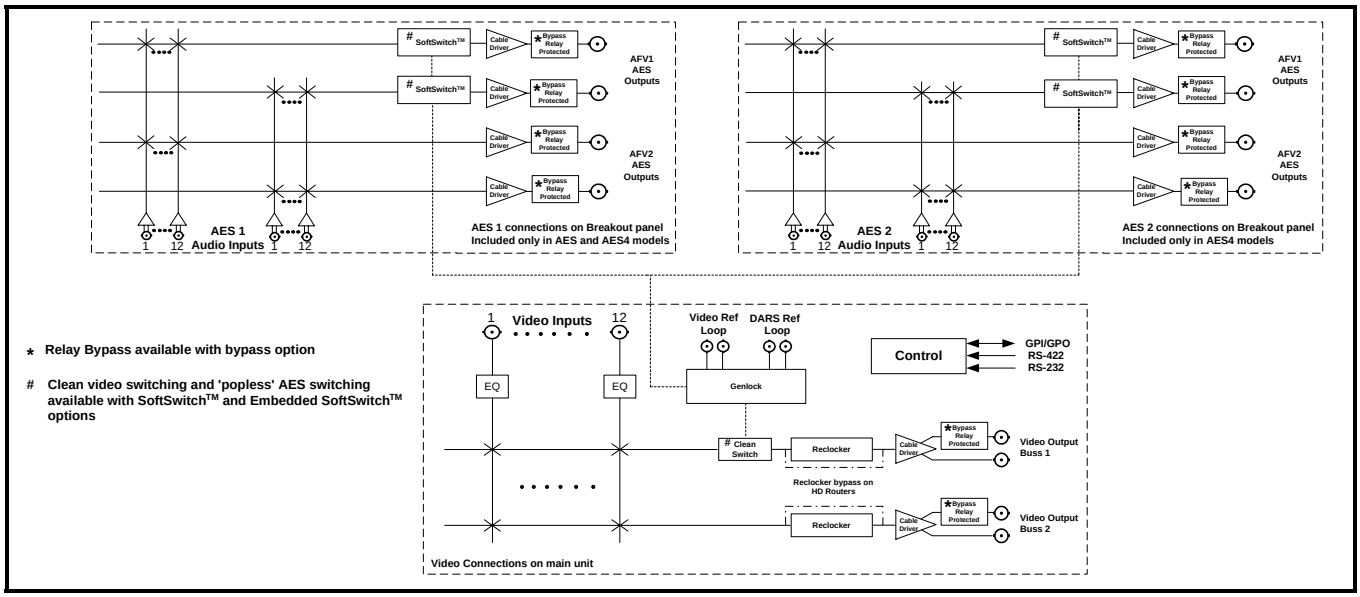

Figure 1-5: X1202 SoftSwitch™ Block Diagram

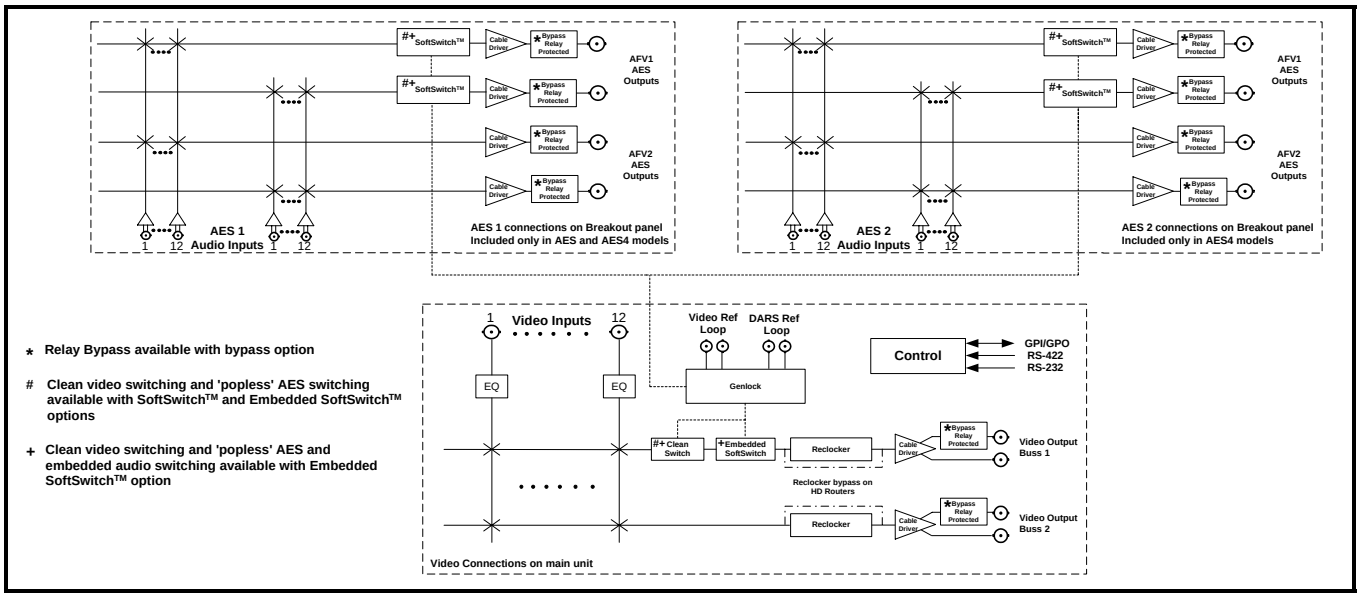

Figure 1-6: X1202 Embedded SoftSwitch™ Block Diagram

1.1. HOW TO USE THIS MANUAL

This manual is organized into 7 chapters: Overview, Installation, Operation, Technical Description, Serial Protocol, Output Configurations, and System Timing. This chapter contains a quick summary of the router features and a glossary to define concepts and terms used throughout the remainder of the manual.

Chapter 2 gives a detailed description of the rear panel connectors, and how the router should be connected into your system.

Chapter 3 gives a detailed description of the operation of the front panel controls, starting with an overview of the pushbuttons and front panel indicators. The operation of the router using the optional remote control panel is identical to the front panel.

Chapter 4 gives an overview of how to update the firmware in the unit and other technical issues.

Chapter 5 is a programmer's reference to the serial control protocol.

Chapter 6 provides a pictorial representation of video and audio output configurations for each version of the router.

Chapter 7 provides a few video timing examples to aid the system designer in properly timing the router.

Items of special note are indicated with a double box like this.

1.2. GLOSSARY

CCIR-601 (This document now known as ITU-R601). An international standard for component digital television from which was derived SMPTE 125M and EBU 3246-E standards. CCIR-601 defines the sampling systems, matrix values and filter characteristics for Y, B-Y, R-Y and RGB component digital television signals.

SERIAL DIGITAL Digital information that is transmitted in serial form. Often used informally to refer to serial digital television signals.

4Fsc: Four times sub-carrier sampling rate uses in composite digital systems. In NTSC this is 14.3 MHz. In PAL this is 17.7 MHz.

4:2:2 A commonly used term for a component digital video format. The details of the format are specified in the CCIR-601 standard. The numerals 4:2:2 denote the ratio of the sampling frequencies of the luminance channel to the two colour difference channels. For every four luminance samples, there are two samples of each colour difference channel.

SDI An abbreviation for *serial digital interface*, this acronym is most commonly used to refer to Standard definition serial digital television video signals up to 540 Mb/s.

HDTV An abbreviation for *high definition television*, this acronym is most commonly used to refer to High definition serial digital television video signals at 1.485 Gb/s.

AES: (Audio Engineering Society): A professional organisation that recommends standards for the audio industries.

AES/EBU: Informal name for a digital audio standard established jointly by the Audio Engineering Society and the European Broadcasting Union organisations.

ANALOG: An adjective describing any signal that varies continuously as opposed to a digital signal that contains discrete levels representing digits 0 and 1.

A-TO-D CONVERTER (ANALOG-TO-DIGITAL): A circuit that uses digital sampling to convert an analog signal into a digital representation of that signal.

BIT: A binary representation of 0 or 1. One of the quantized levels of a pixel.

BIT PARALLEL: Byte-wise transmission of digital video down a multi-conductor cable where each pair of wires carries a single bit. This standard is covered under SMPTE 125M, EBU 3267-E and CCIR 656.

BIT SERIAL: Bit-wise transmission of digital video down a single conductor such as coaxial cable. May also be sent through fiber optics. This standard is covered under SMPTE 259M and CCIR 656.

BIT STREAM: A continuous series of bits transmitted on a line.

BYTE: A complete set of quantized levels containing all the bits. Bytes consisting of 8 to 10 bits per sample are typical in digital video systems.

CABLE EQUALIZATION: The process of altering the frequency response of a video amplifier to compensate for high frequency losses in coaxial cable.

CCIR (International Radio Consultative Committee): An international standards committee. (This organisation is now known as ITU.)

CCIR-601: (This document now known as ITU-R601). An international standard for component digital television from which was derived SMPTE 125M and EBU 3246-E standards. CCIR-601 defines the sampling systems, matrix values and filter characteristics both Y, B-Y, R-Y and RGB component digital television signals.

CCIR-656: (This document now known as ITU-R656). The physical parallel and serial interconnect scheme for CCIR-601. CCIR-656 defines the parallel connector pinouts as well as the blanking, sync and multiplexing schemes used in both parallel and serial interfaces. It reflects definitions found in EBU Tech 3267 (for 625 line systems) and SMPTE 125M (parallel 525 line systems) and SMPTE 259M (serial 525 line systems).

CLIFF EFFECT: (also referred to as the 'digital cliff') This is a phenomenon found in digital video systems that describes the sudden deterioration of picture quality due to excessive bit errors, often caused by excessive cable lengths. The digital signal will be perfect even though one of its signal parameters is approaching or passing the specified limits. At a given moment however, the parameter will reach a point where the data can no longer be interpreted correctly, and the picture will be totally unrecognisable.

COMPONENT ANALOG: The non-encoded output of a camera, video tape recorder, etc., consisting of the three primary colour signals: red, green, and blue (RGB) that together convey all necessary picture information. In some component video formats these three components have been translated into a luminance signal and two colour difference signals, for example Y, B-Y, R-Y.

COMPONENT DIGITAL: A digital representation of a component analog signal set, most often Y, B-Y, R-Y. The encoding parameters are specified by CCIR-601. The parallel interface is specified by CCIR-656 and SMPTE 125M.

COMPOSITE ANALOG: An encoded video signal such as NTSC or PAL video that includes horizontal and vertical synchronizing information.

COMPOSITE DIGITAL: A digitally encoded video signal, such as NTSC or PAL video that includes horizontal and vertical synchronizing information.

D1: A component digital video recording format that uses data conforming to the CCIR-601 standard. Records on 19 mm magnetic tape. (Often used incorrectly to refer to component digital video.)

D2: A composite digital video recording format that uses data conforming to SMPTE 244M. Records on 19 mm magnetic tape. (Often used incorrectly to refer to composite digital video.)

D3: A composite digital video recording format that uses data conforming to SMPTE 244M. Records on 1/2" magnetic tape.

EBU (European Broadcasting Union): An organisation of European broadcasters that among other activities provides technical recommendations for the 625/50 line television systems.

EBU TECH 3267-E: The EBU recommendation for the parallel interface of 625 line digital video signal. This is a revision of the earlier EBU Tech 3246-E standard that was in turn derived from CCIR-601.

EDH: Error Detection and Handling (EDH) is defined in SMPTE RP-165 as a method of determining when bit errors have occurred along the digital video path. According to RP-165, two error detection checkwords are used, one for active picture samples, and the other on a full field of samples. Three sets of flags are used to convey information regarding detected errors, to facilitate identification of faulty equipment or cabling. One set of flags is associated with each checkword, and the third is used to evaluate ancillary data integrity. The checkwords and flags are combined into a special error detection data packet that is included as ancillary data in the serial digital signal.

EMBEDDED AUDIO: Digital audio is multiplexed onto a serial digital video data stream.

GVG TEN-XL: A 10 x 1 router made by the Grass Valley Group. The serial control protocol used for this router has become an industry standard. The control protocol used to control the Evertz 95XX series routers is an extension of this protocol.

ITU: The United Nations regulatory body governing all forms of communications. ITU-R (previously CCIR) regulates the radio frequency spectrum, while ITU-T (previously CCITT) deals with the telecommunications standards.

ITU-R601: See CCIR601

PIXEL: The smallest distinguishable and resolvable area in a video image. A single point on the screen. In digital video, a single sample of the picture. Derived from the words *picture element*.

RESOLUTION: The number of bits (four, eight, ten, etc.) determines the resolution of the signal. Eight bits is the minimum resolution for broadcast television signals.

4 bits = a resolution of 1 in 16.
8 bits = a resolution of 1 in 256.
10 bits = a resolution of 1 in 1024.

SERIAL DIGITAL: Digital information that is transmitted in serial form. Often used informally to refer to serial digital television signals.

SMPTE (Society of Motion Picture and Television Engineers): A professional organisation that recommends standards for the film and television industries.

SMPTE 125M: The SMPTE standard for bit parallel digital interface for component video signals. SMPTE 125M defines the parameters required to generate and distribute component video signals on a parallel interface.

SMPTE 244M: The SMPTE standard for bit parallel digital interface for composite video signals. SMPTE 244M defines the parameters required to generate and distribute composite video signals on a parallel interface.

SMPTE 259M: The SMPTE standard for 525 line serial digital component and composite interfaces.

SMPTE 292M: The SMPTE standard for 1125 line serial digital high definition video interfaces.

SMPTE 299M: The SMPTE standard for embedding AES audio into SMPTE 292M serial digital high definition video.

SoftSwitch™: An Evertz patent pending technology the eliminates audio pops and clicks due to interruptions of the AES carrier. These interruptions are often caused by non-synchronous switching of the inputs, or may be present from upstream devices. Embedded SoftSwitch™ uses the same technology to remove pops and clicks from embedded audio.

TRS-ID: Abbreviation for "Timing Reference Signal Identification". A reference signal used to maintain timing in composite digital systems. (It is four words long.)

CHAPTER 2: INSTALLATION

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2. INSTALLATION

2.1. REAR PANEL

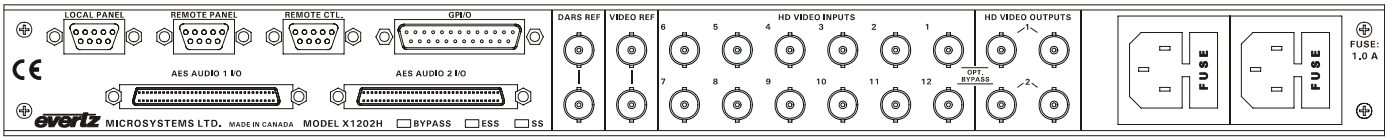

Figure 2-1: X1202H-AES4 Rear Panel Layout

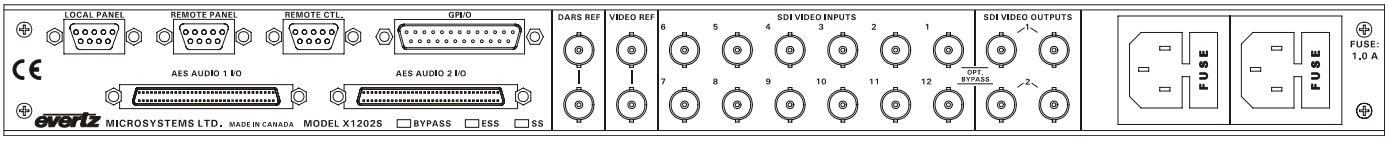

Figure 2-2: X1202S-AES4 Rear Panel Layout

Sections 2.1.1 to 2.1.6 describe the purpose of the rear panel connectors and the specific signals that should be connected to the routers. Router versions that have SoftSwitch™, Embedded SoftSwitch™ or Bypass relay options installed will have the option checked (√) on the rear panel. Chapter 6 provides pictorial representations of the video and audio output configurations for each version of the router.

2.1.1. Standard Definition Digital Video Connections (X1200S)

SDI VIDEO INPUTS 1 to 12: These BNC connectors are for connecting 10-bit serial digital video signals, compatible with the SMPTE 259M standard to the respective video input bus.

SDI VIDEO OUTPUTS 1 and 2: There are two video output connectors for each of the two video router buses on X1202S routers. The Video from the selected Video Input bus will be available on two outputs for each bus. X1201S routers do not have the Second output bus.

When the bypass relay option is fitted, **INPUT 1** is protected by a bypass relay to the adjacent **OUTPUT 1** BNC for both X1202S and X1201S routers. **INPUT 12** is protected by a bypass relay to the adjacent **OUTPUT 2** BNC on the X1202S routers only. The bypass relays will activate in the event of power loss to the router and can also be activated from the front panel menu.

2.1.2. High Definition Digital Video Connections (X1202H)

HD VIDEO INPUTS 1 to 12: These BNC connectors are for connecting 10-bit serial digital video signals, compatible with the SMPTE 292M standard to the respective video input bus.

HD VIDEO OUTPUTS 1 and 2: There are two video output connectors for each of the two video router buses. The Video from the selected Video Input bus will be available on two outputs for each bus.

When the bypass relay option is fitted, **INPUT 1** is protected by a bypass relay to the adjacent **OUTPUT 1** BNC and **INPUT 12** is protected by a bypass relay to the adjacent **OUTPUT 2** BNC. The bypass relays will activate in the event of power loss to the router and can also be activated from the front panel menu.

2.1.3. AES Audio Connections

There are two 68 pin connectors used to connect the AES Audio Breakout panels (X1202ABO or X1201ABO) to the Router. These panels are connected using the cables provided. Each Audio Breakout Panel has two identical sections consisting of 12 AES inputs and 2 outputs. Earlier versions of the router may not have either or both audio connectors installed. See sections 2.1.3.1 to 2.1.3.3 for information about connecting the audio for the version of the router that you have.

When connecting the Audio Breakout Panel cables, insert the cable carefully into the connector on the router and the breakout panel, being careful not to bend the pins. Press it firmly in place and hand tighten the hold down screws firmly to provide proper strain relief.

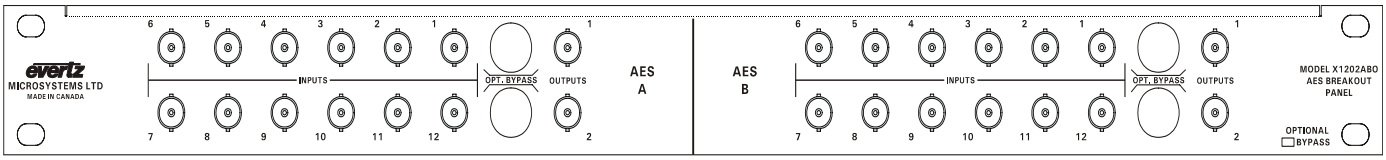

Figure 2-3: X1202ABO Audio Breakout Panel Layout

INPUTS 1 to 12: These BNC connectors are for connecting unbalanced AES audio signals compatible with the SMPTE 276M standard to the respective audio input bus.

OUTPUTS 1 and 2: These BNC connectors are for connecting unbalanced AES audio signals compatible with the SMPTE 276M standard from the respective audio input bus.

On the X1202ABO used with the X1202 routers, when the bypass relay option is fitted, **INPUT 1** is protected by a bypass relay to the adjacent **OUTPUT 1** BNC and **INPUT 12** is protected by a bypass relay to the adjacent **OUTPUT 2** BNC. On the X1201ABO used with the X1201 routers, **INPUT 1** is protected by a bypass relay to the adjacent **OUTPUT 1** BNC. The bypass relays will activate in the event of power loss to the router and can also be activated from the front panel menu.

2.1.3.1. Audio Connections on Router Models with the AES Option Fitted

Routers fitted with the AES option are shipped with one breakout panel. This panel is connected to the **AES AUDIO 1 I/O** connector using the cable provided. On the X1202ABO used with the X1202 routers, inputs for the 1A and 2A buses are on the AES A section of the breakout panel. (See Figure 6-6 and Figure 6-7) Outputs 1 and 2 of the AES A section are the outputs from the 1A and 2A buses respectively. Inputs for the 1B and 2B buses are on the AES B section of the breakout panel. Outputs 1 and 2 of the AES B section are the outputs from the 1B and 2B buses respectively. On the X1201ABO used with the X1201 routers, outputs 1 and 2 are identical. (See Figure 6-2)

2.1.3.2. Audio Connections On Early Router Models With The AES Option Fitted (two breakout panels shipped)

Some early versions of the routers with the AES option were shipped with two breakout panels. On these routers, there are two distinct modes of operation. The *AES MODE* menu item on the *INPUT SETUP* menu is used to select the desired mode.

In the 4(12x1) mode there are four separate 12 x 1-router sections that can be independently assigned to follow one of the video buses. Routers fitted with the AES option are shipped with one breakout panel.

Inputs for the 1A and 1B buses are on the panel connected to the **AES AUDIO 1 I/O** connector. Outputs 1 and 2 of the AES A and AES B sections are identical outputs from the 1A and 1B buses respectively. Inputs for the 2A and 2B buses are on the panel connected to the **AES AUDIO 2 I/O** connector. Outputs 1 and 2 of the AES A and AES B sections are identical outputs from the 2A and 2B buses respectively. (See Figure 6-12 and Figure 6-13)

In the 2(12x2) mode there are two 12 x 2 router sections. The inputs and outputs from the 1A and 1B buses follow the V1 bus and are located on the breakout panel connected to the **AES AUDIO 1 I/O** connector. The inputs to 2A and 2B audio buses are internally connected to the inputs of the 1A and 1B audio buses respectively (The inputs on the breakout panel connected to the **AES AUDIO 2 I/O** connector are not used in this mode). The outputs from the 2A and 2B buses follow the V2 bus and are located on the breakout panel connected to the **AES AUDIO 2 I/O** connector. (See Figure 6-10 and Figure 6-11)

2.1.3.3. Audio Connections on Router Models with the AES4 Option Fitted

Routers fitted with the AES4 option are shipped with two breakout panels. The inputs and outputs from the 1A and 1B buses are located on the breakout panel connected to the **AES AUDIO 1 I/O** connector. The Audio from the selected Audio Input bus associated with video bus1 will be available on output 1 of AES A and AES B sections of the breakout panel. On the X1202ABO used with the X1202 routers, audio from the selected Audio Input bus associated with video bus2 will be available on output 2 of AES A and AES B sections of the breakout panel. (See Figure 6-8 and Figure 6-9) On the X1201ABO used with the X1201 routers, outputs 1 and 2 are identical. (See Figure 6-3)

The inputs and outputs from the 2A and 2B buses and are located on the breakout panel connected to the **AES AUDIO 2 I/O** connector. The Audio from the selected Audio Input bus associated with video bus1 will be available on output 1 of AES A and AES B sections of the breakout panel. Audio from the selected Audio Input bus associated with video bus2 will be available on output 2 of AES A and AES B sections of the breakout panel. On the X1201ABO used with the X1201 routers, outputs 1 and 2 are identical.

2.1.4. Reference Connections

VIDEO REF is a high impedance loop through for connecting an analog video or tri-level sync (X1200H series only) reference. The *REFERENCE* menu is used to select the correct type of video reference being used.

DARS REF (X1202S-AES-SS and X1202S-AES4-SS only) is a high impedance loop through for a Digital Audio Reference Signal. The *REFERENCE* menu is used to select the use of the DARS signal when the Softswitch™ is enabled on Softswitch™ routers.

2.1.5. Remote Control Connections

REMOTE CTL This 9 pin female D connector provides an RS-232 serial interface used for updating the firmware or external serial remote control. The *Setup* menu is used to configure the REMOTE CTL port for external control or firmware updating. (See section 3.3.). This port is wired at the factory as an RS232 DCE port as shown in Table 2-1.

The port can also be used to connect a remote control panel to the router. To connect to a remote panel the port must be configured as a SMPTE 207M Tributary as shown in Table 2-2. To reconfigure the port the user must remove the top cover and reposition jumper J26 so that it is on pins 2 & 3 (toward header J23) and move the ribbon cable to header J23.

If you are planning to use a second remote control/automation, remove the top cover and reposition jumper J26 so that it is on pins 2 & 3 (toward header J23) and move the ribbon. Communications to the remote panel is through a standard straight through RS-422 connection. See section 2.4.2.

Pin #	Name	Description
1	GND	Chassis ground
2	TxD	RS-232 Transmit Output
3	RxD	RS-232 Receive Input
4		
5	Sig Gnd	RS-232 Signal Ground
6		
7	RTS	RS-232 RTS Input
8	CTS	RS-232 CTS Output
9		

Table 2-1: Router RS-232 Port Pin Definitions

REMOTE PANEL This 9 pin female D connector provides an RS-422 serial interface used if the local panel is not attached to the main chassis. This port is wired as a SMPTE 207M Tributary as shown in Table 2-2.

Pin #	Name	Description
1	GND	Chassis ground
2	Tx-	RS-422 Tx-(a) Output
3	Rx+	RS-422 Rx+(b) Input
4	GND	
5		
6	GND	
7	Tx+	RS-422 Tx+(b) Output
8	Rx-	RS-422 Rx-(a) Input
9	GND	

Table 2-2: Router RS-422 Port Pin Definitions

LOCAL PANEL This connector is currently not used.

GPI / O This female DB-25 pin connector provides 14 General Purpose Opto-isolated inputs (GPIs) and 4 General Purpose isolated relay outputs (GPOs). **Vint** provides +5Volts from the Router and **Vext** is used to provide external power to the opto isolators. Typically **Vint** and **Vext** are connected together so that the isolators may be powered from the router. Table 2-3 shows the pin definitions of the GPIO connector. Figure 2-4 shows a schematic of the GPIO circuitry. See section 2.5 for more information on connecting the General Purpose inputs and outputs. The functions of the GPIs and GPOs are assigned using the Setup menu, and can be used to select crosspoints and receive tallies from the router. See section 3.12 and 3.13 for information on setting up the GPIO operation.

Pin #	Name	Description
1	GPI 01	General Purpose Input 01
2	GPI 02	General Purpose Input 02
3	GPI 03	General Purpose Input 03
4	GPI 04	General Purpose Input 04
5	GPI 05	General Purpose Input 05
6	GPI 06	General Purpose Input 06
7	GPI 07	General Purpose Input 07
8	GPI 08	General Purpose Input 08
9	GPI 09	General Purpose Input 09
10	GPI 10	General Purpose Input 10
11	GPI 11	General Purpose Input 11
12	GPI 12	General Purpose Input 12
13	GPI 13	General Purpose Input 13
14	GPI 14	General Purpose Input 14
15	Vext	External voltage input to power opto isolators
16	Vint	Protected +5 volts output from router
17	GPO 01 C	General Purpose Output 01 Common contact
18	GPO 01 NC	General Purpose Output 01 Normally closed contact
19	GPO 02 C	General Purpose Output 02 Common contact
20	GPO 02 NC	General Purpose Output 02 Normally closed contact
21	GPO 03 C	General Purpose Output 03 Common contact
22	GPO 03 NC	General Purpose Output 03 Normally closed contact
23	GPO 04 C	General Purpose Output 04 Common contact
24	GPO 04 NC	General Purpose Output 04 Normally closed contact
25	GND	Router Chassis ground

Table 2-3: GPI/O Pin Definitions

2.1.6. Power Connections

The router has one or two (redundant supply is optional) universal power supplies that operate on either 115 Volt / 60 Hz or 230 Volt / 50 Hz AC.

2.2. MOUNTING

The Router is equipped with rack mounting angles and fits into a standard 19 inch by 1.75 inch by 17.75 inch (483 mm x 45 mm x 451mm) rack space. The mounting angles may be removed if rack mounting is not desired.

2.3. POWER REQUIREMENTS

2.3.1. Selecting the Correct Mains Voltage

Power requirements are 115 or 230 volts AC at 50 or 60 Hz. The router has a universal power supply that automatically senses the input voltage. Power should be applied by connecting a 3-wire grounding type power supply cord to the power entry module on the rear panel. The power cord should be minimum 18 AWG wire size; type SVT marked VW-1, maximum 2.5 m in length. If the router is fitted with the redundant power supply there will be an additional IEC-320 connector on the rear panel.

If the router is fitted with dual power supplies, make sure that power is removed from both supplies before performing any work on the unit.

The IEC 320 power entry module combines a standard power inlet connector, two 5 x 20 mm fuse holders and an EMI line filter.

2.3.2. Changing the Fuses

The fuse holder is located inside the power entry module. To change the fuses, pull out the fuse holder from the power entry module using a small screwdriver. The fuse holder contains two fuses, one for the line and one for the neutral side of the mains connection. Pull out the blown fuse and place a fuse of the correct value in its place. Use slo blo (time delay) 5 x 20 mm fuses rated for 250 Volts with a current rating of 1 amp. Carefully reinsert the fuse holder into the power entry module.

Never replace with a fuse of greater value.

2.4. CONNECTING THE REMOTE CONTROL PANEL

The X1200 series routers can be sold with integrated front panel control, or with a rack mountable remote control panel (RCP version). On the RCP version, the front panel of the main unit has only the PSU Status indicators. A second control panel (model X1202-REMOTE) can be added to either version.

2.4.1. Connecting The Primary Remote Control Panel (RCP Version)

On the RCP version of the router, the primary control panel is connected to the **REMOTE PANEL** connector using a straight through cable provided. For longer distances, simply make your own cable of the required length according to the diagram in Table 2-4. Communications to the remote panel is through a standard straight through RS-422 connection, so the panel can be located up to 1000 feet from the main electronics unit. A plug in 12 VDC adapter supplies power for the remote control panel.

Router End			Remote Panel End	
9 pin D Male	**Pin**	**Belden 9729**	**9 pin D Female**	**Pin**
	1			1
Tx-	2	-------1a------	Rx-	2
Rx+	3	-------2b------	Tx+	3
Rx Gnd	4	---drain 2----	Rx Gnd	4
	5			
Tx Gnd	6	---drain 1----	Tx Gnd	6
Tx+	7	-------1b-----	Rx+	7
Rx-	8	-------2a------	Tx-	8
	9			9
Frame Gnd	Shield	---drain 1----	Frame Gnd	Shield

Table 2-4: Remote Control Panel Extender Cable

2.4.2. Connecting A Second Remote Control Panel

On either the Front Panel Control or Remote Control version of the router a second control panel can be connected to the **REMOTE CONTROL** connector using a straight through cable provided. For longer distances, simply make your own cable of the required length according to the diagram in Table 2-4. The default configuration of the **REMOTE CONTROL** port on the router is RS-232. Before connecting the remote panel the port must be configured as a SMPTE 207M Tributary as shown in Table 2-2. To reconfigure the port the user must remove the top cover and reposition jumper J26 so that it is on pins 2 & 3 (toward header J23) and move the ribbon. Communications to the remote panel is through a standard straight through RS-422 connection, so the panel can be located up to 1000 feet from the main electronics unit. A plug in 12 VDC adapter supplies power for the remote control panel.

2.5. CONNECTING THE GENERAL PURPOSE INPUTS AND OUTPUTS

The 25 pin GPI/O connector has 14 programmable general purpose inputs (GPI) and 4 programmable general purpose outputs (GPO) as shown in Table 2-3. The schematic representation is in Figure 2-4. The GPIs are opto-isolated inputs that can be powered from an external source or from the frame. The GPOs are relay contacts that are normally closed when the power to the router is off.

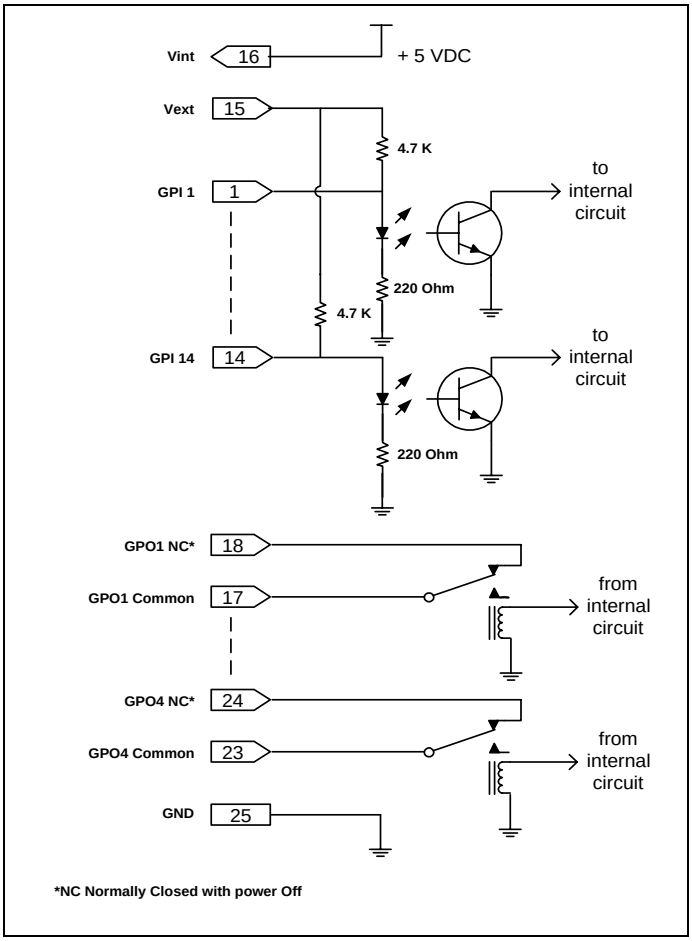

Figure 2-4: General Purpose I/O Schematic

2.5.1. Connecting the General Purpose Inputs

The GPI's are used to activate video and audio bus crosspoints and are programmable in a number of configurations. The GPIs can be configured to operate in one of 3 encoded modes. In these modes, many of the GPI inputs are pre-assigned to a function. The unused inputs are still available for the user to assign to a particular function using the *Program Gpi's* menu item. When the GPI Encoding is set to none, all 14 inputs are available for the user to assign to particular functions. Sections 3.12.3.1 to 3.12.3.3 describe how each of the GPI encoding modes work and which inputs are available for user assignment.

When the GPI inputs are independently programmed, they can be set to activate on rising or falling edges, or high or low levels. The factory default is for *low* level activation, which means a ground level on the input will trigger the GPI function when the Opto isolator is normally powered. See Figure 2.2 and 2.3

The *high* level activation can be used when you need to trigger the GPI function by providing a positive voltage to a GPI input. This mode is not generally used and should not be considered a first choice.

The *falling* edge activation is used to trigger a GPI function by removing a provided voltage to a GPI or by making a closure to ground when the Opto isolator is already powered. The falling edge GPI will respond the same as a *low* level activation when the opto isolator is normally powered.

The *rising* edge activation is used to trigger a GPI function when power is provided to the Opto isolator, or when the GPI closure to ground is released. This function can be used to trigger a GPI function when a GPO error tally is released.

The user can connect GP+5V supplied from the frame (Vint pin) into the Vext pin to provide power to the GPIO opto-isolator circuitry. In this configuration the user can activate GPIs simply by connecting the GPI input pins to Ground (see Figure 2-5). This can be done with a button, switch, relay or an open collector transistor.

Warning: Do not connect GP+5V from one frame to another frames GP+5V.

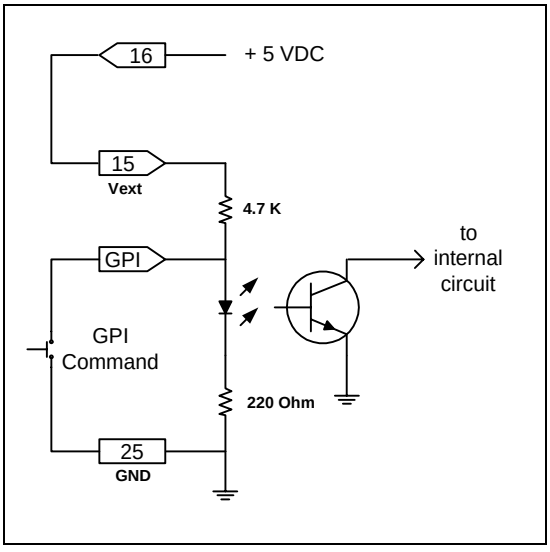

Figure 2-5: Powering the General Purpose Input Opto-Isolators from the Router

Alternately, an external voltage source may be applied as shown in Figure 2-6. The Vext voltage must be greater than the voltage supplied to the GPI by at least 5v.

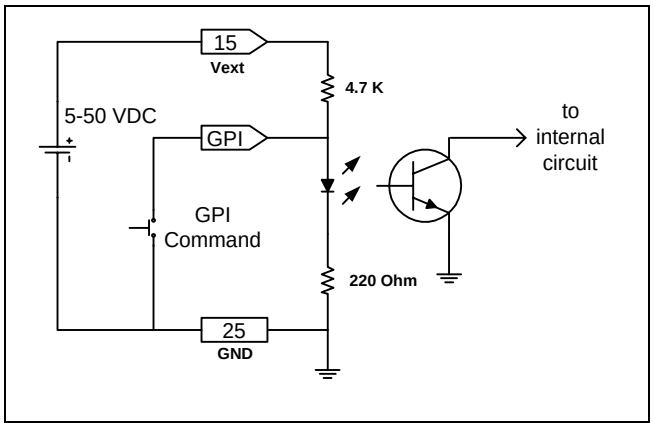

Figure 2-6: Powering the General Purpose Input Opto-Isolators from an External Power Supply

2.5.2. Connecting the General Purpose Outputs

The Programmable GPOs are used to trigger alarms or to provide a limited tally capability. The GPOs will be in the de-energized state when the power is off so all contacts will be closed. When the router is powered up the GPO Relay contacts will open. An alarm or tally will cause a contact closure. The 4 GPO contact sets can be operated in one of two encoded modes. The GPOs can be configured to operate in one of 2 encoded modes. In these modes, many of the GPO contacts are pre-assigned to a function. When the GPO Encoding is set to none, all 4 contact sets are available for the user to assign to particular functions. Section 3.13.3 describes how each of the GPO encoding modes works and how to configure the GPOs using the *GPO SETUP* menu.

2.5.3. GPI/O Examples

By careful use of the GPIs and GPOs one can create some unique control scenarios for controlling the Router, Figure 2-7 shows one such application. By setting up jumpers for the GPI/O connector and setting the GPI/O configurations in the router *Setup* menu, one can create an auto changeover for a program feed. In this configuration when input 1 fails and that input is currently selected on the output of bus V1, The router will automatically select input 2.

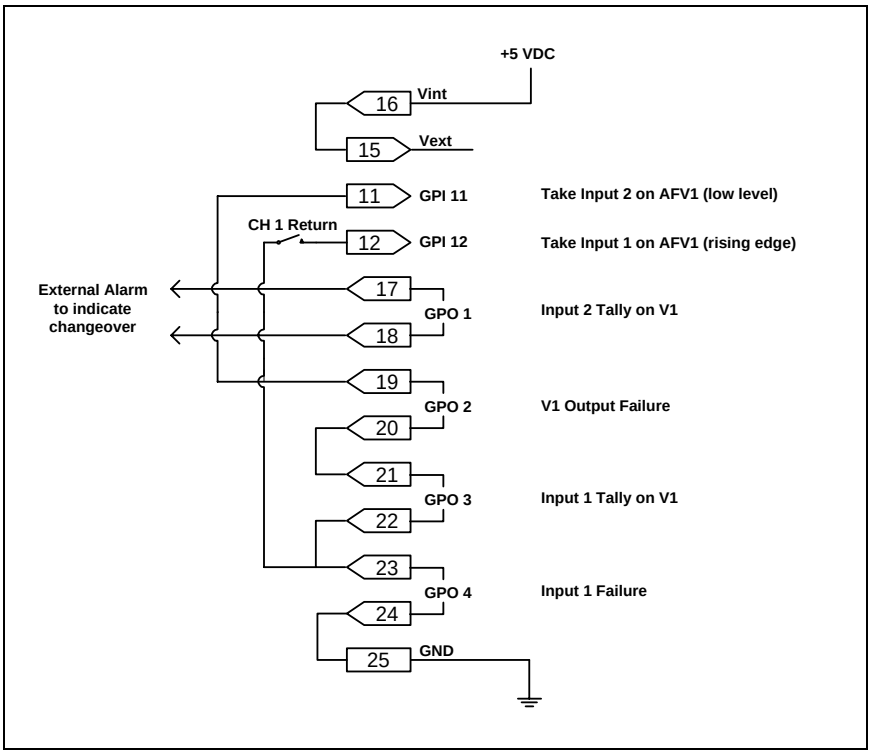

Figure 2-7: GPIO Example – Auto Changeover to Input 2 on Loss of Input 1

If the "CH 1 Return " switch is closed input 1 will be automatically selected when it is present again. This has a down side that if the Input 1 signal failure is sporadic the router will chatter between input 1 and 2. The purpose here is to show the use of a rising edge GPI trigger.

Also interesting to note that this functionality can co-exist with the *HEX* and *AFV HEX* GPI encoding as GPI 11 and 12 are both available for user functions in these encoded GPI modes.

2.6. CONTROLLING THE ROUTER USING THE EXTERNAL SERIAL PROTOCOL

The X1200 series routers can be controlled from router control devices or it can control other devices employing industry standard router control protocols. Currently the only control protocol supported is the Grass Valley Ten-XL ASCII protocol. The control device is connected to the router using the **REMOTE CTL** connector on the rear panel. The *REMOTE CTL* menu is used to configure the **REMOTE CTL** port for external control using the *Baud Rate, Serial Format, Serial Address* and *Serial Control* menu items. See section 3.14 for information about configuring the **REMOTE CTL** port parameters. See chapter 5 for detailed information about controlling the router.

2.6.1. Connecting the Router to a Grass Valley Ten XL ASCII Control Device

Use the *External control* item on the *Setup Menu* and select `Gvg ten xl ASCII` protocol. The *Baud Rate, Serial Address,* and *Serial Format* menu settings must be set to match those required by the GVG control device. If the Router is being controlled by another device set the *Serial Control* menu setting to `slave`. If the router is controlling another device using its remote control port then set the *Serial Control* menu setting to `master`. The **REMOTE CTL** port is shipped from the factory configured for RS232 operation. If you require RS-422 operation then you will have to change the port wiring as described in section 2.4.2.

When connecting two X1200 series routers together in a master/slave relationship make sure that the **REMOTE CTL** port is configured the same at both ends (including the RS232 or RS422 wiring). Use the cable shown in Table 2-5 for RS-232 wiring and the cable shown in Table 2-6 for RS-422 wiring. For other applications consult the manual for the equipment you are connecting, configure the port accordingly and use the information in Table 2-1 and Table 2-2 to make an appropriate cable.

Master 1202 End			**Slave 1202 End**	
9 pin D Male	**Pin**	**Belden 9729**	**9 pin D Male**	**Pin**
	1			1
TxD	2	-------2b------	RxD	3
RxD	3	-------1a------	TxD	2
	4			4
Gnd	5	---drain 2----	Gnd	5
	6			6
RTS	7	-------1b-----	CTS	8
CTS	8	-------2a------	RTS	7
	9			9
Frame Gnd	Shield	---drain 1----	Frame Gnd	Shield

Table 2-5: Master 1202 to Slave 1202 Cable – RS-232 Configuration

Master 1202 End			**Slave 1202 End**	
9 pin D Male	**Pin**	**Belden 9729**	**9 pin D Male**	**Pin**
Gnd	1	---drain 2----	Gnd	1
Tx-/TxD	2	-------2b------	Rx-/RxD	8
Rx+/RxD	3	-------1a------	Tx+/TxD	7
RxGnd	4		RxGnd	4
	5			5
TxGnd	6		TxGnd	6
Tx+/RTS	7	-------1b-----	Rx+/CTS	3
Rx-/CTS	8	-------2a------	Tx-/RTS	2
	9			9
Frame Gnd	Shield	---drain 1----	Frame Gnd	Shield

Table 2-6: Master 1202 to Slave 1202 Cable – RS-422 Configuration

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CHAPTER 3: OPERATION

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Tables

3. OPERATION

The router electronics is housed in a 1RU rack mount frame and is controlled from the built-in front panel controls. Each model can also be purchased with an optional rack mount remote control panel that replaces the built-in control panel. Operation of the Remote Control panel is identical to the built in control panel. A second control panel can also be purchased for the routers. This panel is connected to the **REMOTE CTL** port and allows the user to access all of the router functions except the *Setup* menu. All units can also be controlled by contact closures on the GPI control port or through the **REMOTE CTL** serial remote control port using Grass Valley switcher protocol.

3.1. OVERVIEW OF THE FRONT PANEL DISPLAY AND CONTROLS

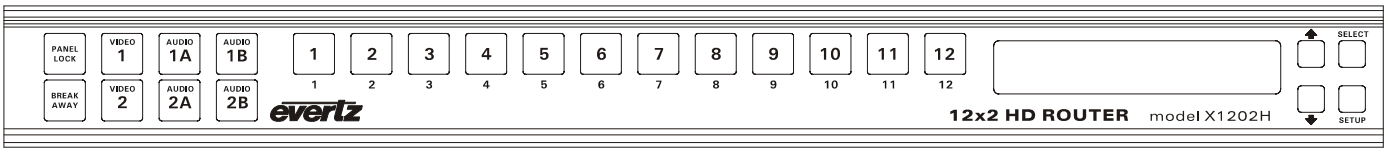

Figure 3-1: Front Panel Layout

The front panel layout for the X1202S and X1202H routers are identical.

3.1.1. Video Router Controls

1 to 12: These twelve buttons allow the user to select between the 12 available video inputs for the two video output busses, as well as selecting the 12 available audio inputs for the four AES buses. The button caps can be removed to allow the user to provide his own legends for the buttons.

V1, V2, 1A, 1B, 2A, 2B: These six buttons are used to select the Bus to be controlled by buttons 1 to 12.

PANEL LOCK: This button locks out the use of the control panel.

The router may still be controlled from the GPI inputs or the serial remote control protocol when the front panel is Locked.

BREAKAWAY: This button initiates the breakaway selection. Pressing this button after the desired breakaway is selected performs the switch of the Video and its associated Audio breakaways.

3.1.2. Setup Key Group

SETUP This button is used to enter the *Setup* menu, which is used to control various setup options to configure the operating modes of the router. (See section 3.3 for a complete description of the *Setup* menu.) When you are in the *Setup* menu, this button is also used to back out of menu selections to the next higher menu level. When exiting the *Setup* menu, the **SETUP** button is also used to discard *menu* choice settings and return to normal panel operation.

SELECT This button is used to choose a submenu and navigate to the next level down in the menu structure. It is also used to make a menu choice. When exiting the *Setup* menu, the **SELECT** button is also used to save *menu* choice settings and return to normal panel operation.

↑ & ↓ The arrow keys are used to navigate through various menu choices at a menu level in the *Setup* menu. When the router is in *source labelling* mode, the arrow keys are used to select various characters in the source name.

3.1.3. Front Panel Display Messages

In addition to the normal operating mode displays that show the names of the inputs that have been selected, the 1200 series routers show some diagnostic messages to help the user diagnose possible system problems.

`Video Ref. Fail` This message will alternate with the current display message when the video reference signal is not present.

`DARS Ref. Fail` This message will alternate with the current display message when the Audio Reference menu item is set to DARS, and the DARS reference signal is not present. The Audio reference will default to the Video Reference in this case.

`Genlock Fail` This message will alternate with the current display message when the Audio Reference menu item is set to DARS, and neither the Video Reference or the DARS reference signal are present.

3.2. OVERVIEW OF FRONT PANEL OPERATION

3.2.1. Audio Follow Video Switching (AFV)

The X1200 series routers have one or two video buses and up to four audio buses (1A, 1B, 2A and 2B) depending on the model (see Table 1-1).

The X1201 routers fitted with the AES option have a dual 12 x 1 AES configuration and are shipped with one breakout panel (X1201ABO). On these units audio buses 1A and 1B will follow the video V1 bus. (See Figure 6-2) The X1201 routers fitted with the AES4 option have a quad 12 x 1 AES configuration and are shipped with two breakout panels (X1201ABO). On these units audio buses 1A, 1B, 2A and 2B will follow the video V1 bus. (See Figure 6-3)

The X1202 routers fitted with the AES option have a dual 12 x 2 AES configuration and are shipped with one breakout panel (X1202ABO). On these units audio buses 1A and 1B will follow the video V1 bus and audio buses 2A and 2B will follow the video V2 bus. (See Figure 6-6 and Figure 6-7)

The X1202 routers fitted with the AES4 option have a quad 12 x 2 AES configuration and are shipped with two breakout panels (X1202ABO). On these units output 1 from audio buses 1A, 1B, 2A and 2B will follow the video V1 bus and output 2 from audio buses 1A, 1B, 2A and 2B will follow the video V2 bus. (See Figure 6-8 and Figure 6-9)

Some early X1202 routers fitted with the AES option were shipped with two breakout panels. These units can be used in either a dual 12 x 2 configuration or quad 12 x 1 configuration where the audio buses can be associated with either video bus V1 or V2. When these units were shipped from the factory they were configured in the quad 12 x 1 mode and audio buses 1A and 1B are assigned to video bus V1. Similarly audio buses 2A and 2B are assigned to video busV2. (See Figure 6-10 to Figure 6-13)

To select a crosspoint for bus V1, press the **V1** button and then select the desired input by pressing one of the buttons **1** to **12.** Note that when bus V1 is selected the **V1** button will light as well as the buttons corresponding to the audio buses that are assigned to follow video bus V1. When the desired input is selected the button for that bus will light and the video label for that input will be displayed on the front panel display. The input labels for the associated audio buses may be displayed momentarily by pressing the respective audio bus keys.

When selecting an audio bus that has been assigned to a video bus, all the buttons for that AFV assigned group will light and any input selection will effect the whole group.

On early versions of the X1202 routers with the AES option operating in the quad 12 x 1 configuration, the Audio buses that follow the respective video buses can be changed using the *Input Setup* menu. Any audio channel that has not been assigned to an AFV group will not be effected by V1 or V2 switch selections and may be independently controlled by pressing the respective audio bus selector button.

The switch selection may be disallowed if there is no video present on the input chosen depending on the setting of the *No Video Action* menu item in the *Input Setup* menu. A message `No Video Present` will be temporally displayed. Similarly if the Video input has been turned off using the *Video V1 and* V2 menu item in the *Input Setup* menu, the switch will be disallowed and the message `Input turned off` will be displayed. Turning off Audio inputs in the *Input Setup* menu will cause the audio switch to be ignored by any AFV switching.

3.2.2. Breakaway Audio On An Audio Follow Video Group

The occasion may arise where one wants to select a different audio input than what the video bus normally dictates. This is a breakaway function and the router allows for this mode. To initiate a breakaway function the first step is to select the desired input for the Video bus as described in section 3.2.1. Then press the **BREAKAWAY** key to enter the breakaway selection mode. The **BREAKAWAY** key will blink to indicate that breakaway mode has been entered. At the same time all of the audio bus keys for that breakaway group will light along with the current selected input key. To break away audio Bus 1B press that key. The **Audio 1B** key will blink to indicate the specific breakaway bus. Press the key for the desired input selection for the audio 1B bus. The selected input key will also blink indicating that it will be selected for audio bus 1B when the breakaway is complete. The other input key that is still lit represents the bus selection for the V1 bus and the 1A audio bus that have not changed. The breakaway is now set up. To complete the breakaway, press the **BREAKAWAY** key again. The panel will now show the **BREAKAWAY** key lit and two input keys will also be lit.

To understand which inputs belong to which bus, press the button for the bus in question. Only the input button and the button for that bus will illuminate, all other keys will be temporally extinguished. During that short interval the display will show the input label for that input key.

To cancel the breakaway simply press the next input selection. At this time all the buses in that AFV group will track to that input selection.

It is also possible when in breakaway mode to select breakaways for all the Audio buses that are assigned to follow the video. It is also possible for the breakaway to work on the video bus. This allows for a salvo switch where all audio and video buses are switched to different inputs.

Turning off Audio inputs in the *Input Setup* menu will cause the audio switch to be ignored by any AFV Breakaway switching.

3.2.3. Independent Audio Bus Switching

On the early versions of the X1202 router that can be configured as a quad 12 x 1 AES, the audio buses can be switched independent of the video bus. If one wishes to have an audio bus independent of an AFV group switch, then that bus needs to be released from its AFV assignment using the *Input Setup* menu. This shall be described later in the manual. If audio 1B has been released from its AFV assignment it will switch as an independent bus.

When one selects the **1B** key it will light up and all other bus selection keys will extinguish. One of the twelve input keys will light and the display will show the audio input label for the selection. Pressing another input key will cause that input to be selected on that bus only.

In independent Audio Bus switching, switch selection will be disallowed if the input has been turned off in the *Input Setup* menu. A message **"Input turned off"** will be temporally displayed.

3.3. FRONT PANEL SETUP MENU

REFERENCE
- **Video Reference**
- **Output Timing**
- **Input Timing**
- **Audio Reference**

TRANSITION
- **Switch Line**
- **Video Line Sync**
- **Audio SoftSwitch**
- **EA SoftSwitch**

INPUT SETUP
- **AES Mode**
- **Audio Follow V1**
- **Audio Follow V2**
- **Video V1 and V2**
- **Audio 1A inputs**
- **Audio 1B inputs**
- **Audio 2A inputs**
- **Audio 2B inputs**
- **No Video Action**
- **Input Standard**

INPUT LABEL
- **Label Video**
- **Label Audio 1A**
- **Label Audio 1B**
- **Label Audio 2A**
- **Label Audio 2B**

OUTPUT SETUP
- **Setup V1 Output**
- **Setup V2 Output**

BYPASS
- **Bypass All A & V**

GPI SETUP
- **Disable All GPI's**
- **Enable All GPI's**
- **GPI Encoding**
- **GPI Type**
- **Program GPI's**

GPO SETUP
- **Disable All GPO's**
- **Enable All GPO's**
- **GPO Encoding**
- **GPO Type**
- **Program GPO's**

REMOTE CTL
- **Baud Rate**
- **Serial Format**
- **Serial Address**
- **Serial control**
- **Protocols**

PRESETS
- **Load Factory**
- **Load Preset 1**
- **Load Preset 2**
- **Save Preset 1**
- **Save Preset 2**

FIRMWARE
- **Firmware Version**
- **Firmware Update**

EXIT
- **Save and Exit**
- **Exit no Save**
- **Return to Menu**

Figure 3-2: Overview of the Setup Menu

The *SETUP* menu system uses the 16 digit alphanumeric display and provides a quick, intuitive method of configuring the Router. The *SETUP* Menu contains items that pertain to the overall operation of the router. These items are normally only required to be set up at installation time, and do not pertain to the day-to-day operation of the unit.

3.4. NAVIGATING THE SETUP MENU

To enter the on-screen menu system, press the **SETUP** key. This will bring you to the main *Setup* menu where you can use the ↑ **&** ↓ keys to move up and down the list of available sub-menus. Top level menu items are shown in UPPERCASE. Once you have chosen the desired sub-menu, press the **SELECT** key to select the next menu level.

Once in a sub-menu, there may be another menu layer (shown in Title Case), or there may be a list of parameters to adjust (shown in lower case). If there is another set of menu choices, use the ↑ **&** ↓ keys to select the desired menu item and press the **SELECT** key. Continue this process until you get to the bottom of the menu tree where the list of parameters to be adjusted is shown.

To adjust any parameter, use the ↑ **&** ↓ keys to move up or down to the desired parameter. To view the possible values for that item, press the **SELECT** key. The current value for that parameter will be shown blinking. Pressing the ↑ **&** ↓ keys allows you to show the possible values for the selected menu item. The various menu values that are not currently selected will NOT be blinking. When you have stopped at the desired value, press the **SELECT** key to save your selection. The value shown will begin blinking; indicating that it is the current value. To move up one level in the menu press the **SETUP** key. The parameter value that is blinking will become the current value when you exit the menu system by selecting the *Exit and Save* menu option.

You can select other parameters from that sub-menu by using the ↑ **&** ↓ keys, followed by the **SELECT** key. Alternately you can move up one menu item by pressing the **SETUP** key.

When you have made all the desired changes, press the **SETUP** key one or more times until you return to the top of the Menu tree where you will be presented with an Exit menu. Using the ↑ **&** ↓ keys, choose one of the three choices and then press the **SELECT** key. A description of the actions taken for each *Exit* menu choice is shown below. You will be prompted to press the **SELECT** key one more time to confirm your decision. Pressing the **SETUP** key at this time will return you to the *Exit* menu level.

SAVE AND EXIT	Selecting this option will make all the changes you made while in the *Setup* menu permanent. You will exit the *Setup* menu and return to normal front panel operation.
EXIT NO SAVE	Selecting this option will discard all the changes you made in the *Setup* menu and restore the settings that were in use when you entered the *Setup* menu. You will exit the *Setup* menu and return to normal front panel operation.
RETURN TO MENU	You will return to the top level of the *Setup* menu at the menu item you last selected.

Each of the menu items is described in the following sections.

3.5. FRONT PANEL SETUP MENU – MAIN MENU

The Front panel *Setup* menu is arranged in a layered structure that groups similar configuration items together. The following section gives a brief description of the first level of menus that appear when you enter the menu. Selecting one of these items will take you to the next menu level. Sections 3.6 to 3.16 provide detailed descriptions of each of the sub-menus. The tables in sections 3.6 to 3.16 are arranged in an indented structure to indicate the path taken to reach the control. Menu items or parameters that are underlined indicate the factory default values.

REFERENCE	This menu is used to set up the Genlock Reference.
TRANSITION	This menu is used to set up the Transition type for audio and video.
INPUT SETUP	This menu is used to assign which video and audio inputs are enabled and which audio buses are assigned to follow each of the video buses.
INPUT LABEL	This menu is used to change the default labels for the video and audio inputs.
OUTPUT SETUP	This menu is only available on the X1202H HD Router. It is used to select whether the video outputs will be reclocked on non-reclocked.
BYPASS	This menu is used to manually activate the video and audio bypass relays.
GPI SETUP	This menu is used to configure the 14 General Purpose inputs.
GPO SETUP	This menu is used to configure the 4 General Purpose outputs.
REMOTE CONTROL	This menu is used to configure the Serial Remote Control port.
PRESETS	This menu is used to save and recall user presets, and to restore the router to its factory default condition.
FIRMWARE	This menu is used to view the current firmware version and to upload new firmware into the router.

3.6. CONFIGURING THE ROUTER REFERENCES

The *ROUTER* menus are used to configure the reference timing for the router. The chart below shows the items available in the *REFERENCE* menu. On most routers, only the *Reference video* menu item is available. The other menu items are used for configuring the SoftSwitch™ features of routers fitted with the SoftSwitch™ option. Sections 3.8.1 and 3.8.3 give detailed information about each of the sub-menus.

Video Reference	Configures the video reference type.
Output Timing	Adjusts the timing of the video output V1 in relation to the Video Reference input on SoftSwitch™ equipped routers.
Input Timing	Adjusts the line synchronizer timing of the video output V1 in relation to the Video Reference input on SoftSwitch™ equipped routers.
Audio Reference	Selects the Audio reference on SoftSwitch™ equipped routers.

3.6.1. Setting up the Video Reference

The *Video Reference* menu is used to select the type of video reference being used for the router. The Video reference is used to control the switching point in the video when cross points are changed.

REFERENCE
- *Video Reference*
  - *ref:ntsc/60*
  - *ref:ntsc/59.94*
  - *ref:pal/50*

The standard definition X1200S series router can accept only NTSC or PAL video references.

REFERENCE
- *Video Reference*
  - *ref:ntsc/60*
  - *ref:ntsc/59.94*
  - *ref:pal/50*
  - *ref:1080i/60*
  - *ref:1080i/59.94*
  - *ref:1080i/50*
  - *ref:1080p/30**
  - *ref:1080p/29.97**
  - *ref:1080p/25**
  - *ref:1080p/24sF*
  - *ref:1080p/23.98sF*
  - *ref:720p/60*
  - *ref:720p/59.94*

The high definition X1200H series router can accept NTSC or PAL, or Tri-level sync HD video references.

In general, the reference video should be chosen to match the standard of the video program material passing through the router. For HD program video, a standard definition reference video can be used as long as it is at the same frame rate.

e.g.	HDSDI PGM Video	Analog Genlock Video
	1080i/59.94	NTSC/59.94 1080i/59.94
	1080i/50	PAL/50 1080i/50
	720p/59.94	NTSC/59.94 720p/59.94

* These Video Reference formats are not available on the SS and ESS versions of the X1200H

3.6.2. Setting up the Video Output Timing (SoftSwitch™ and Embedded SoftSwitch™ routers only)

REFERENCE
- *Output timing*
  - *Course phase = 1*

This menu item is used to set the vertical phase of the V1 output on the SoftSwitch™ and Embedded SoftSwitch™ versions of the routers. The course phase has valid values from 1 to the number of lines per frame and adjusts V1 output phase delayed with respect to reference video. The timing of the V2 output is not adjustable.

When the course phase is adjusted the “course phase” label will blink, when the incoming signal that was selected when entering the set up menu, is within the line synchronizer range.

3.6.3. Setting up the Video Line Synchronizer Timing (SoftSwitch™ and Embedded SoftSwitch™ equipped routers only)

REFERENCE
Input timing
line phase = 0

This menu item is used to set the line synchronizer acceptance range with respect to the video reference for the V1 output on the SoftSwitch™ and Embedded SoftSwitch™ routers.

Setting course phase to "1" and line phase to "0" are the standard settings. This will allow any incoming video signal with a +/- one half line timing with respect to the applied video reference, to switch cleanly on the V1 bus. The output on V1 will remain constant at 1 line delayed with respect to the applied video reference signal. The timing of the V2 output is not adjustable.

The line phase has following valid values:

1202S 0 to +/-700 samples (approx. +/- 25 μsec)
1202H 0 to +/-940 samples (approx. +/- 12 μsec) for 1080 line standards
1202H 0 to +/-620 samples (approx. +/- 8 μsec) for 720 line standards

***Line Phase* is specific to a particular video standard. Therefore, if the *Input Standard* is changed from a 1080 line standard to a 720 line standard, the *Line Phase* will be reset to 0, and must be set up again for the new video standard.**

The *Course Phase* and *Line Phase* adjustments are REAL TIME ADJUSTMENTS and will effect router timing even without the menu *EXIT AND SAVE* menu selection. The *EXIT AND SAVE* menu item will save the values while the *EXIT AND NO SAVE* menu item will return the router to the original values. For difficult timing situations the presets can be used for different timing setups.

3.6.4. Setting up the AES Audio Reference (SoftSwitch™ and Embedded SoftSwitch™ equipped routers only)

REFERENCE
Audio Reference
lock to video
lock 48 kHz DARS

This menu is used to select the type of audio reference being used for the SoftSwitch™ and Embedded SoftSwitch™ routers. These routers can accept a DARS reference signal to ensure the Z bit alignment on the AES outputs. If *video* is selected, the Z bit alignment of the AES outputs is random. If *DARS* is selected and the DARS reference is absent, the router will revert to *video* lock. On the SS routers, for the SoftSwitch™ technology to function correctly, the audio sources must be synchronous with the chosen *Audio Reference.*

On the ESS routers, for the Embedded SoftSwitch™ technology to function correctly, the AES sources must be synchronous with the *Video reference* and the A*udio Reference* for the router should be set to *video*. (If you are using a DARS reference with ESS, then the DARS reference must be locked to the video reference.) If Embedded SoftSwitch™ functionality is not required (e.g. Dolby E in the embedded stream) then the AE SoftSwitch can be disabled and the router can function the same as a SoftSwitch™ equipped router.

3.7. CONFIGURING THE VIDEO AND AUDIO TRANSITIONS

3.7.1. Configuring The Switch Line

TRANSITION
Switch Line
Switch line = 10

On the Standard Definition Routers this menu allows the user to select which line of the video reference the switching will occur on. Valid values are 1 to 64, with the default switch line set to 10.

TRANSITION
Switch Line
Switch line = 7

On HD routers this menu allows the user to select which line of the video reference the switching will occur on.

On routers that do not have SoftSwitch™ or Embedded SoftSwitch™, the switch line number will be the line number of the video reference.

On SoftSwitch™ and Embedded SoftSwitch™ equipped routers, when using a bi-level sync reference, the switch line number will be the equivalent line number in HD, as shown in Figure 3-3 and Figure 3-4. When using a tri-level sync reference, the switch line number will be the line number of the HD video reference. Valid values are 1 to 64, with the default switch line set to 7 as per SMPTE RP168-2002. For proper timing operation the *Input Standard* setting on the *INPUT SETUP* menu must be set to match the input video format. (See section 3.8.5)

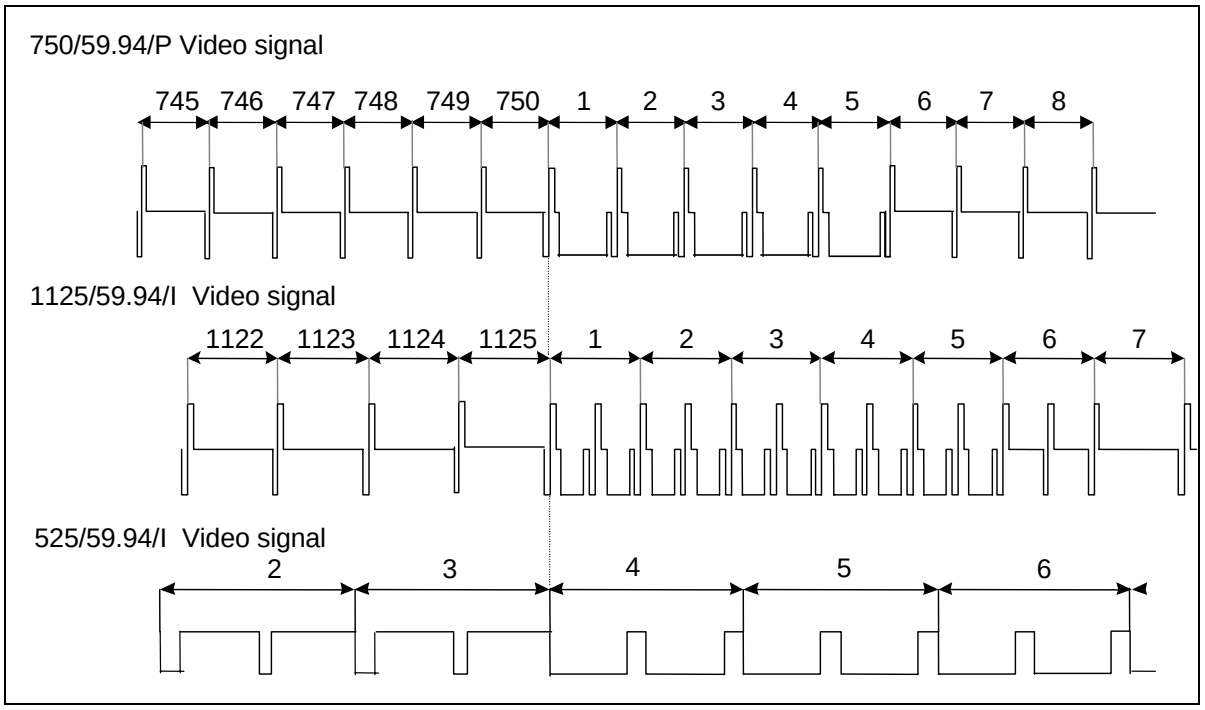

Figure 3-3: Switch Line Selection in 59.94 Hz Field Rate Systems

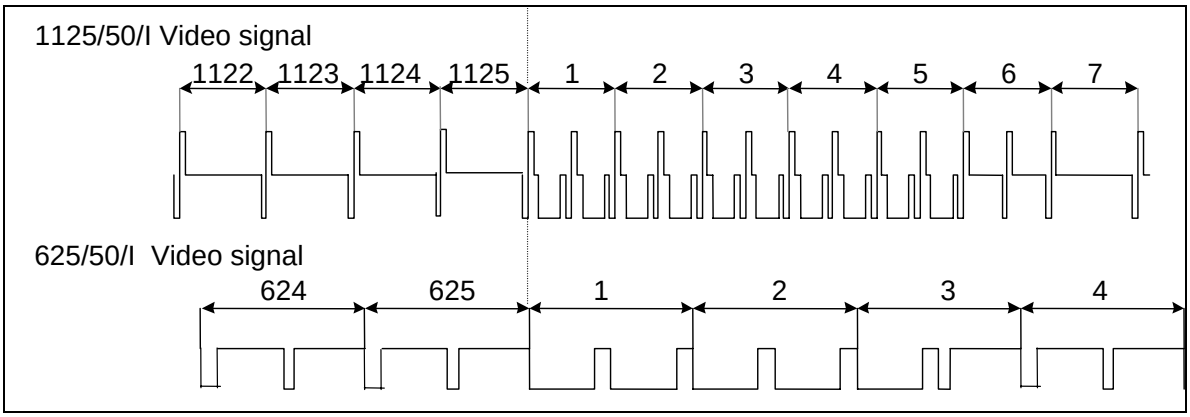

Figure 3-4: Switch Line Selection in 50 Hz Field Rate Systems

3.7.2. Enabling The Video Line Synchronizer For Clean Video Switches (SoftSwitch™ and Embedded SoftSwitch™ equipped routers only)

TRANSITION
Video Line Sync
line sync:off
line sync on

This menu allows the user to control the video line synchronizer function on the SoftSwitch™ and Embedded SoftSwitch™ equipped routers. The Line Synchronizer control only affects the V1 video bus output.

When the line synchronizer is set to *Off*, the router will provide a hard switch on the V1 bus.

When the line synchronizer is set to *On*, the router will provide a clean switch on the V1 bus when the input signals are within the line synchronizer range. If the input signal is outside the line synchronizer range the router will attempt to synchronize the signal but may cause timing shifts in the output picture.

3.7.3. Enabling The AES Audio SoftSwitch™ For Clean Audio Switches (SoftSwitch™ and Embedded SoftSwitch™ equipped routers only)

TRANSITION
Audio SoftSwitch
softswitch:off
softswitch:on

This menu allows the user to enable the Audio SoftSwitch™ on the SoftSwitch™ and Embedded SoftSwitch™ equipped routers. When Audio SoftSwitch is On, the router will provide a clean AES switch on the AES audio buses associated with the V1 bus.

This function can be turned *On* or *Off* and should be *Off* when switching non-linear audio sources such as Dolby E.

3.7.4. Enabling The Embedded Audio SoftSwitch™ For Clean Audio Switches (Embedded SoftSwitch™ equipped routers only)

TRANSITION
EA SoftSwitch
embedded ss:off embedded ss:on

This menu allows the user to enable the embedded audio SoftSwitch™ on the Embedded SoftSwitch™ equipped routers. When Embedded Audio SoftSwitch is On, the router will provide a clean audio switch on the audio embedded on the V1 bus.

This function can be turned *On* or *Off* and should be *Off* when switching non-linear embedded audio such as Dolby E.

3.8. CONFIGURING THE VIDEO AND AUDIO INPUTS

The *INPUT SETUP* menus are used to configure the input video standard for the router, to disable unused video and audio inputs, and to configure which Audio buses will follow video buses 1 and 2 in an 'Audio follow video' switch. The chart below shows the items available in the *INPUT SETUP* menu. Sections 3.8.1 and 3.8.3 provide detailed information about each of the sub-menus.

AES Mode	Configures whether the AES will be quad 12 x 1 or dual 12 x 2 configuration
Audio Follow V1	Configures which audio buses will follow the Video 1 bus
Audio Follow V2	Configures which audio buses will follow the Video 2 bus
Video V1 and V2	Allows the user to disable unused video inputs
Audio 1A inputs	Allows the user to disable unused inputs on the Audio 1A bus
Audio 1B inputs	Allows the user to disable unused inputs on the Audio 1B bus
Audio 2A inputs	Allows the user to disable unused inputs on the Audio 2A bus
Audio 2B inputs	Allows the user to disable unused inputs on the Audio 2B bus
No Video Action	Allows the user to determine the operation when there is no video input
Input Standard	Allows the user to set the input video standard for the router

3.8.1. Setting the Configuration of the AES Router Section (Early X1202H-AES Routers with 2 breakout panels only)

INPUT SETUP
- *AES mode*
  - *4(12 x 1)*
  - *2(12 x 2)*

Some early units fitted with the AES option were shipped with two breakout panels.

In the 2(12 x 2) configuration audio buses 1A and 1B are associated with video bus 1 and 2A and 2B are associated with video bus 2. The *Audio follow V1* and *Audio follow V2* menu items are disabled.

In the 4(12 x 1) configuration the four audio buses can be associated with either video bus V1 or V2 using the *Audio follow V1* and *Audio follow V2* menu items.

3.8.2. Setting up the Audio Follow Video Groups

On early units fitted with the AES option that were shipped with two breakout panels, when the *AES Mode* is set to 4(12x1), the *Audio Follow V1* and *Audio Follow V2* menu items set up which audio buses are assigned to follow video bus 1 and 2 respectively. For simplicity only the menu items for the V1 are shown in the manual. These menu items are disabled when these routers are in 2(12x2) mode, and for later routers shipped with one breakout panel.

INPUT SETUP
- *A Follow V1 Setup*
  - *AFV sel buss*
  - *1A*
  - *2B*
  - *2A*
  - *2B*

When you select this menu item the V1 button will be blinking. The buttons for the Audio buses that are assigned to V1 will be On. If you make any changes the V1 button will stop blinking

To remove an assigned audio bus press one of the illuminated buttons - the LED will go Off and a message (e.g. `1A available`) will be shown momentarily on the front panel.

To assign an available audio bus, click the non-illuminated buttons – the LED will go On and a message (e.g. `1A assigned`) will be shown momentarily on the front panel.

To confirm your selection press the **SELECT** button. The V1 button will start blinking again indicating that you have confirmed your changes.

3.8.3. Configuring Which Inputs Are Active

The *V1 and V2 Inputs, Audio 1A Inputs,* and *Audio 1B Inputs* menu items allow the user to disable unused inputs. When an input is disabled, the router will not perform a switch to that input even if the front panel button is pressed. Also, disabled inputs will not cause the Input failure tally output to trigger. Disabling inputs for each of the buses operate the same way but for simplicity only the *V1 and V2 Inputs* will be shown in the manual.

INPUT SETUP
V1 and V2 Inputs
video i/p setup

When you select this menu item the V1 and V2 buttons will be blinking. The buttons for the video inputs that are enabled will be On. If you make any changes the V1 and V2 buttons will stop blinking

To disable an input press the corresponding button - the LED will go Off and a message (e.g. `Input xx disabled`) will be shown momentarily on the front panel.

To enable an input press the corresponding button - the LED will go On and a message (e.g. `Input xx enabled`) will be shown momentarily on the front panel.

To confirm your selection press the **SELECT** button. The V1 and V2 buttons will start blinking again indicating that you have confirmed your changes.

On early units fitted with the AES option that were shipped with two breakout panels, when the *AES Mode* is set to 4(12x1), the *Audio 2A Inputs* and *Audio 2B Inputs* menu items allow the user to disable unused inputs on the Audio 2A and 2B buses. On these routers, when the *AES Mode* is set to 2(12x2), the inputs for the 2A and 2B buses are taken from the 1A and 1B inputs, so these menu items are disabled.

3.8.4. Configuring What To Do When There Is No Video Input Present

INPUT SETUP
No video action
no video:take
no video:no take
no video:black

This menu item determines whether a selected switch will occur if there is no video present on the selected input.

When it is set to *take* the switch to the input will be made.

When it is set to *no take* the switch will not be allowed.

On the HD SoftSwitch™ and SD or HD Embedded SoftSwitch™ routers there is an additional mode. When it is set to *black* and the Line synchronizer is turned on, the switch will be allowed and the video output will be black. When the Line synchronizer is turned off, the switch will be allowed and the output video will contain whatever is present at the input.

3.8.5. Configuring The Router Video Standard (HD SoftSwitch™ and Embedded SoftSwitch™ equipped routers only)

INPUT SETUP
Input Standard
std:1080i/60
std:1080i/59.94
std:1080i/50
std:1080p/24sF
std:1080p/23.98sF
std:720p/60
std:720p/59.94

The high definition X1202H series routers equipped with SoftSwitch™ and Embedded SoftSwitch™ have a line synchronizer to provide clean video switches. This menu item must be used to set the video standard in use in the router in order for the line synchronizer to work correctly.

3.9. LABELING THE VIDEO AND AUDIO INPUTS

The X1200 Series Routers provide a simple method of identifying each of the video sources with a 16 character label. The *INPUT LABEL* menu is used to change the default input labels for the video and audio inputs. You can either input the label text from a text file (see section 3.9.1), or manually update the individual input labels from the front panel (see section 3.9.2). The chart below shows the items available in the *INPUT LABEL* menu.

On early units fitted with the AES option that were shipped with two breakout panels, when the *AES Mode* is set to 4(12x1), the *Label Audio 2a* and *Label Audio 2b* menu items allow the user to label the inputs on the Audio 2A and 2B buses. On these routers, when the *AES Mode* is set to 2(12x2), the inputs for the 2A and 2B buses are taken from the 1A and 1B inputs, so these menu items are disabled.

Input Label File	Allows the user to upload and download input labels from a text file
Label Video	Allows the user to label the Video inputs
Label Audio 1a	Allows the user to label the Audio 1A inputs
Label Audio 1b	Allows the user to label the Audio 1B inputs
Label Audio 2a	Allows the user to label the Audio 2A inputs
Label Audio 2b	Allows the user to label the Audio 2B inputs

3.9.1. Uploading/Downloading Input Labels from a Text File

INPUT LABEL
Input Label File
Receive File
Send File

This menu item is used to upload and download Input Label text files with a terminal program.

Receive File allows you to upload new input labels from a text file.

Send File allows you to download the current input labels to a text file.

It is important to make sure that the structure of the text file that contains the router labels is correct, or the router will not accept any of the label definitions. The simplest way to create a file with the correct layout is to download the current labels from the router using the *Send File* menu option. You can then just edit the label names, and then upload the new file back to the router using the *Receive File* menu option.

Any serial protocol (remote panel or GVG) that is currently open on the remote port will be closed during the Label updating procedure. The serial protocol will be reopened once the upload or download has finished.

Use the procedure described in section 4.3 to upload label text files to the router.

3.9.2. Changing the Input Labels from the Front Panel.

From the *Input Label* menu use the ↑ **&** ↓ buttons and press the **SELECT** key to select the input bus you wish to label. The method of labelling each of the inputs is the same. The button corresponding to the bus you have chosen will blink. For simplicity the manual will describe how to label the video inputs.

Press the button corresponding to the input you wish to label. The label associated with the selected input bus will be displayed on the front panel with the leftmost character blinking. Use the ↑ **&** ↓ buttons to change the first character of the displayed label. When you change the blinking character, the bus LED will stop blinking. When you have selected the desired character, press the **SELECT** button to save the changes for the first character and advance to the next character. The bus LED will start blinking again indicating you have confirmed the changes to the first character. Follow the same procedure until you have finished entering the label. Make sure that you press the **SELECT** button after you change the rightmost character. Press the **SETUP** button to return to the *select input* menu. To change the label on another input press the desired input button and follow the same procedure. When you have changed all the labels for the selected bus, press the **SETUP** button to return to the *INPUT LABEL* menu.

3.10. CONFIGURING THE VIDEO OUTPUTS (HD ROUTERS ONLY)

The *OUTPUT SETUP* menus are used to configure the Video Outputs on the High Definition routers. This menu is not available on the Standard Definition routers. The chart below shows the items available in the *OUTPUT SETUP* menu. Section 3.10.1 provides detailed information about the sub-menus.

Setup V1 Output	Configures whether the outputs from Video Bus 1 will be reclocked or non-reclocked.
Setup V2 Output	Configures whether the outputs from Video Bus 2 will be reclocked or non-reclocked.

3.10.1. Selecting the Reclocking Mode of the HD Video Outputs (HD Routers only)

OUTPUT SETUP
- *Setup V1 Output*
  - *reclocked*
  - *non reclocked*

The *Setup V1 Output* and *Setup V2 Output* menu items determine if the respective video outputs will be reclocked or not. For simplicity only the menu items for V1 are shown in the manual.

When the router is operated in the *reclocked* mode it will pass only SMPTE 292M video.

When the router is operated in the *non relcocked* mode it will pass SMPTE 292M, SMPTE 259M and SMPTE 310M video.

3.11. MANUALLY ACTIVATING THE BYPASS RELAYS

The *BYPASS* menus are used to manually activate the Video and Audio bypass relays. (If the Bypass Relay Option is not installed this menu will be disabled.) The chart below shows the items available in the *BYPASS* menu. The relays will not activate until you exit the menu system with the *Exit and Save* menu option. Section 3.11.1 gives detailed information about the sub-menus.

Bypass All A & V	This menu allows the user to manually activate all video and audio bypass relays.

3.11.1. Manually Activating All the Bypass Relays

BYPASS *Bypass All A & V* *off* *on*	Manually activates all the bypass relays when set to *On*. Releases the bypass relays when set to *Off.*

3.12. CONFIGURING THE GENERAL PURPOSE INPUTS (GPI)

The X1200 series routers can be controlled remotely by using 14 general purpose (GPI) inputs. The functions of these inputs can be programmed to suit the specific requirements of the user. The *GPI SETUP* menus are used to configure the functions of the GPI inputs. The GPIs can be configured to act independently of each other or in one of three Encoded modes. In addition a global GPI disable function allows the user to override the programmed functions of GPIs. See section 2.5 for information about connecting the GPI inputs. The chart below shows the items available in the *GPI SETUP* menu. Sections 3.12.1 to 3.12.5 give detailed information about each of the sub-menus.

Disable all Gpi's	This menu allows the user to manually override the programmed functions of all GPI inputs and disable them.
Enable all Gpi's	This menu allows the user to turn off the manual override of the GPI inputs and return them to their programmed functions.
Gpi Encoding	This menu allows the user to choose one of 4 pre-defined encoding modes for the GPI inputs.
Gpi Type	This menu allows the user to select whether the GPI input will be level or edge triggered.
Program Gpi's	This menu allows the user to program different functions for the GPI inputs that are not previously assigned using one of the encoding modes.

3.12.1. How to Override (Temporarily Disable) the GPI Functions

GPI SETUP *Disable all Gpi's*	Pressing the **SELECT** key when this menu item is shown will override the programmed functions of all the GPI inputs. The GPI inputs will not respond when they are disabled.

3.12.2. How to turn off the GPI Override (Return the GPIs to their Programmed Functions)

GPI SETUP
Enable all Gpi's

Pressing the **SELECT** key when this menu item is shown will restore the programmed functions of all the GPI inputs. Individual GPIs can be still be disabled using the *Program Gpi's* menu item (see section 3.12.5).

3.12.3. Configuring the Encoding mode for the GPI Inputs

GPI SETUP
Gpi Encoding
gpi enc:none
gpi enc:standard
gpi enc:hex
gpi enc:afv hex

The GPIs can be configured to operate in one of 3 Encoded modes. In these modes, many of the GPI inputs are pre-assigned to a function. The unused inputs are still available for the user to assign to a particular function using the *Program Gpi's* menu item.

When the GPI Encoding is set to *none*, all 14 inputs are available for the user to assign to particular functions using the *Program GPI* menu item for the particular GPI. Section 3.12.5 describes how to program individual GPI functions.

Sections 3.12.3.1 to 3.12.3.3 describe how each of the GPI encoding modes works and which inputs are available for user assignment.

3.12.3.1. Standard GPI Encoding

Standard GPI encoding is designed to allow simple select an 'Audio follow Video' switch of one of the input groups to one of the output buses. There are twelve GPIs to select each input and two GPIs to perform the switch to either the AFV1 or AFV2 output buses.

GPI #	Action	Function
1	Low	Select Input 1
2	Low	Select Input 2
3	Low	Select Input 3
4	Low	Select Input 4
5	Low	Select Input 5
6	Low	Select Input 6
7	Low	Select Input 7
8	Low	Select Input 8
9	Low	Select Input 9
10	Low	Select Input 10
11	Low	Select Input 11
12	Low	Select Input 12
13	Falling Edge	Switch selected input to AFV1 Outputs
14	Falling Edge	Switch selected input to AFV2 Outputs

Table 3-1: Standard GPI Encoding Functions

3.12.3.2. HEX GPI Encoding

HEX GPI encoding is designed to audio follow video or breakaway switch selection. Four inputs are encoded to select one of the 12 inputs. Eight GPI inputs perform the switch to one of the video or audio buses or one of the AFV groups. There are two GPI inputs available for user defined functions.

GPI #	Action	Function
1	High or low Level	Four HEX encoded inputs select one of the 12 input buses – see Table 3-3
2		
3		
4		
5	Falling Edge	Switch selected input to V1 Output
6	Falling Edge	Switch selected input to V2 Output
7	Falling Edge	Switch selected input to 1A Output
8	Falling Edge	Switch selected input to 1B Output
9	Falling Edge	Switch selected input to 2A Output
10	Falling Edge	Switch selected input to 2B Output
11	High or low Level (only applicable when AES4 option installed)	High: GPI 7 to 10 control breakaway of audio associated with V1 video buss Low: GPI 7 to 10 control breakaway of audio associated with V2 video buss
12	Set by GPI type menu	Set by Program GPI Menu
13	Falling Edge	Switch selected input to AFV1 Outputs
14	Falling Edge	Switch selected input to AFV2 Outputs

Table 3-2: HEX GPI Encoding Functions

GPI 4	GPI 3	GPI 2	GPI 1	Input Select
Low	Low	Low	Low	Invalid selection
Low	Low	Low	High	1
Low	Low	High	Low	2
Low	Low	High	High	3
Low	High	Low	Low	4
Low	High	Low	High	5
Low	High	High	Low	6
Low	High	High	High	7
High	Low	Low	Low	8
High	Low	Low	High	9
High	Low	High	Low	10
High	Low	High	High	11
High	High	Low	Low	12
High	High	Low	High	Invalid selection
High	High	High	Low	Invalid selection
High	High	High	High	Invalid selection

Table 3-3: HEX Input Selection (HEX and AVF HEX Encoding)

3.12.3.3. AFV HEX GPI Encoding

AFV HEX GPI encoding is designed to permit separate audio follow video switch selection for both V1 and V2 buses. Four inputs are encoded to select one of the 12 inputs for the AFV1 group. Four inputs are encoded to select one of the 12 inputs for the AFV2 group. Two GPI inputs perform the switch to one of the AFV groups. There are four GPI inputs available for user defined functions.

GPI #	Action	Function
1	High or low Level	Four HEX encoded inputs select one of the 12 input buses – see Table 3-3
2		
3		
4		
5	High or low Level	Four HEX encoded inputs select one of the 12 input buses – see Table 3-5
6		
7		
8		
9	Set by GPI type menu	Set by Program GPI Menu
10	Set by GPI type menu	Set by Program GPI Menu
11	Set by GPI type menu	Set by Program GPI Menu
12	Set by GPI type menu	Set by Program GPI Menu
13	Falling Edge	Switch input selected by GPI1-4 to AFV1 Outputs
14	Falling Edge	Switch input selected by GPI5-8 to AFV2 Outputs

Table 3-4: AFV HEX GPI Encoding Functions

GPI 8	GPI 7	GPI 6	GPI 5	Input Select
Low	Low	Low	Low	Invalid selection
Low	Low	Low	High	1
Low	Low	High	Low	2
Low	Low	High	High	3
Low	High	Low	Low	4
Low	High	Low	High	5
Low	High	High	Low	6
Low	High	High	High	7
High	Low	Low	Low	8
High	Low	Low	High	9
High	Low	High	Low	10
High	Low	High	High	11
High	High	Low	Low	12
High	High	Low	High	Invalid selection
High	High	High	Low	Invalid selection
High	High	High	High	Invalid selection

Table 3-5: HEX Input Selection for AFV2 (AVF HEX Encoding)

3.12.4. Configuring Whether the GPI Inputs are Edge or Level Activated

- *GPI SETUP*
  - *Gpi Type*
    - *Gpi 1 type*
      - *gpi type:fall*
      - *gpi type:rise*
      - *gpi type:high*
      - *gpi type:low*

This menu configures whether the GPI inputs that are available for user functions will activate on rising or falling edges, or high or low levels.

Individual menus for each GPI input allow each input to be independently configured. For simplicity only the *Gpi 1 type* menu will be shown.

3.12.5. Programming the GPI Inputs Functions

The GPI inputs can be configured to operate in one of 4 modes using the *Gpi Encoding* menu item. In three of these modes, many of the GPI inputs have pre-assigned functions, and the unused inputs are available for the user to program for a specific function. In the fourth mode (when the GPI Encoding is set to *none*) all 14 GPI inputs are available for the user to program for specific functions.

The *Program Gpi* menu is used to program the functions of the GPI inputs that are available for user functions. Individual menus for each GPI input allow each input to be independently configured. For Simplicity only the *Gpi 1 type* menu will be shown.

- *GPI SETUP*
  - *Program Gpi's*
    - *Program Gpi 1*
      - *disable gpi*
      - *afv1 sel. i/p*
      - *afv2 sel. i/p*
      - *v1 sel. i/p*
      - *v2 sel. i/p*
      - *1a(afv1) sel i/p*
      - *1b(afv1) sel i/p*
      - *2a(afv1) sel i/p*
      - *2b(afv1) sel i/p*
      - *1a(afv2) sel i/p*
      - *1b(afv2) sel i/p*
      - *2a(afv2) sel i/p*
      - *2b(afv2) sel i/p*
      - *10xl v1 redirect*
      - *10xl v2 redirect*

If the GPI function is already determined by one of the encoding modes, the front panel will display a message such as `Gpi 1 Encoded`

The *afv1* and *afv2* functions will cause the selected video and associated audio inputs to switch to the indicated output buses.

The *v1* and *v2* functions will cause the selected video input to switch to the indicated output video bus.

The *1a, 1b, 2a* and *2b* functions will cause the selected audio input to switch to the output audio bus shown in brackets. (e.g. *1a(afv1)* will cause the selected audio input to switch to the 1a audio output associated with V1.)

The *10xl v1 and V2 redirect* functions will cause the respective video bus to respond to GVG 10XL serial command issues to address 0, in spite of the programmed *Serial Address* for that video bus. This feature allows both/either video bus to be controlled by standard Single drop GVG Protocol. See section 5.1 for further information about controlling the router using GVG 10XL Serial Protocol commands.

When one of these modes is selected the button corresponding to the selected input will blink. To select another input press the corresponding button (the input button LED will turn On) and confirm your selection by pressing the **SELECT** key (the input button LED will blink).

The *Disable GPI* option will turn off the GPI input

3.13. CONFIGURING THE GENERAL PURPOSE OUTPUTS (GPO)

The X1200 series routers have four general purpose (GPO) outputs that can be programmed to various functions to suit the specific requirements of the user. The *GPO SETUP* menus are used to configure the functions of the GPO outputs. See section 2.5 for information about connecting the GPO outputs. The chart below shows the items available in the *GPI SETUP* menu. Sections 3.13.1 to 3.13.5 give detailed information about each of the sub-menus.

Disable all Gpo's	This menu allows the user to manually override the programmed functions of all GPO outputs and disable them.
Enable all Gpo's	This menu allows the user to enable all GPO outputs and return them to their programmed functions.
Gpo Encoding	This menu allows the user to choose one of 3 pre-defined encoding modes for the GPO outputs.
Gpo Type	This menu allows the user to select whether the GPO output will be latched or momentary.
Program Gpo's	This menu allows the user to program different functions for the GPO outputs.

3.13.1. How to Override (Temporarily Disable) the GPO Functions

GPO SETUP
- *Disable all Gpo's*

Pressing the **SELECT** key when this menu item is shown will override the programmed functions of all the GPO outputs. The GPO outputs will be Off when they are disabled.

3.13.2. How to turn off the GPO Override (Return the GPOs to their Programmed Functions)

GPO SETUP
- *Enable all Gpo's*

Pressing the **SELECT** key when this menu item is shown will restore the programmed functions of all the GPO outputs. Individual GPOs can be disabled using the *Program Gpo's* menu item (see section 3.13.5).

3.13.3. Configuring the Encoding mode for the GPO Outputs

GPO SETUP
- *Gpo Encoding*
  - *gpo enc:none*
  - *gpo enc:hex v1*
  - *gpo enc:hex v2*

The GPOs can be configured to operate in one of 2 Encoded modes. In these modes, the GPO outputs are pre-assigned to provide encoded tallies of the router input selections for the V1 or V2 buses. Section 3.13.3.1 describes how the GPO encoding modes work.

When the GPO Encoding is set to *none*, all 4 outputs are available for the user to assign to particular functions. Section 3.13.5 describes how to program the individual GPO functions

3.13.3.1. HEX GPO Encoding

The *HEX V1* and *HEX V2* GPO encoding modes are designed to allow the four GPO outputs to give tallies for either the V1 or V2 buses respectively. The four General purpose outputs are encoded to provide tallies to indicate which one of the 12 inputs is currently routed to the video bus as shown in Table 3-6. The encoded tally is held low while the respective video input is routed to the video output bus.

GPO 4	GPO 3	GPO 2	GPO 1	Output Select
Low	Low	Low	Low	Power Off
Low	Low	Low	High	1
Low	Low	High	Low	2
Low	Low	High	High	3
Low	High	Low	Low	4
Low	High	Low	High	5
Low	High	High	Low	6
Low	High	High	High	7
High	Low	Low	Low	8
High	Low	Low	High	9
High	Low	High	Low	10
High	Low	High	High	11
High	High	Low	Low	12

Table 3-6: HEX Encoded Output Tallies

3.13.4. Configuring Whether the GPO Outputs are Latched or Momentary

GPO SETUP
- *Gpo Type*
  - *Gpo 1 type*
    - *gpo type:latch*
    - *gpo type:1/2 sec*

This menu configures whether the GPO outputs that are available for user functions will be latched or momentary (0.5 seconds in duration) when the GPO encoding is set to *none*.

Individual menus for each GPO output allow each output to be independently configured. For simplicity only the *Gpo 1 type* menu will be shown.

3.13.5. Programming the GPO Output Functions

GPO SETUP
- *Program Gpo's*
  - *Program Gpo 1*
    - *disable gpo*
    - *power failure*
    - *output v1 fail.*
    - *output v2 fail.*
    - *ref. video fail.*
    - *any v i/p fail.*
    - *sel. v i/p fail.*
    - *sel. v1 i/p tally*
    - *sel. v2 i/p tally*

The *Program Gpo* menu is used to program the functions of the GPO outputs that are available for user functions. Individual menus for each GPO output allow each output to be independently configured. For simplicity only the *Program Gpo 1* menu will be shown.

Disable GPO will turn off the GPO output

The rest of the GPO functions will cause one of the outputs to activate as a tally for various conditions as shown in the chart below.

When one of the sel. xx i/p modes is selected the button corresponding to the selected input will blink. To select another input press the corresponding button (the input button LED will turn On) and confirm your selection by pressing the SELECT key (the input button Led will blink).

3.14. CONFIGURING THE REMOTE CONTROL PORT OPERATION

The X1200 series routers can be externally controlled using the REMOTE CONTROL port, or can operate as a controller to another slave router. The *REMOTE CTL* menu is used to configure the parameters and protocol for the Remote Control Port. The chart below shows the items available in the *GPI SETUP* menu. Sections 3.13.1 to 3.13.5 give detailed information about each of the sub-menus. Also see section 2.6 and chapter 5 for specific information about connecting the router to the external device.

Baud Rate	This menu allows the user to set the baud rate.
Serial Format	This menu allows the user to set the serial data format (word length, parity and stop bits)
Serial Address	This menu allows the user to select address of the router that is required for multi-drop protocols.
Serial Control	This menu allows the user to select whether the router will be the master (controller) or slave (controlled) device.
Protocol	This menu allows the user to select which control protocol will be used.

3.14.1. Selecting the Baud Rate for Remote Control Port

REMOTE CTL
- *Baud Rate*
  - *baud:9600* (default)
  - *baud:19200*
  - *baud:38400*

This menu item is used to select the baud rate used by the Remote Control port. The baud rate normally will vary depending on the routing switcher control device. The *Serial Format, Serial Address, Serial Control* settings must also be set to match the desired control protocol.

3.14.2. Selecting the Serial Data Format for the Remote Control Port

REMOTE CTL
- *Serial Format*
  - *format:8.n.1* (default)
  - *format:8.e.1*
  - *format:8.o.1*
  - *format:7.n.1*
  - *format:7.e.1*
  - *format:7.o.1*

This menu item is used to select the serial data format used by the Remote Control port. The data format normally will vary depending on the routing switcher control device. The *Baud Rate, Serial Address, Serial Control* settings must also be set to match the desired control protocol.

3.14.3. Selecting the Serial Control Address

REMOTE CTL
Serial Address
address = 1 *valid address values are 0 to 64*

The GVG Ten XL protocol allows multiple devices to be addressed. The *Serial Address* menu item is used to set a unique address for each router that is connected. When the X1200 series router is operating in *master* mode, it will send out commands to the router that matches its *serial address*. When the X1200 series router is operating in the *slave* mode, it will only respond to commands that match its *serial address.* If two X1200 series routers are connected in a master/slave configuration, then the address of both routers must be set the same. For more information about addressing both video bus outputs using the GVG Ten XL protocol see section 5.1

Use the ↑ and ↓ arrows to select the desired address and press the **SELECT** key to confirm the new address.

The *Baud Rate, Serial Format* and *Serial Control* settings must also be set to match the desired control protocol.

3.14.4. Selecting the Serial Data Control Mode

REMOTE CTL
Serial Control
control:slave *control:master*

This menu item is used to select whether the router will issue commands or respond to commands on the Remote Control port.

When set to *master*, the router will issue commands using the currently selected protocol.

When set to *slave*, the router will respond to commands it receives on the control port.

The *Baud Rate, Serial Format,* and *Serial Address* settings must also be set to match the desired control protocol.

3.14.5. Selecting the External Remote Control Protocol

REMOTE CTL
Protocols
gvg ten xl ascii *remote panel*

This menu item is used to select the protocol used for control by routing switcher control devices.

The *Baud Rate, Serial Format, Serial Address* and *Serial Control* settings must also be set to match the desired control protocol.

When the Protocol is set to *Remote Panel* the 1202-REMOTE remote control panel can be connected to this port. In this mode, the *Baud Rate* and *Serial Format* settings are forced to *9600 baud, 8.n.2.* Also, the physical port wiring must be changed to RS-422 as described in section 2.4.2.

3.15. SAVING AND RECALLING CONFIGURATION PRESETS

The *PRESETS* menu allows the user to save specific configurations to one of two non-volatile presets. Using this menu, these presets can be restored, or the user can restore the router to its factory preset configuration. The chart below shows the items available in the *PRESETS* menu. Sections 3.13.1 to 3.13.5 give detailed information about each of the sub-menus.

Load Factory	This allows the user to restore the router to the factory default configuration.
Load Preset 1	This allows the user to recall the router configuration in user preset 1.
Load Preset 2	This allows the user to recall the router configuration in user preset 2.
Save Preset 1	This allows the user to save the current router configuration to user preset 1.
Save Preset 2	This allows the user to save the current router configuration to user preset 2.

3.15.1. How to Restore the Factory Default Settings

PRESETS
- *Load Factory*

This menu item is used to restore the factory default values of all the programmable features in the router.

Pressing the **SELECT** key when this menu item is shown will prompt you to confirm that you want to load the Factory Default configuration. Doing this will override all of your current configuration items. To proceed, press the **SELECT** key one more time. The front panel display will briefly show a message indicating that the Factory default configuration has been loaded. The configuration will become active until you exit the menu system with the *Exit and Save* menu option.

3.15.2. How to Recall a Saved User Preset Configuration

PRESETS
- *Load Preset 1*

This menu item is used to recall the values of all the programmable features in the router saved in user preset 1. (A similar menu item allows you to recall user preset 2).

Pressing the **SELECT** key when this menu item is shown will prompt you to confirm that you want to load the user preset configuration. Doing this will override all of your current configuration items. To proceed, press the **SELECT** key one more time. The front panel display will briefly show a message indicating that the user preset configuration has been loaded. The configuration will become active until you exit the menu system with the *Exit and Save* menu option.

3.15.3. How to Save the Router Configuration to a User Preset

PRESETS
Save Preset 1

This menu item is used to save the values of all the programmable features of the router in user preset 1. (A similar menu item allows you to save into user preset 2).

Pressing the **SELECT** key when this menu item is shown will prompt you to confirm that you want to save the current configuration to the user preset. Doing this will overwrite the values currently saved in the user preset. To proceed, press the **SELECT** key one more time. The front panel display will briefly show a message indicating that the user preset configuration has been saved. The saved preset configuration will copied to the non-volatile memory when you exit the menu system with the *Exit and Save* menu option. (It takes approximately 30 seconds to complete the copy to non-volatile memory after you exit the menu.)

3.16. MANAGING THE ROUTER FIRMWARE

The *FIRMWARE* menu allows the user to view the Firmware version and to update the firmware to a new version. The chart below shows the items available in the *FIRMWARE* menu. Sections 3.13.1 to 3.13.5 provide detailed information about each of the sub-menus.

Firmware Version	This allows the user to view the current firmware version.
Firmware Update	This allows the user to update the firmware in the router.

3.16.1. Reading the Router Firmware Version

FIRMWARE
Firmware Version

This menu item is used to read the firmware version of the router.

3.16.2. How to Update the Router Firmware

FIRMWARE
Firmware Update
Sel to upgrade

This menu item is used to initiate an upload of new firmware into the router.

Pressing the **SELECT** key when this menu item is shown will prompt you to confirm that you want to update the firmware. Doing this will erase the current firmware. To proceed, press the **SELECT** key one more time. The front panel display will show a message indicating that the router is waiting for you to upload new firmware. See section 4.2 for more information on updating the firmware.

CHAPTER 4: TECHNICAL DESCRIPTION

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4. TECHNICAL DESCRIPTION

4.1. SPECIFICATIONS

4.1.1. Video Specifications (X1200S Series)

4.1.1.1. SDI Video Inputs

Standards: SMPTE 259M (270Mb/s, 360Mb/s, 540Mb/s)
Number of Inputs: 12
Connector: BNC per IEC 60169-8 Amendment 2
Equalisation: Automatic up to 250m @ 270 Mb/s with Belden 8281 or equivalent cable
Return Loss: > 15 dB up to 540 Mb/s

Input Timing: (V1 bus on SoftSwitch™ and Embedded SoftSwitch™ equipped models only)
Input Range: measured with respect to the Genlock reference
± one half line when *Course phase* = 1, *Fine phase* = 0

4.1.1.2. SDI Video Outputs

Standard: Same as Input
Number of Outputs:
X1201S 1 bus, 2 outputs, input 1 bypass protected when bypass relay option is installed
X1202S 2 busses, 2 outputs per buss, input 1 and 12 bypass protected when bypass relay option is installed
Connector: BNC per IEC 60169-8 Amendment 2
Signal Level: 800mV nominal
DC Offset: 0V ±0.5V
Rise and Fall Time: 200ps nominal
Overshoot: <10% of amplitude
Return Loss: > 15 dB up to 540 Mb/s
Wide Band Jitter: < 0.2 UI
Output Timing: (V1 bus on SoftSwitch™ and Embedded SoftSwitch™ equipped Models only)
Output phase: measured with respect to the Genlock reference
Adjustable 1 line to a full frame of delay - set by *Coarse phase* parameter

Note: While the output timing is adjustable, the active video content will align to the nearest line. Output timing is measured with respect to the Genlock reference and is associated to the V1 Bus Only

4.1.2. Video Specifications (X1200H Series)

4.1.2.1. HD Video Inputs

Standards:
Reclock mode: SMPTE 292M (1.5 Gb/s)
Non-reclock mode: SMPTE 259M (270Mb/s, 360Mb/s, 540Mb/s), DVB-ASI, SMPTE 310M (19.4 Mb/s)

Number of Inputs: 12
Connector: BNC per IEC 60169-8 Amendment 2
Equalisation: Automatic up to 100m with Belden 1694 or equivalent cable
(50 m on Inputs 1 and 12 when the optional Bypass relays are installed)
Return Loss: > 15 dB up to 1.5 Gb/s

Input Timing: (V1 bus on SoftSwitch™ and Embedded SoftSwitch™ equipped models only)
Input Range: Measured with respect to the Genlock reference
± one half line when *Course phase* = 1, *Fine phase* = 0

4.1.2.2. HD Video Outputs

Standard: Same as Input
Number of Outputs:
X1201H 1 bus, 2 outputs, input 1 bypass protected when bypass relay option is installed
X1202H 2 buses, 2 outputs per bus, input 1 and 12 bypass protected when bypass relay option is installed
Reclocking on outputs may be turned off on each bus independently.
Connector: BNC per IEC 60169-8 Amendment 2
Signal Level: 800mV nominal
DC Offset: 0V ±0.5V
Rise and Fall Time: 200ps nominal
Overshoot: <10% of amplitude
Wide Band Jitter: < 0.2 UI
Return Loss: > 15 dB up to 1 Gb/s, > 12 dB up to 1.5 Gb/s
Output Timing: (V1 bus on SoftSwitch™ and Embedded SoftSwitch™ equipped Models only)
Output phase: measured with respect to the Genlock reference
Adjustable 1 line to a full frame of delay - set by *Coarse phase* parameter

Note: While the output timing is adjustable, the active video content will align to the nearest line. Output timing is measured with respect to the Genlock reference and is associated to the V1 Bus Only

4.1.3. Video Reference

Type: Menu selectable - depends on video format (See section 2.1.4)
NTSC or PAL Colour Black 1 V p-p
Composite bi-level sync (525i/59.94 or 625i/50) 300 mV
HD Tri-level Sync (X1202H versions only)
Connectors: BNC per IEC 60169-8 Amendment 2
Termination: High impedance loop through

4.1.4. AES Audio Inputs

Standards: SMPTE 276M single ended AES
Number of Inputs:
- **X1201-AES** 2 groups of 12 (on one 1201ABO AES Breakout panel provided with router)
- **X1201-AES4** 4 Groups of 12 (on two 1201ABO AES Breakout panels provided with router)
- **X1202-AES** 2 Groups of 12(on one 1202ABO AES Breakout panel provided with router)
- **X1202-AES4** 4 Groups of 12(on two 1202ABO AES Breakout panels provided with router)

Connector: BNC per IEC 60169-8 Amendment 2 on breakout panels provided with router
Signal Level: 1 V p-p ± 10%

4.1.5. AES Audio Outputs

Standards: SMPTE 276M single ended AES
Number of Outputs:
- **X1201-AES** 2 busses, 2 outputs per bus
- **X1201-AES4** 4 busses, 2 outputs per bus,
  On X1201 routers, input 1 bypass protected when bypass relay option is installed
- **X1202-AES** 4 busses, 1 output per bus
- **X1202-AES4** 8 busses, 1 output per bus
  On X1202 routers, inputs 1 and 12 bypass protected when bypass relay option is installed

Connector: BNC per IEC 60169-8 Amendment 2 on breakout panels provided with router
Signal Level: 1 v p-p
Reference: From Video Reference.
On SoftSwitch™ equipped routers, menu selectable to Video or DARS.
On Embedded SoftSwitch™ equipped routers, menu selectable to Video or DARS when Embedded SoftSwitch™ is disabled. When Embedded SoftSwitch™ is enabled audio must be referenced from video reference.

4.1.6. DARS Reference (SoftSwitch™ and Embedded SoftSwitch™ equipped routers only)

Type: Digital Audio Signal with 48Khz sample rate.
Standard: SMPTE 276M-1995 single ended AES
Connectors: BNC per IEC 60169-8 Amendment 2
Termination: High impedance loop through

4.1.7. GPI Control Port

Number of Inputs: 14 opto-isolated, programmable functions
Number of Outputs: 4 sets of relay contacts, normally closed, programmable functions
Relay Max Ratings: 1 A at 30 V DC

4.1.8. Serial Remote Control

Standard: RS-232 or RS-422, programmable baud rate
Connector: 9 pin female “D”
Protocol: GVG Ten XL ASCII, master or slave or Remote Control Panel

4.1.9. Electrical

Voltage: Auto ranging 100 - 240 Volts AC, 50/60 Hz
Power: 30 VA
Fuse Rating: 250 V, 1amp time delay
Safety: ETL Listed, complies with EU safety directives
EMI/RFI: Complies with FCC Part 15 Class A regulations
Complies with EU EMC directive

4.1.10. Physical

Dimensions: 19“ W x 1.75” H x 18.75” D.
(483mm W x 45mm H x 477mm D)
Weight: 8 lbs. (3.5Kg)

4.2. UPGRADING FIRMWARE

The X1200 series routers contain firmware that is contained in a FLASH EPROM device. From time to time firmware updates will be provided to add additional features to the unit.

You will need the following equipment in order to update the X1200 Router Firmware:

- PC with available communications port. The communication speed is 57600 baud, therefore a 486 PC or better with a 16550 UART based communications port is recommended.
- “Straight-thru” serial extension cable (DB9 female to DB9 male) or (DB25 female to DB9 male).
- Terminal program that is capable of Xmodem file transfer protocol. (such as HyperTerminal)
- New firmware supplied by Evertz.

4.2.1. Step 1 – Terminal Program Setup

1. Connect the serial cable to the **SERIAL REMOTE** DB9 connector on the rear panel

2. Connect the 9 pin connector on the end of the serial update cable to the PCs’ RS-232 communications port.

3. Start the terminal program.

4. Configure the port settings of the terminal program as follows:

Baud	**57600**
Parity	**no**
Data bits	**8**
Stop bits	**2**
Flow Control	**None**

5. Power up the X1200 series router unit.

4.2.1.1. Step 2 – Invoke Upload Mode Via The Front Panel

If you cannot invoke the upload mode via the front panel outlined in Step 2 then follow the steps in Step 3.

6. You can invoke the Software upgrade mode using the front panel Setup Menu. (See section 3.2 for information on how to operate the front panel menus.)

   - Press the **SETUP** button once to enter the front panel menu.
   - Press the ↑ **&** ↓ keys until the front panel display reads `FIRMWARE.`
   - Press the **SELECT** button then press the ↑ **&** ↓ keys until the front panel display reads `Firmware Update.`
   - Press the **SELECT** button and the front panel display should now show the message `Sel to upgrade`.
   - Press the **SELECT** button to confirm the *Upgrade* operation, or press the **SETUP** button three times to return to top of the menu tree where you will be presented with the exit menu. (see section 3.4)
   - Proceed to Step 4 for instructions on uploading the firmware.

4.2.1.2. Step 3 – Invoke Upload Mode From The Terminal Program

In the event that you cannot initiate upload mode from the front panel menu, you may send commands to the Router to initiate upload mode using the terminal program.

7. Power up the X1200 Router. After the unit powers up, a banner with the boot code version information should appear in the terminal window. The cursor to the right of the word BOOT> should be spinning for about 5 seconds then the unit will continue to boot.

   For example:

```
EVERTZ MCF5407 MONITOR 2.3 BUILD 8
COPYRIGHT 1997, 1998, 1999, 2000, 2001, 2002 EVERTZ MICROSYSTEMS LTD.
28F160C3B FLASH DETECTED
BRD=X1202
MODEL=X1202H-AES4-SS
PROD=X1202H-AES4-SS
FRAME=9000SFF
MCF5407 COLD BOOT> |
```

8. The following is a list of possible reasons for failed communications:

   - Defective Serial Upgrade cable.
   - Wrong communications port selected in the terminal program.
   - Improper port settings in the terminal program. (Refer to step 7 for settings). Note that HyperTerminal will not change port settings while connected. Click on HyperTerminal's "Disconnect" Button then click the "Reconnect" button to activate changes to the port settings.

9. While the cursor is spinning press the <CTRL> and <X> keys on your computer keyboard at the same time, this should stop the cursor from spinning. The spinning prompt will only remain for about 5 seconds. You must press <CTRL-X> during this 5 second delay. If the unit continues to boot-up, simply cycle the power and repeat this step.

10. Hit the <ENTER> key on your computer once.

11. Type the word “upgrade”, without quotes, and hit the <ENTER> key once.

12. The boot code will ask for confirmation. Type "y", without quotes.

13. You should now see a prompt asking you to upload the file.

4.2.2. Step 4 – Uploading the new firmware

14. Upload the “*.bin” file supplied using the X-Modem transfer protocol of your terminal program. If you do not start the upload within 10 minutes the unit’s Boot code will time out. You can restart the upgrade process by power cycling the unit.

15. The boot code will indicate whether the operation was successful upon completion of the upload.

    For Example:

```
UPLOAD OKAY
MCF5407 COLD BOOT> |
```

16. The following is a list of possible reasons for a failed upload:

- If you get the message "transfer cancelled by remote" you must restart the terminal program and load the bin file, then remove and install the module again.
- The supplied “*.bin” file is corrupt.
- Wrong file specified to be uploaded.
- Wrong file transfer protocol used – make sure you specify Xmodem, not Xmodem 1K.
- The PCs’ RS-232 communications port cannot handle a port speed of 57600.
- Noise induced into the Serial Upgrade cable.

4.2.3. Step 5 – Completing the Upgrade

17. Type the word “boot”, without quotes, and hit the <ENTER> key once or power cycle the unit. The unit should now reboot.

18. You can now close the terminal program and disconnect the RS-232 serial cable from the PC.

4.3. UPLOADING ROUTER INPUT LABELS FROM A TEXT FILE

The *Input Label File* menu item allows labels for the video and audio inputs to be input from the serial port of the router using a simple terminal program such as HyperTerminal. It is important to make sure that the structure of the text file that contains the router labels is correct, or the router will not accept any of the label definitions. The simplest way to create a file with the correct layout is to download the current labels from the router using the *Send File* menu option. You can then edit the label names, and then upload the new file back to the router using the *Receive File* menu option.

Any serial protocol (remote panel or GVG) that is currently open on the remote port will be closed during the Label updating procedure. The serial protocol will be reopened once the upload or download has finished.

The following procedure describes the process used to upload labels to the router:

4.3.1. Step 1 – Terminal Program Setup

1. Connect a 'straight through' serial cable to the **SERIAL REMOTE** DB9 connector on the rear panel.

2. Connect the 9 pin connector on the end of the serial update cable to the PCs' RS-232 communications port.

3. Start the terminal program.

4. Configure the port settings of the terminal program as follows:

Baud	**57600**
Parity	**no**
Data bits	**8**
Stop bits	**2**
Flow Control	**None**

   If you are using HyperTerminal this is done using the *File/Properties* menu item. Note that HyperTerminal will not change port settings while connected. Click on HyperTerminal's "Disconnect" Button then click the "Reconnect" button to activate changes to the port settings.

5. Configure the terminal program to capture text to a file. If you are using HyperTerminal this is done using the *Transfer/Capture Text* menu item.

4.3.2. Step 2 – Download the Current Labels from the Router

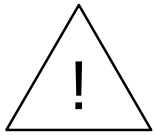
6. Invoke the *Label Send File* mode using the front panel Setup Menu. (See section 3.4 for information on how to operate the front panel menus.)

   - Press the **SETUP** button once to enter the front panel menu.
   - Press the ↑ **&** ↓ keys until the front panel display reads `INPUT LABEL.`
   - Press the **SELECT** button
   - Press the ↑ **&** ↓ keys until the front panel display reads `Input Label File.`
   - Press the **SELECT** button.
   - Press the ↑ **&** ↓ keys until the front panel display reads `Send file?`
   - Press the **SELECT** button to send the file to the terminal program

7. When you have captured the file, you will need to close the capture file. If you are using HyperTerminal this is done using the *Transfer/Capture Text* menu item again.

4.3.3. Step 3 – Editing the Label Text File

8. Using a text editor such as Notepad, edit the input labels in the file you have captured.



Note: It is not recommended that you use a word processor such as Microsoft Word, as it may append hidden control codes into the text file that will not allow the edited file to be uploaded correctly to the router.

The file structure is as follows:

```
[category_a]<CR><LF>
labelvar_a1=value 1<CR><LF>
labelvar_a3=value 2<CR><LF>
labelvar_a2=value 3<CR><LF>
[category_b]<CR><LF>
labelvar_b1=value<CR><LF>
labelvar_b2=value<CR><LF>
<CR><LF>
<CR><LF>
<CR><LF>
Note: <CR><LF> = Enter key
```

Each category is enclosed in square brackets [] and identifies the input category (e.g.`[VIDEO]`, `[AUDIO1A]`) for a group of associated label variables. The label variables must follow their associated category in the file and represent the label names that can be changed in the router. The value that follows the equals sign is a 16 character maximum length text string that is assigned to the variable. Alphanumeric characters such as a-z, A-Z, 0-9 and punctuation (ISO Character values 32 to 126) are valid. Label variables can be in any order as long as they occur in the correct category section of the file. Physical inputs on the router that do not have an associated label variable will retain their original value when the label file is uploaded to the router. If a label variable is specified more than once, the last value in the file will be used.

4.3.4. Step 4 – Upload the New Label file to the Router

9. Invoke the *Label Receive File* mode using the front panel Setup Menu. (See section 3.2 for information on how to operate the front panel menus.)

   - Press the **SETUP** button once to enter the front panel menu.
   - Press the ↑ **&** ↓ keys until the front panel display reads `INPUT LABEL.`
   - Press the **SELECT** button
   - Press the ↑ **&** ↓ keys until the front panel display reads `Input Label File.`
   - Press the **SELECT** button.
   - Press the ↑ **&** ↓ keys until the front panel display reads `Receive file?`
   - Press the **SELECT** button. A text prompt `Send file to router now` will appear on the terminal program screen.

10. Configure the terminal program to send the label text file. If you are using HyperTerminal this is done using the *Transfer/Send Text File* menu item.

11. Exit the menu system by pressing the **SETUP** key one or more times until you return to the top of the Menu tree where you will be presented with an Exit menu. Using the ↑ **&** ↓ keys, choose the *SAVE AND EXIT* item and then press the **SELECT** key. You will be prompted to press the **SELECT** key one more time to confirm your decision.

4.3.5. Sample Label Text Files

Example 1

The category [AUDIO2B] is before the category [VIDEO] but will still be accepted. Variables input4_audio2B to input12_audio2B for category [AUDIO2B] will not be modified. For category [VIDEO], input1_video is specified more than once so the last occurrence is used.

```
[AUDIO2B]
input1_audio2B=INPUT # 1 (2B)
input2_audio2B=INPUT # 2 (2B)
input3_audio2B=INPUT # 3 (2B)
[VIDEO]
input1_video=Input # 1 Video
input2_video=Input # 2 Video
input1_video=Test # 1 Video
```

Example 2

All the variables for the category [VIDEO] are in alphabetic order. Variables input4_audio2B to input7_audio2B for [AUDIO2B] are out of order but will still be accepted.

```
[VIDEO]
input1_video=Input # 1 Video
input2_video=Input # 2 Video
input3_video=Input # 3 Video
input4_video=Input # 4 Video
input5_video=Input # 5 Video
input6_video=Input # 6 Video
input7_video=Input # 7 Video
input8_video=Input # 8 Video
input9_video=Input # 9 Video
input10_video=Input # 10 Video
input11_video=Input # 11 Video
input12_video=Input # 12 Video
[AUDIO2B]
input1_audio2B=INPUT # 1 (2B)
input2_audio2B=INPUT # 2 (2B)
input3_audio2B=INPUT # 3 (2B)
input8_audio2B=INPUT # 8 (2B)
input9_audio2B=INPUT # 9 (2B)
input10_audio2B=INPUT # 10 (2B)
input11_audio2B=INPUT # 11 (2B)
input12_audio2B=INPUT # 12 (2B)
input4_audio2B=INPUT # 4 (2B)
input5_audio2B=INPUT # 5 (2B)
input6_audio2B=INPUT # 6 (2B)
input7_audio2B=INPUT # 7 (2B)
```

Example 3

Category [AUDIO2B] has a variable that does not belong to it (input1_video). An error message will be displayed on HyperTerminal and on the router front panel indicating the reason.

```
[AUDIO2B]
input1_audio2B=INPUT # 1 (2B)
input2_audio2B=INPUT # 2 (2B)
input3_audio2B=INPUT # 3 (2B)
input1_video=Input # 1 Video
```

HyperTerminal output:

```
Warning: Unrecognized variable: input1_video
Error: Some labels or variables were not recognized
```

Front panel output:

```
Bad labels/vars
```

CHAPTER 5: SERIAL CONTROL

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5. SERIAL CONTROL OF THE ROUTERS

5.1. GVG TEN-XL ASCII PROTOCOL

The following sections are provided as a technical reference for programmers who want to write their own software to control the Evertz X1200 series routers using the GVG TEN-XL ASCII command protocol. There are some hardware differences between the X1200 series routers and the Grass Valley TEN-XL routers, which have required differences in implementation of the protocol for the X1200 series routers.

The GVG Ten XL protocol allows multiple devices to be addressed on a multi-drop serial connection. The GVG TEN-XL protocol was originally designed to control 10 x 1 routers, therefore each video bus (with its associated audio buses) in the X1200 routers has its own address. In the X1202 routers, these addresses are the one set in the *Serial Address* menu item and the next high number. (i.e. if the *Serial Address* menu item is set to 10, then address 10 will correspond to video bus 1 and its associated audio buses, and address 11 will correspond video bus 2 and its associated audio buses. In the X1201 routers only the serial address set in the *Serial Address* menu is used.

Some implementations of the GVG Ten XL protocol only allow one device to be addressed on a single-drop serial connection. These implementations use address 0 only. When controlling X1201 routers from single drop GVG protocol, set the *Serial Address* to 0. In the X1202 routers, special provisions have been made to override the programmed *Serial Address* and re-direct the control to either video bus. Setting one or two of the GPI Inputs to one of the 10XL Redirect GPI Input functions can accomplish this. When one GPI is pulled to ground, all serial commands to address 0 will control the respective video bus, regardless of the setting of the *Serial Address* menu item. To control the other video bus, ground the other GPI input. If both GPIs are active at the same time the higher GPI number will have priority. If you set the *Serial Address* to 0, and one GPI is programmed to the *10XL redirect V2* function, serial commands will control V1 bus when the GPI is inactive, and the V2 bus when the GPI is active.

When the X1200 series router is operating in the *master* mode, it will send out commands to the router that matches its *serial addresses*. When the X1200 series router is operating in the *slave* mode, it will only respond to commands that match its *serial addresses.* If two X1200 series routers are connected in a master/slave configuration, then the addresses of both routers must be set the same.

The *Setup Menu* in the router must be used to configure the **REMOTE CTL** port. See section 3.14 for information about configuring the serial port.

5.1.1. Serial Data Format

In GVG's TEN-XL ASCII protocol all words sent and received use the following format:

Standard: RS-232 (Can be set to RS-422 by changing internal Jumpers (See section 2.4.2)
Data Rate: Default 38400 Baud (Can be set using the *Baud Rate* menu item)
Data Format: Default 8 data bits, even parity, 1 stop bit (Can be set using the *Serial Format* menu item)

5.1.2. Definitions

1 GVG's TEN-XL ASCII protocol uses standard ASCII hex codes for the transmission of commands. Programmers must use the hex equivalent code in order to successfully convey commands from their controlling software to the X1200 series router. Hexadecimal [hex] numbers are represented with the prefix "0x."

i.e. decimal "14" = "0x0E."

2. There are two reserved words in GVG TEN-XL ASCII Protocol. They are illustrated in the table below.

Reserved Word	Hexadecimal Equivalent	Control Character
STX	0x02	^B
ENQ	0x05	^E

3. Internal crosspoint numbers are 'zero-based', meaning that crosspoint number 1 is accessed as source 0. Since GVG TEN-XL protocol is based on 10 internal crosspoints and the Evertz 12 x 1 router family contains 12 internal crosspoints it was necessary to extend the protocol to include crosspoint #11 and #12. Valid sources range from 0 to 11 decimal or 0x00 to 0x0B as shown in Table 5-1.

Data Byte		Corresponding Source
Hex Value	ASCII Character	
0x30	0	1
0x31	1	2
0x32	2	3
0x33	3	4
0x34	4	5
0x35	5	6
0x36	6	7
0x37	7	8
0x38	8	9
0x39	9	10
0x41	A	11*
0x42	B	12*

*- Not found in regular GVG TEN-XL protocol.

Table 5-1: Crosspoint Numbers and their Internal Source Numbers

5.1.3. Command Formats

Commands are issued by concatenating a sequence of hex codes or parameters as shown in Table 5-2. All codes are adjacent to each other with no spaces in between bytes.

Parameter	Definition
[STX]	ASCII hex code for Start of Transmission
[ENQ]	ASCII hex code for Inquiry
[HI ADDR]	ASCII hex code for the High byte of the address
[LO ADDR]	ASCII hex code for the Low byte of the address
[XPT(V)]	ASCII hex code for Video crosspoint (i.e.0..9, A, B)
[XPT(A)]	ASCII hex code for Audio crosspoint (i.e.0..9, A, B)
[PSUPP]	ASCII hex code for the Power Supply Status (i.e.0x31 = active, 0x30 = either inactive)

Table 5-2: ASCII Command Definitions

5.1.3.1. Write or Take Command

This command is used to switch the active crosspoint in the router.

[STX][HI ADDR][LO ADDR][XPT(V)][XPT(A)]

5.1.3.2. Read or Query Command

This command is used to read back the status of the router.

[STX][HI ADDR][LO ADDR][ENQ]

5.1.3.3. Reply Command String

This reply is sent back from the router in response to the Write or Read command. It indicates which audio and video crosspoints are active, and the current status of the power supplies.

[XPT(V)][XPT(A)][PSUPP]

5.1.4. Command Examples:

The following are examples of the GVG's TEN-XL ASCII protocol write and read commands controlling a X1202S-AES model router. The *Serial Address* menu item is assumed to be set to 01 so video Bus 1 will be addressed as 01 and video bus 2 will be addressed as 02.

5.1.4.1. Input Selection – Audio Follow Mode

Switch the video 1 bus and its associated audio buses to video input 4 (crosspoint # 3)

ASCII string: ^B0133 [^B = control+B which is the STX code]
Hex string: [0x02][0x30][0x31][0x33][0x33]

This will cause the router to switch the video to input 4 or video crosspoint #3, and both audio channels of the audio to input 4 or audio crosspoint #3, and then reply with:

ASCII string: 331
Hex string: [0x33][0x33][0x31]

to indicate that the router has switched and that the power supply is active. Note-The router will always respond to a valid request.

5.1.4.2. Input Selection – Breakaway Mode

Switch the video 2 bus to video input 2 (crosspoint # 1).
Switch the audio associated with the video 2 bus to audio input 4 (crosspoint # 3)

ASCII string: ^B0213 [^B = control+B which is the STX code]
Hex string: [0x02][0x30][0x32][0x31][0x33]

This will cause the router to switch the video 2 output to input 2 or video crosspoint #1, and the audio 2A and 2B buses to input 4 or audio crosspoint #3, and then reply with:

ASCII string: 131
Hex string: [0x31][0x33][0x31]

to indicate that the router has switched and that the power supply is active.

5.1.4.3. Router Status Request

Request the crosspoint settings of the video 2 bus and its associated audio buses.

ASCII string: ^B02^E [^B = control+B which is the STX code]
[^E = control+E which is the ENQ code]
Hex string: [0x02][0x30][0x32][0x05]

This will cause the router to respond with the current crosspoint status:

ASCII string: 131
Hex string: [0x31][0x33][0x31]

to indicate that the router video 2 bus is set to video input 2 or crosspoint #1 and the associated audio buses are set to audio input 4 or crosspoint #3. It also indicates that the power supply is active.

CHAPTER 6: VIDEO AND AUDIO OUTPUT CONFIGURATIONS

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6. VIDEO AND AUDIO OUTPUT CONFIGURATIONS

The following diagrams show the video bus outs and their associated audio bus outputs for each version of the router. The shaded buttons indicate which buttons are illuminated on the front panel.

6.1. MODEL X1201 - 12 X 1 OUTPUT CONFIGURATIONS

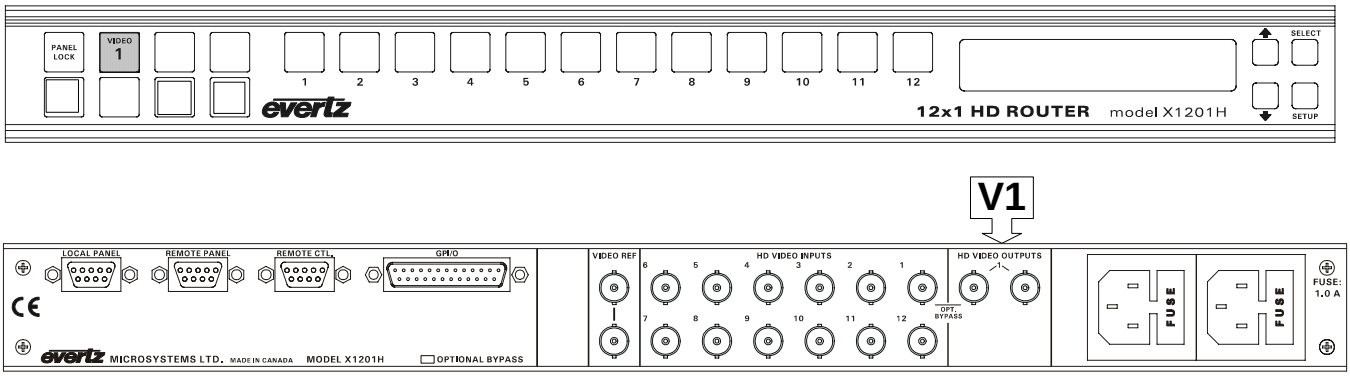

Figure 6-1: Model 1201 - Video 1 Output Buss

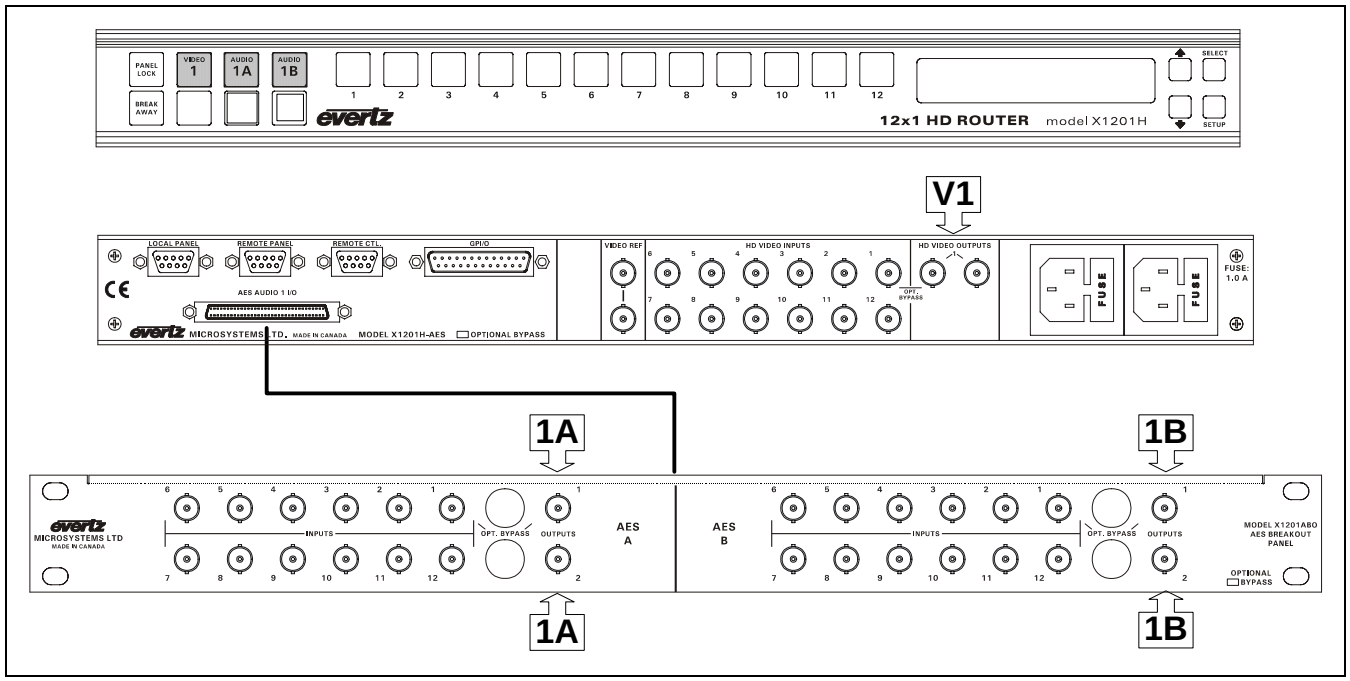

Figure 6-2: Model 1201-AES – Video 1 and Associated Audio

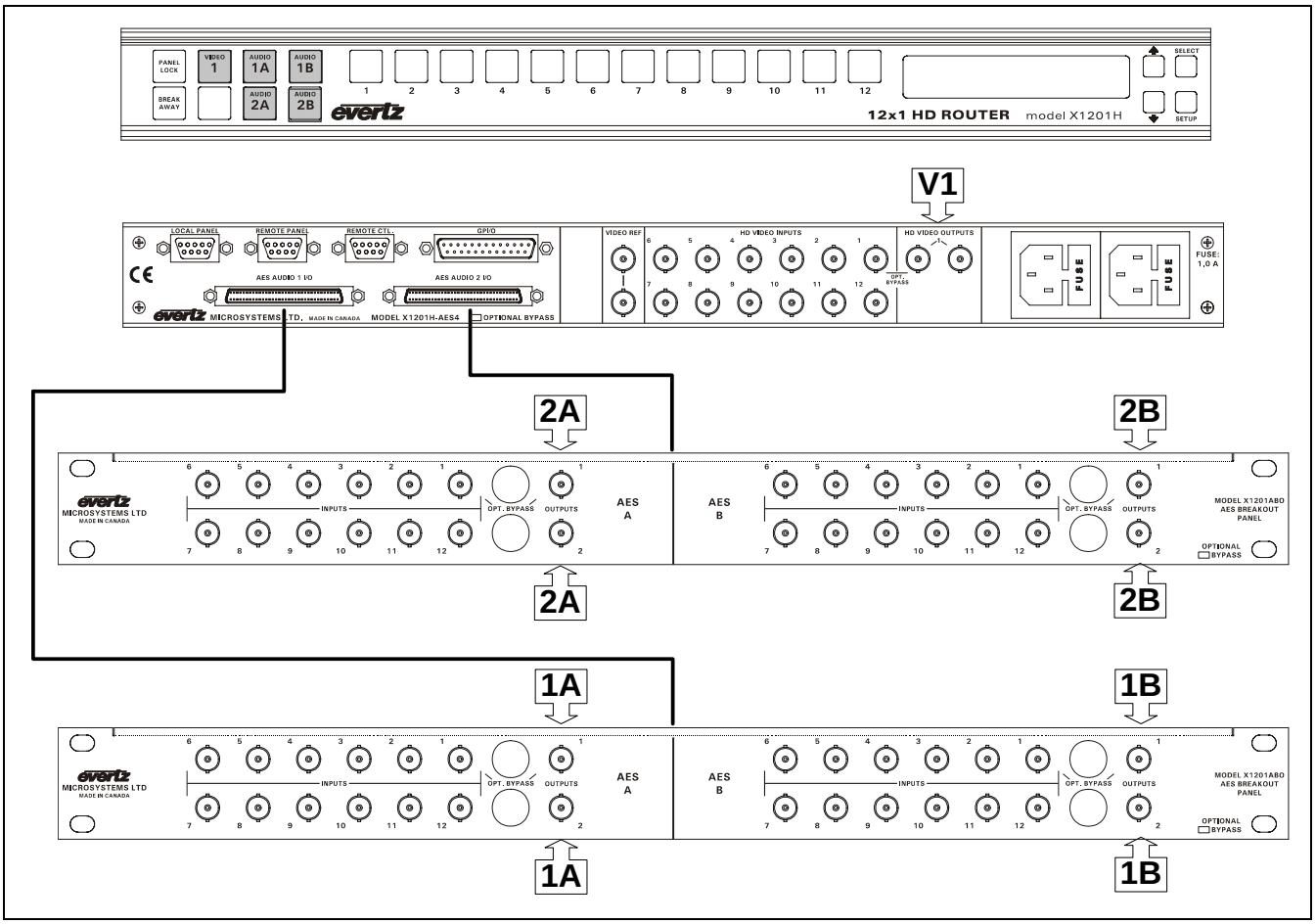

Figure 6-3: Model 1201-AES4 – Video 1 and Associated Audio

6.2. MODEL X1202 - 12 X 2 OUTPUT CONFIGURATIONS

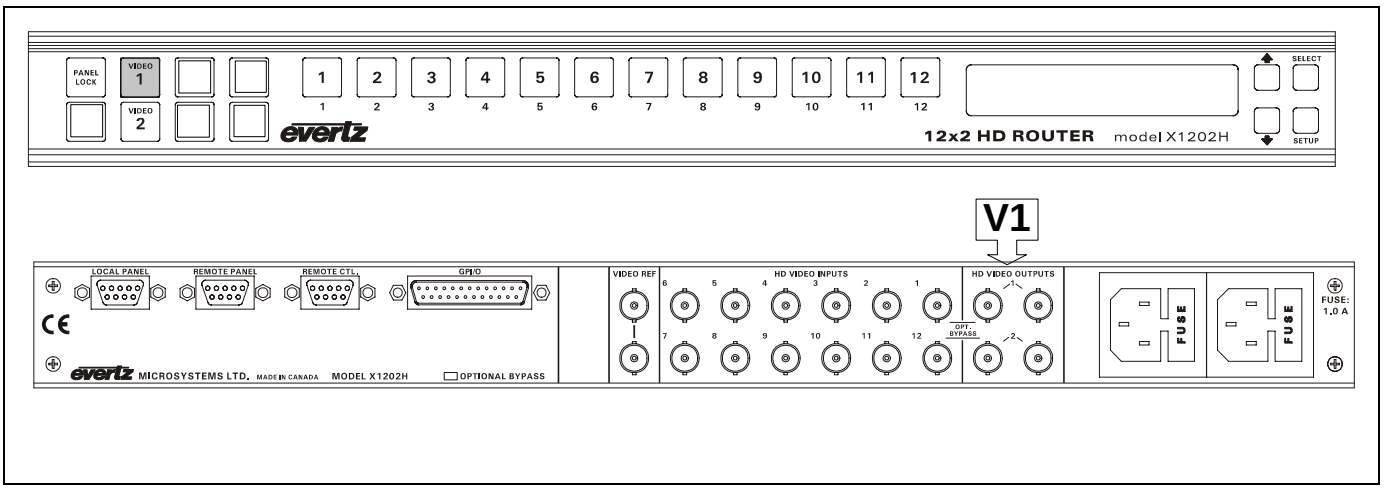

Figure 6-4: Model 1202 - Video 1 Output Bus

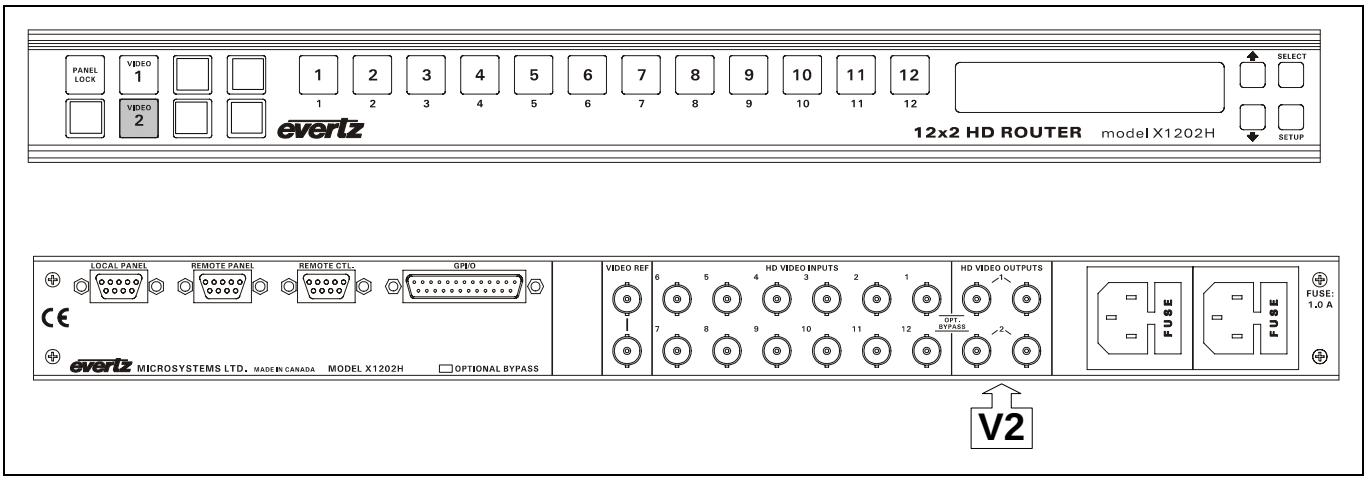

Figure 6-5: Model 1202 - Video 2 Output Bus

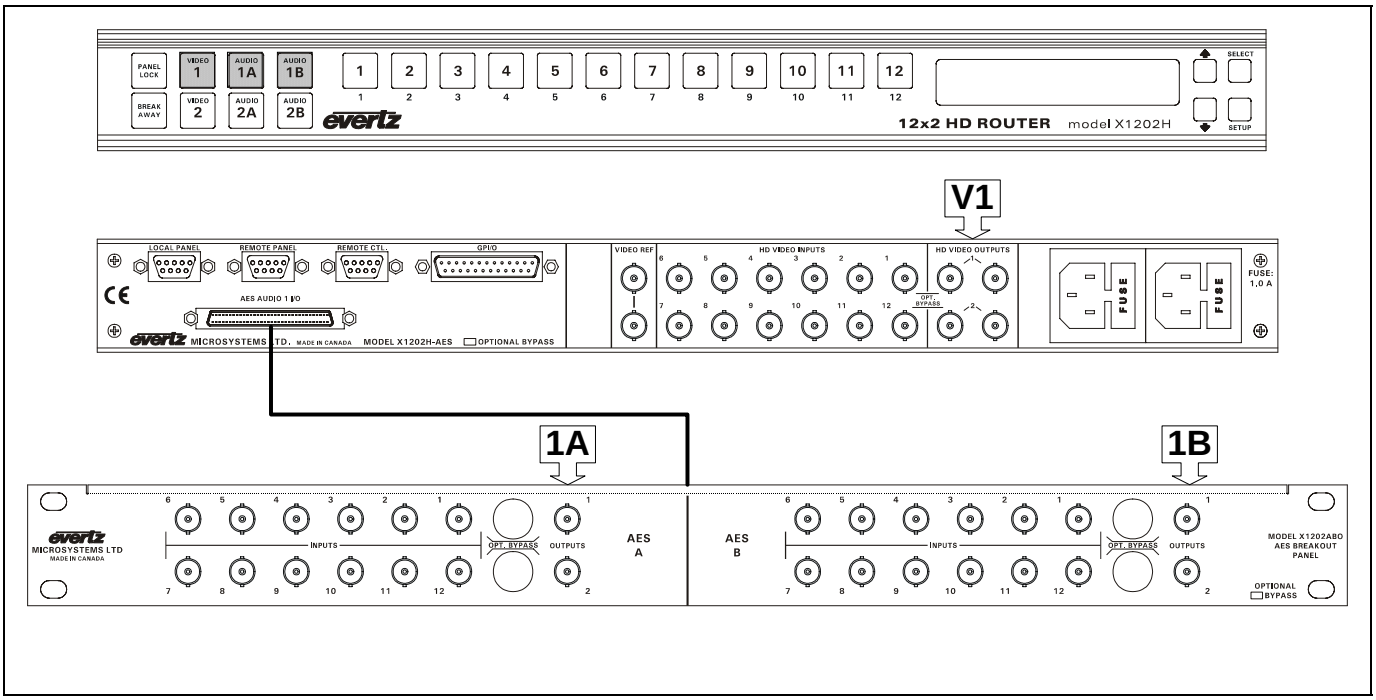

Figure 6-6: Model 1202-AES – Video 1 and Associated Audio

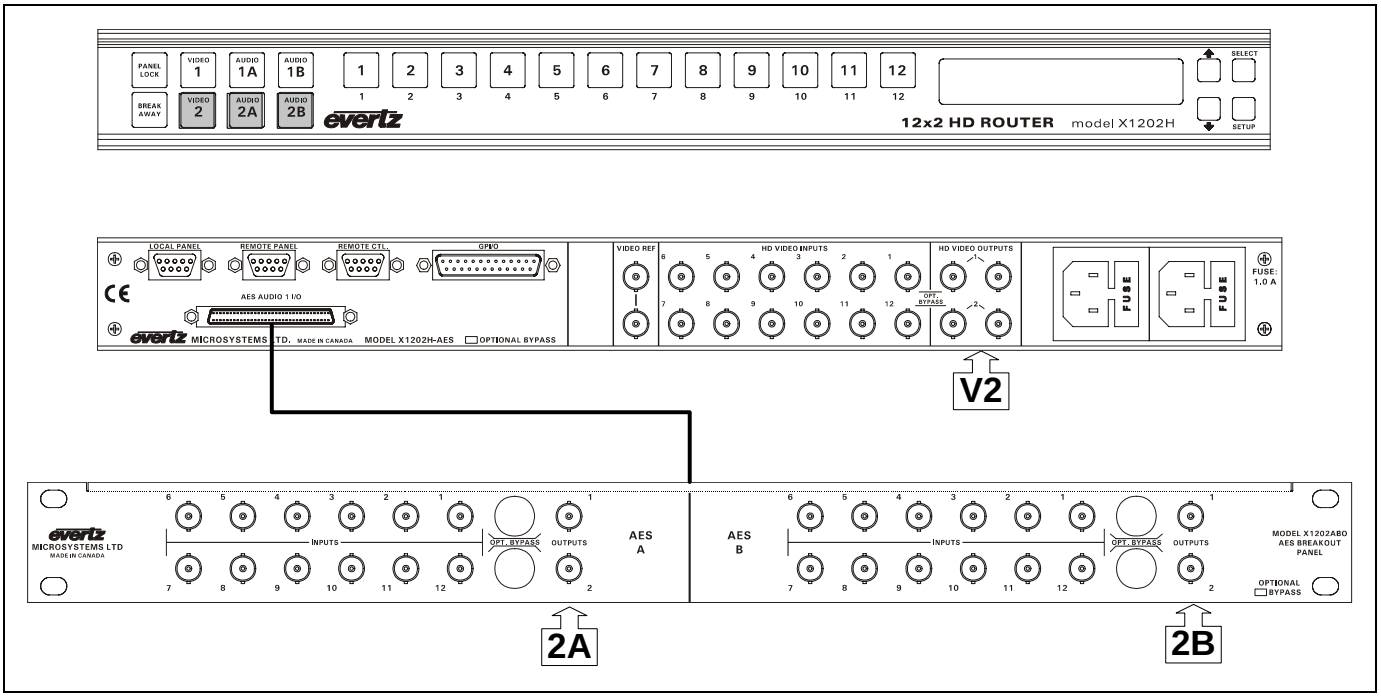

Figure 6-7: Model 1202-AES – Video 2 and Associated Audio

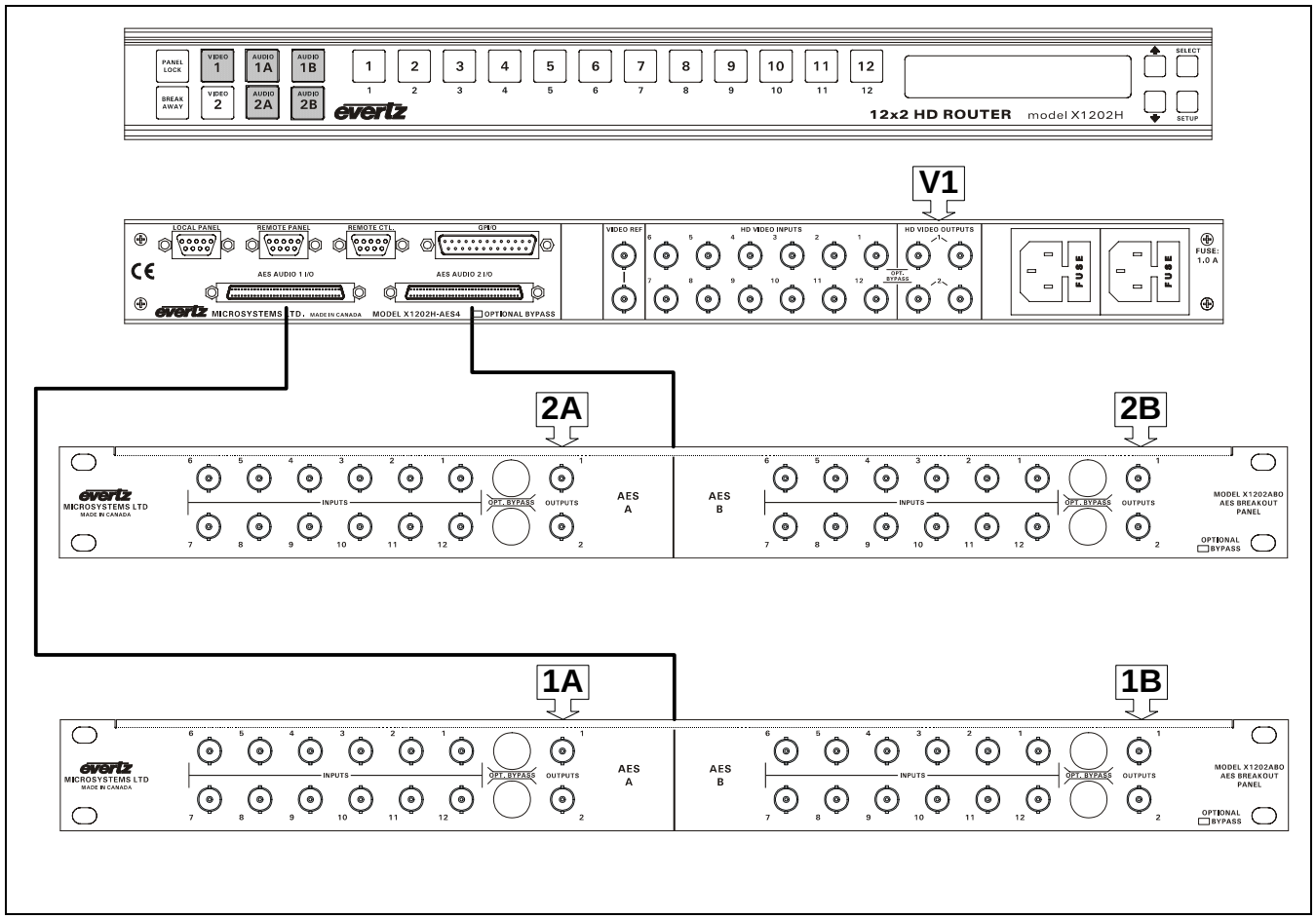

Figure 6-8: Model 1202-AES4 – Video 1 and Associated Audio

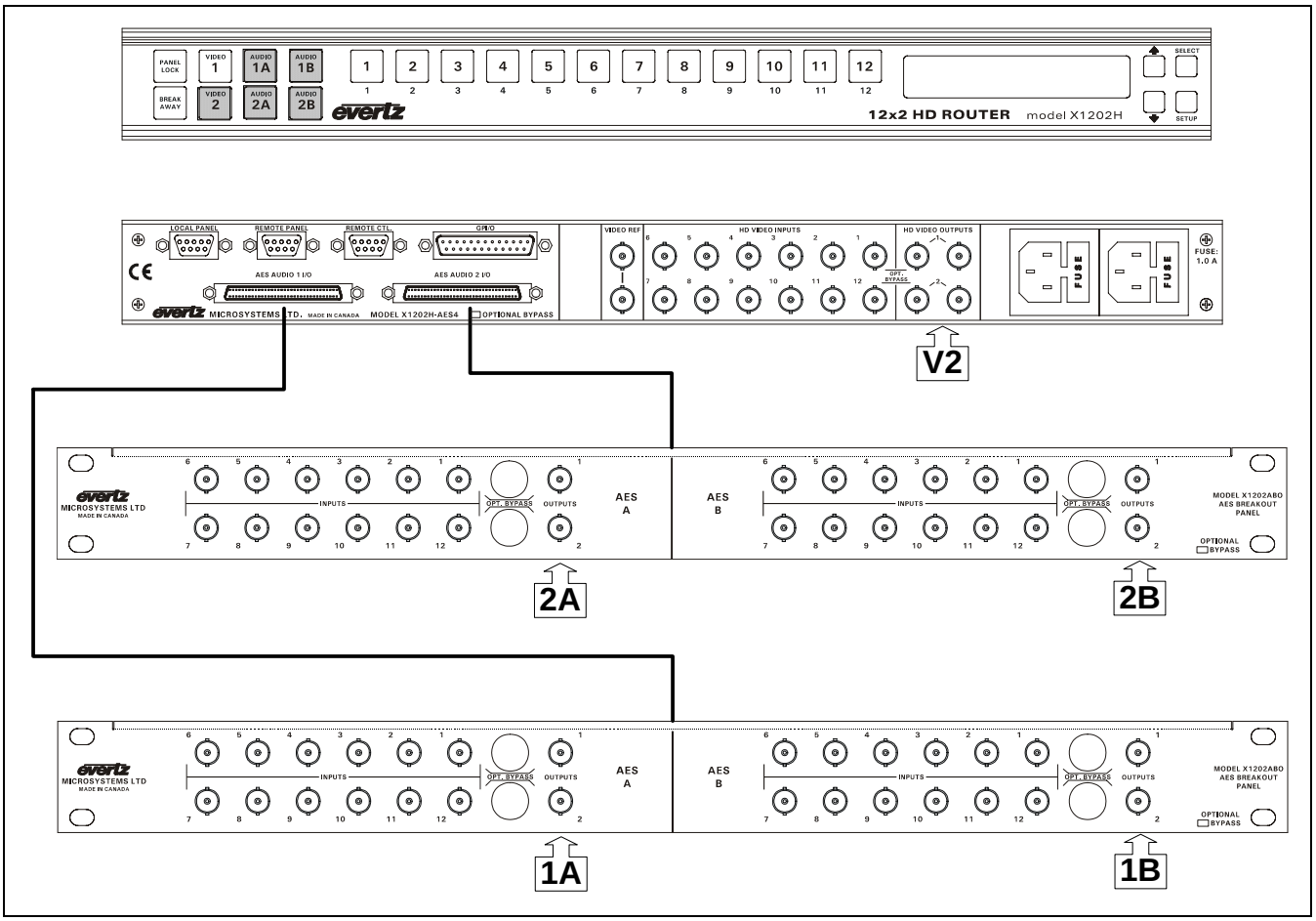

Figure 6-9: Model 1202-AES4 – Video 2 and Associated Audio

6.3. MODEL X1202 (EARLY VERSIONS WITH 2 BREAKOUT PANELS) - 12 X 2 OUTPUT CONFIGURATIONS

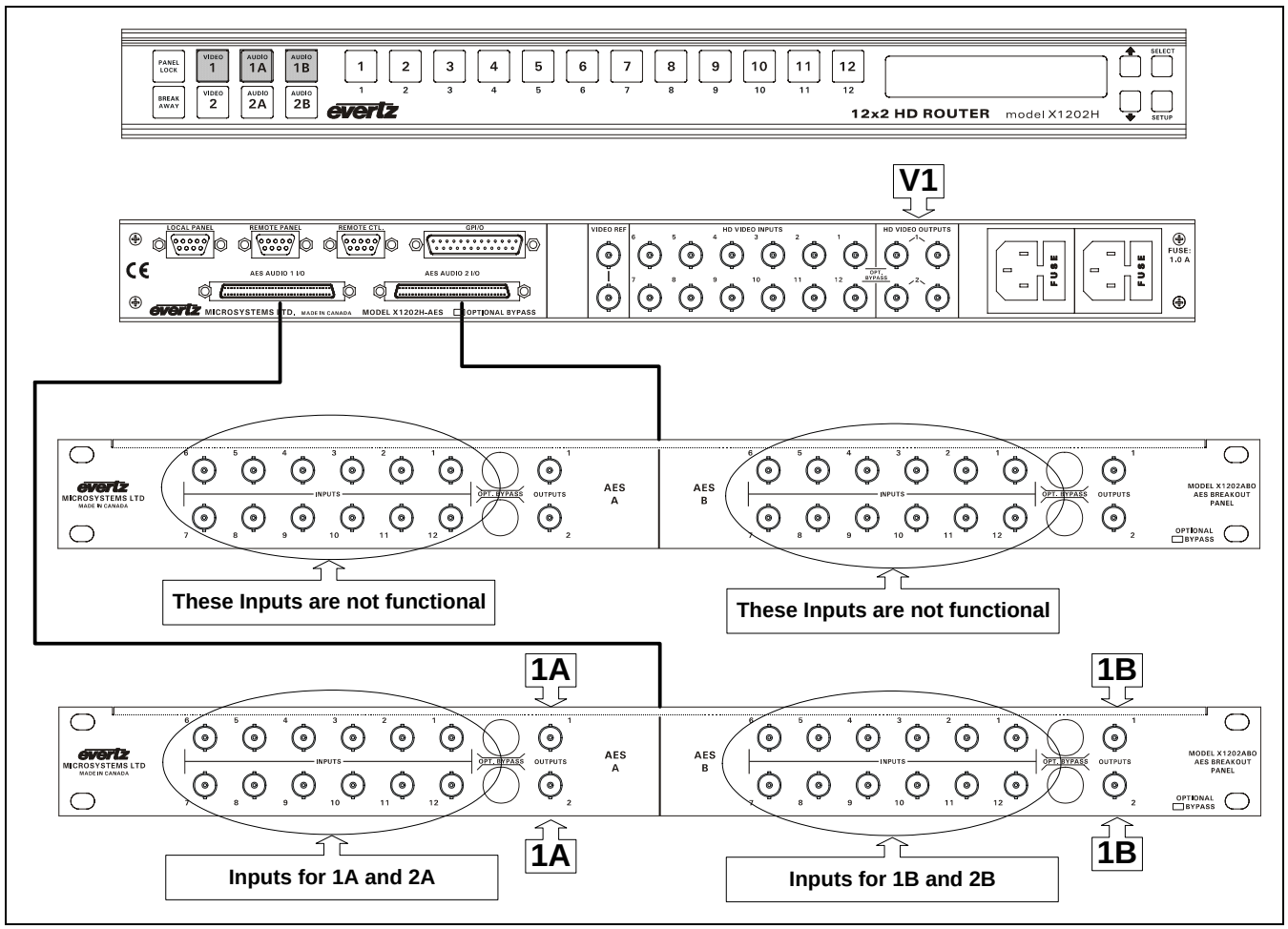

Figure 6-10: Model 1202-AES (Early version with AES Mode set to 2(12 x 2)) – Video 1 and Associated Audio

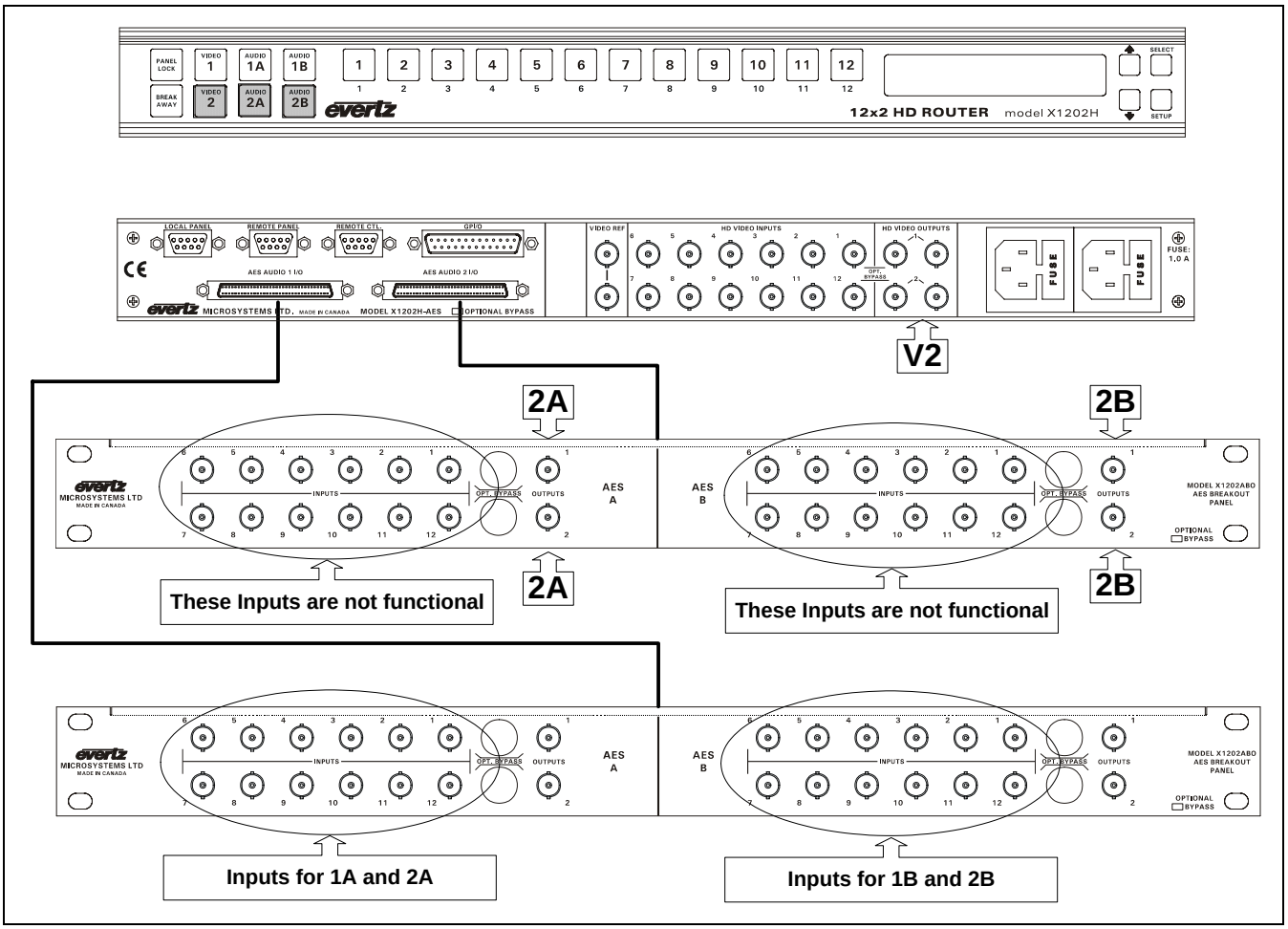

Figure 6-11: Model 1202-AES (Early version with AES Mode set to 2(12 x 2)) – Video 2 and Associated Audio

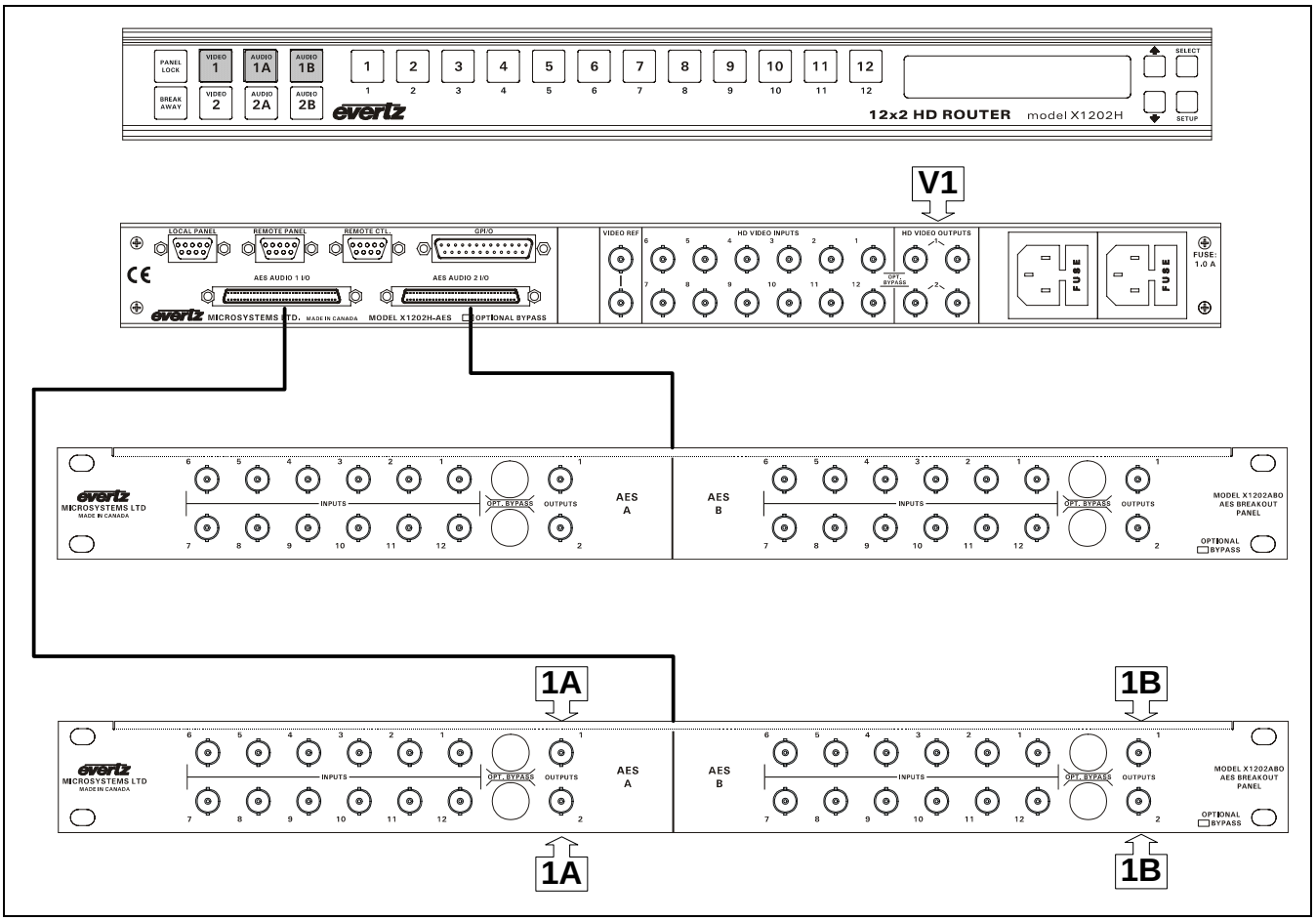

Figure 6-12: Model 1202-AES (Early version with AES Mode set to 4(12 x 1) and default AFV grouping) – Video 1 and Associated Audio

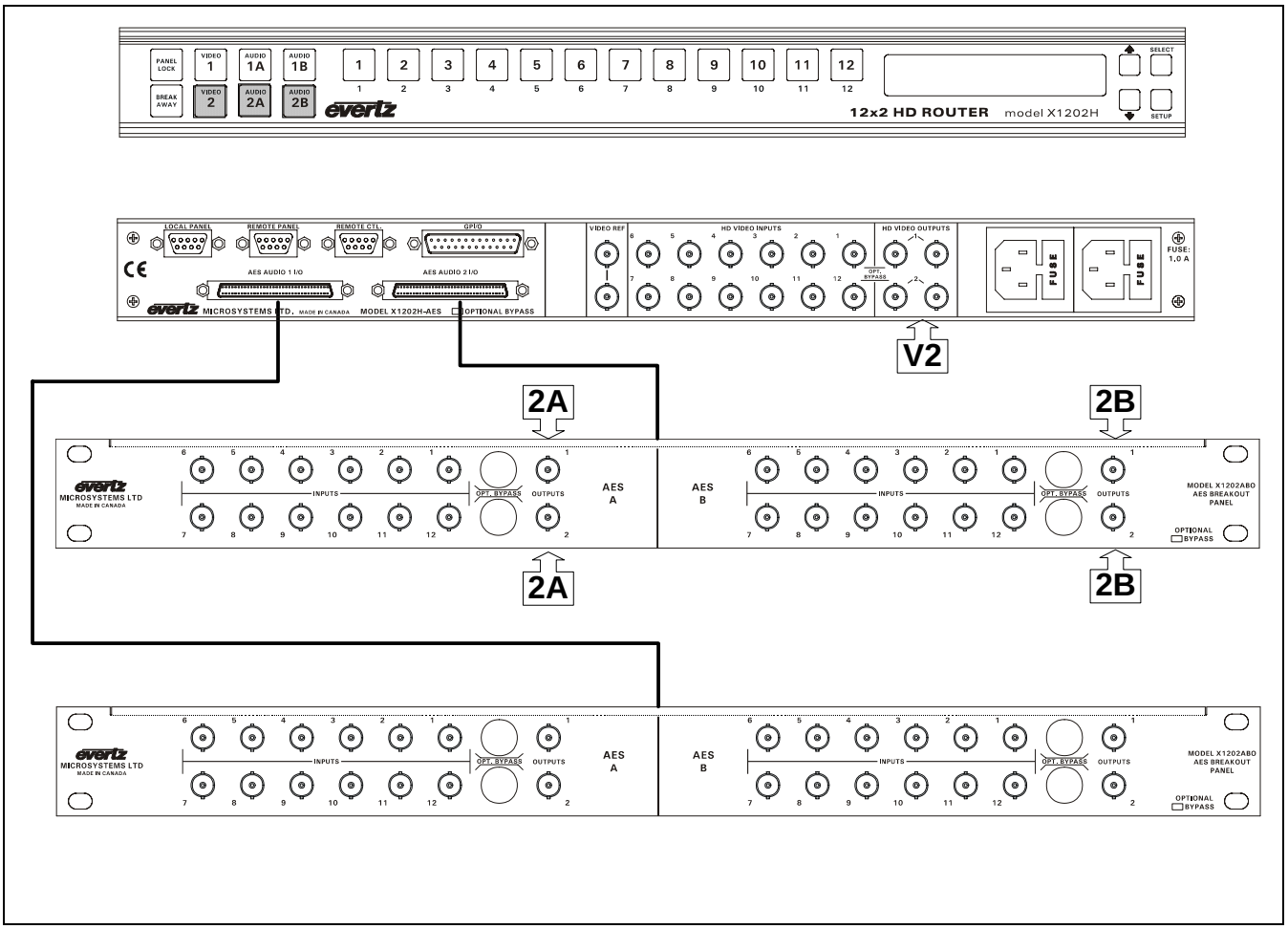

Figure 6-13: Model 1202-AES (Early version with AES Mode set to 4(12 x 1) and default AFV grouping) – Video 2 and Associated Audio

CHAPTER 7: VIDEO TIMING CONSIDERATIONS

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7. VIDEO TIMING CONSIDERATIONS

The following diagrams show how to set up the system timing under a number of different input signal conditions so that SoftSwitch™ and Embedded SoftSwitch™ equipped routers can perform a clean switch on the V1 bus.

7.1. ALL INPUT SIGNALS ARE TIMED TO REFERENCE

This example shows the timing setup for a clean switch when all input signals are in time with the reference. The V1 bus output will be delayed 1 line with respect to the reference. A clean switch is also attainable on the V2 bus output.

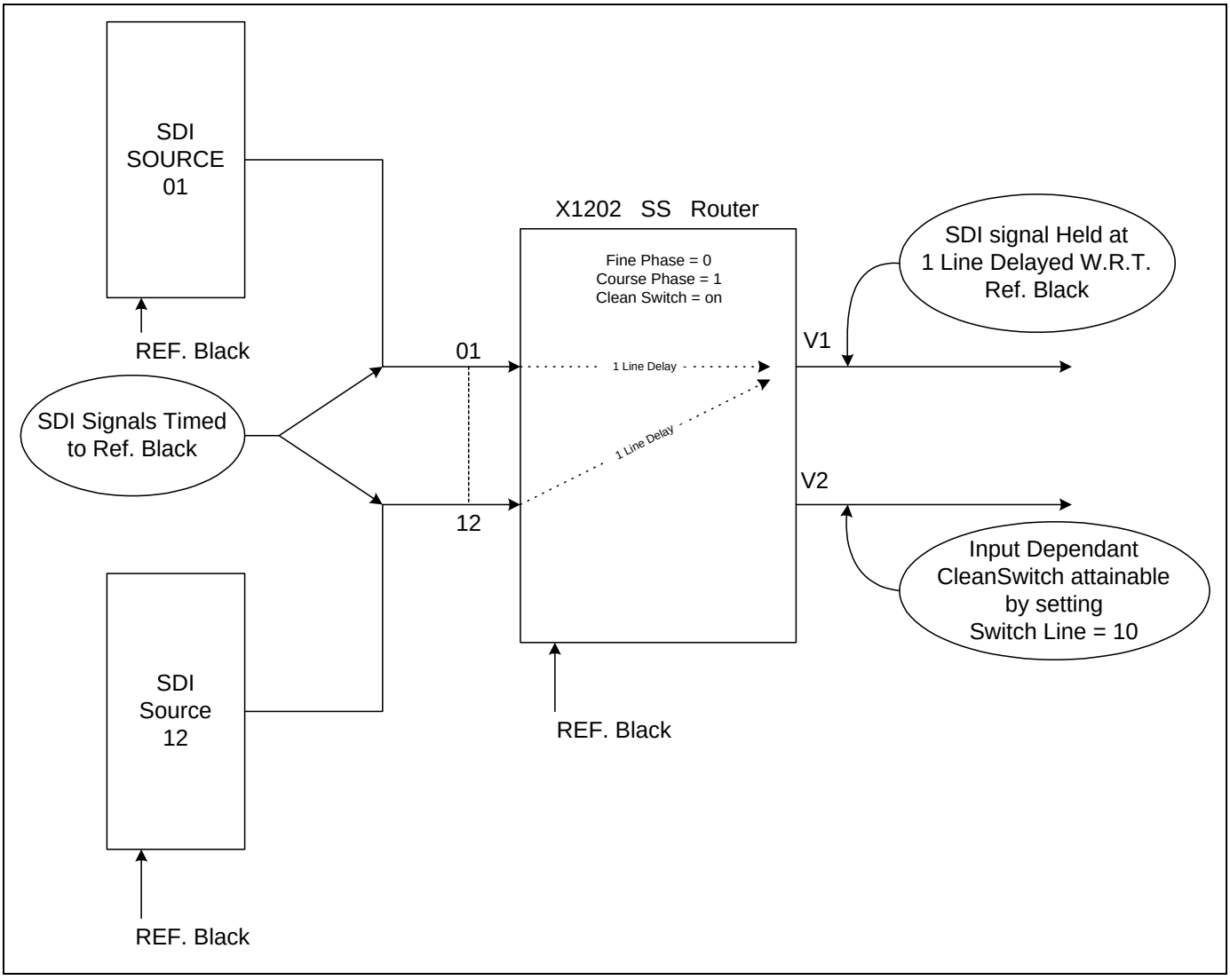

Figure 7-1: Timing Example 1 – Inputs in Time with Reference

7.2. INPUT SIGNALS ARE WITHIN TIMED TO WITHIN +/- 1 LINE OF REFERENCE

This example shows the input timing range requirements for a clean switch in the most basic configuration. The V1 bus output will be delayed 1 line with respect to the reference. A clean switch is not attainable on the V2 bus output.

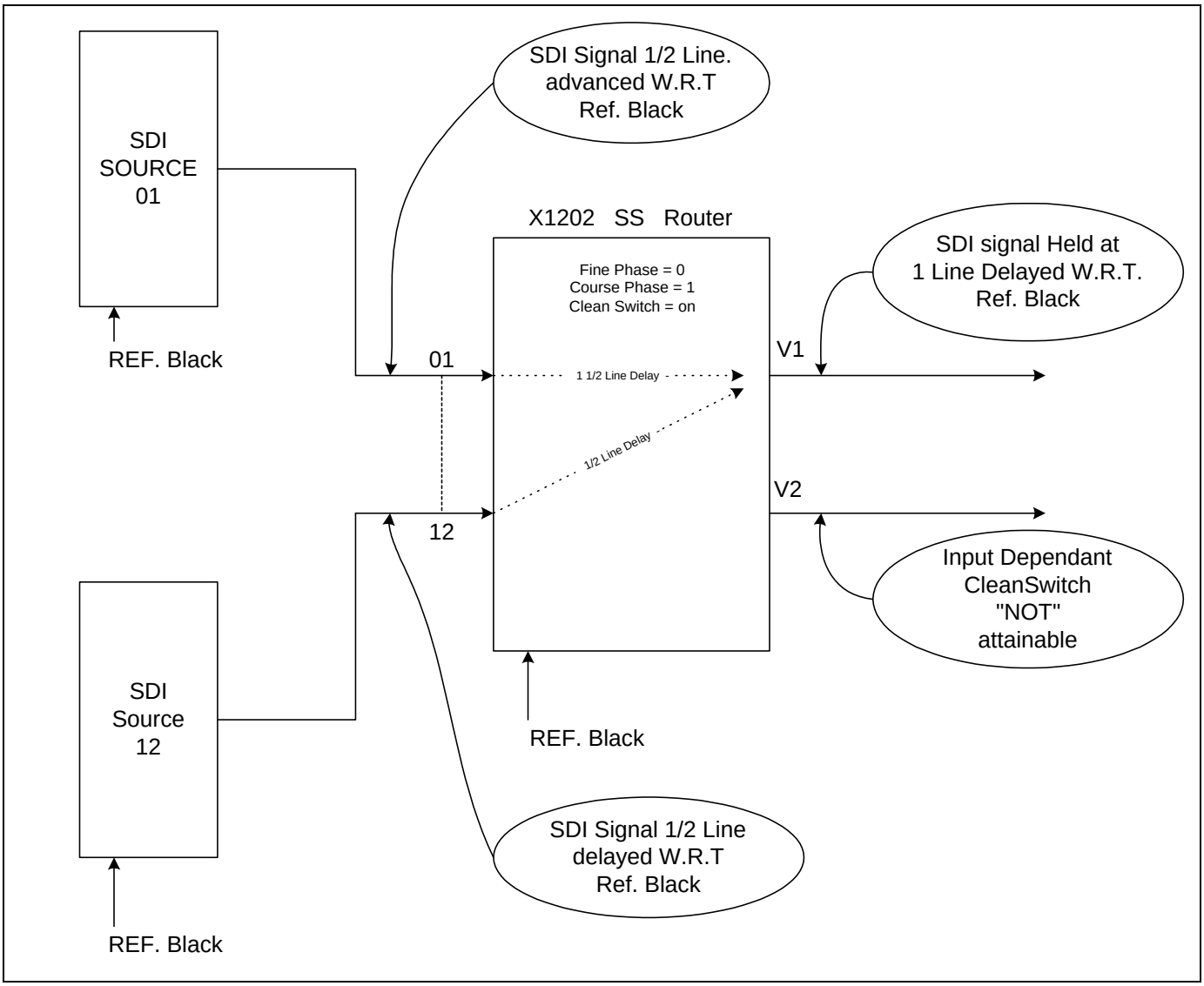

Figure 7-2: Timing Example 2 – Inputs in Time with Reference

7.3. ALL INPUT SIGNALS ARE TIMED TOGETHER BUT DELAYED 5 LINES FROM REFERENCE

This example shows how to set up the router timing when the input signals are delayed by more than one line. The V1 bus output will be delayed 6 lines with respect to the reference. A clean switch is also attainable on the V2 bus output.

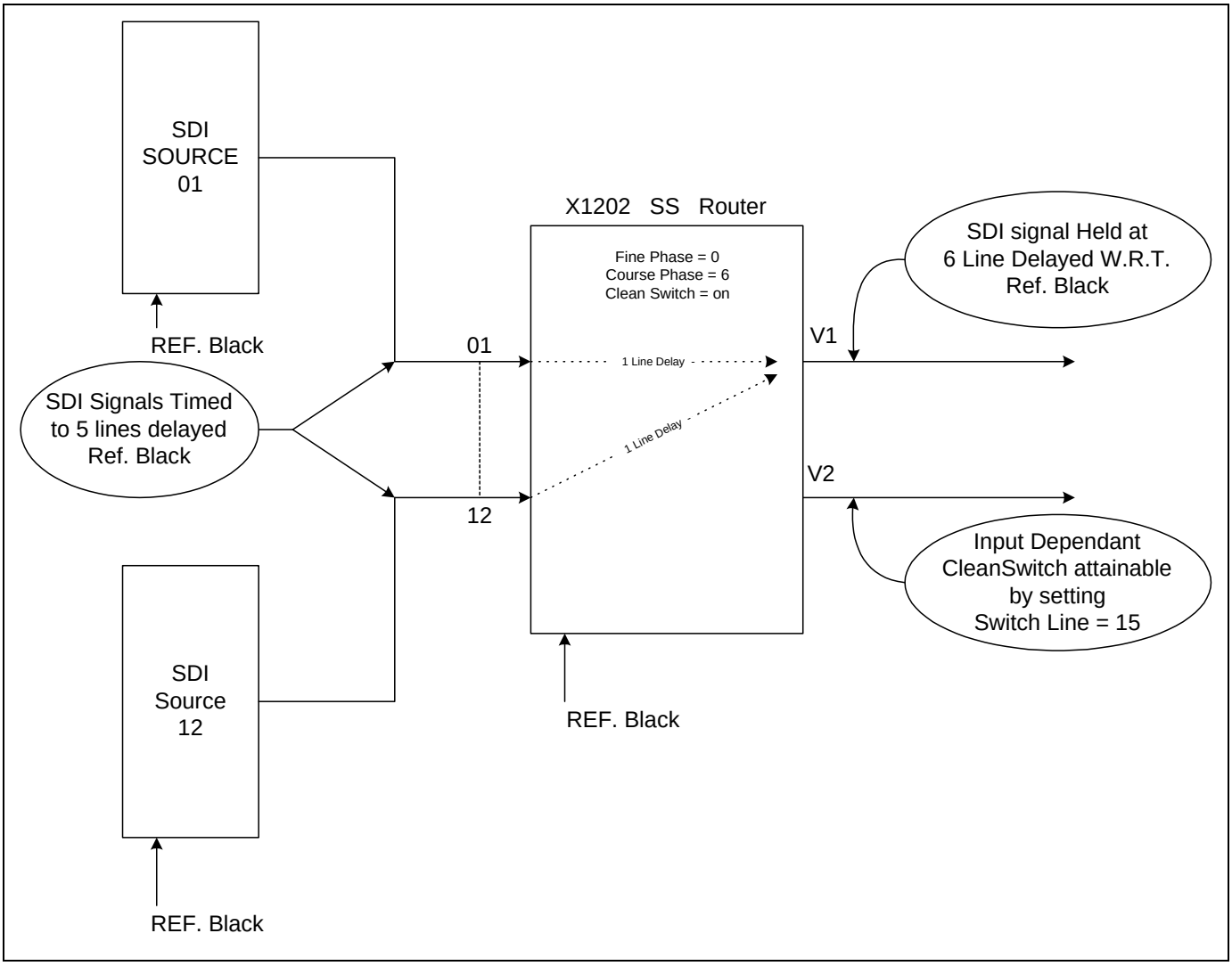

Figure 7-3: Timing Example 3 – Inputs in Time but Delayed 5 Lines from Reference

7.4. ALL INPUT SIGNALS ARE TIMED WITHIN A RANGE OF +/- 1 LINE FROM EACH OTHER BUT DELAYED 5 LINES FROM REFERENCE

This example shows how the router can perform a clean switch on input signals that are delayed by more than a one from the reference, and are mistimed with respect to each other. The V1 bus output will be delayed 6 lines with respect to the reference. A clean switch is not attainable on the V2 bus output.

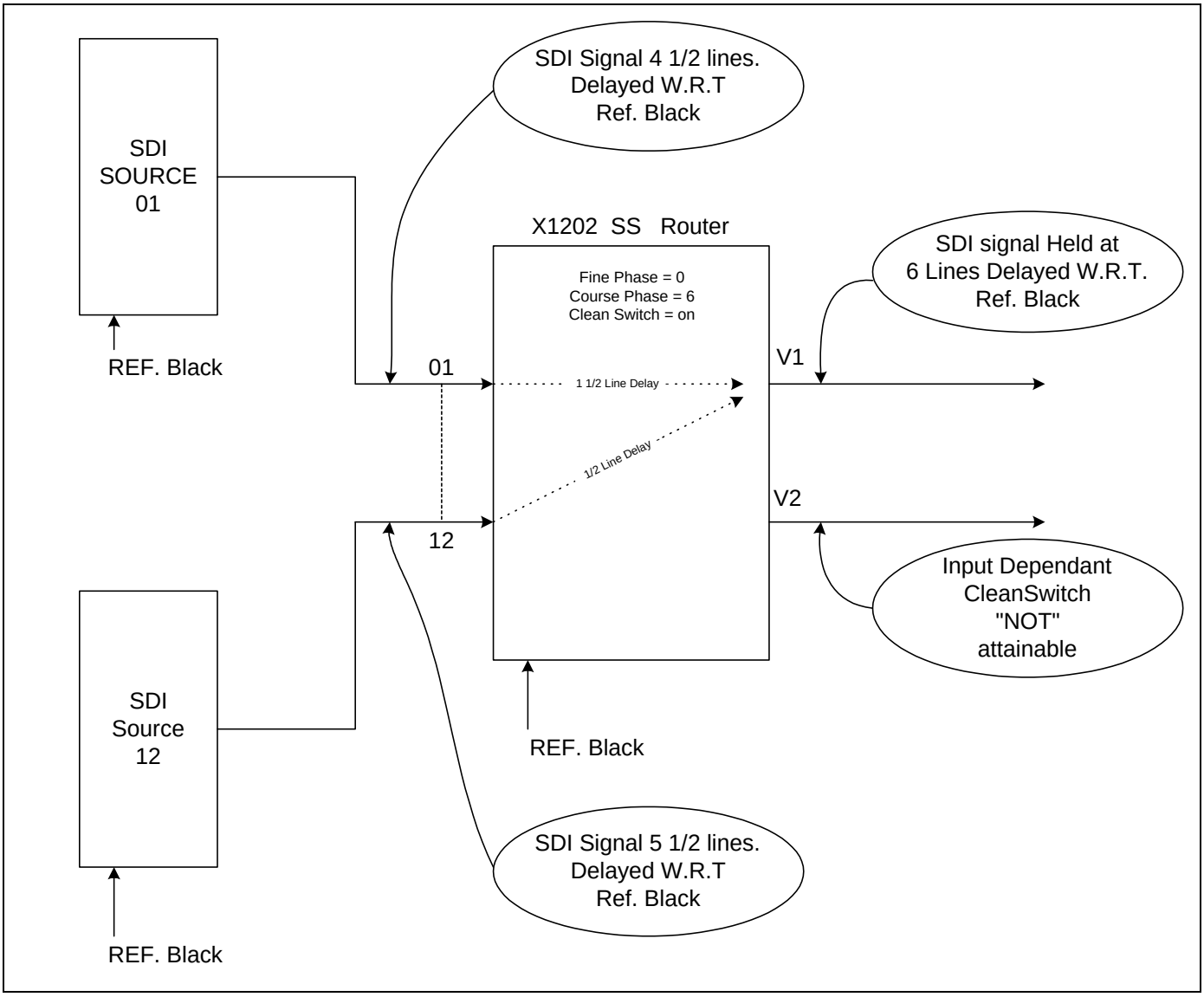

Figure 7-4: Timing Example 4 – Inputs Not in Time and Delayed from Reference

7.5. ALL INPUT SIGNALS ARE TIMED WITHIN A RANGE OF +/- 1 LINE FROM EACH OTHER BUT DELAYED 5 LINES FROM REFERENCE

This example shows how a production switcher can be clean switched in and out of a 1200 series SoftSwitch™ or Embedded SoftSwitch™ router used as a bypass router. Controlling the timing of the incoming signals can allow all sources to be switched cleanly in the X1200 series router. At the same time all the signals are in time to the production switcher. Finally, the production switcher can also be presented to the bypass router within the range of the X1200 series router's line synchronizer.

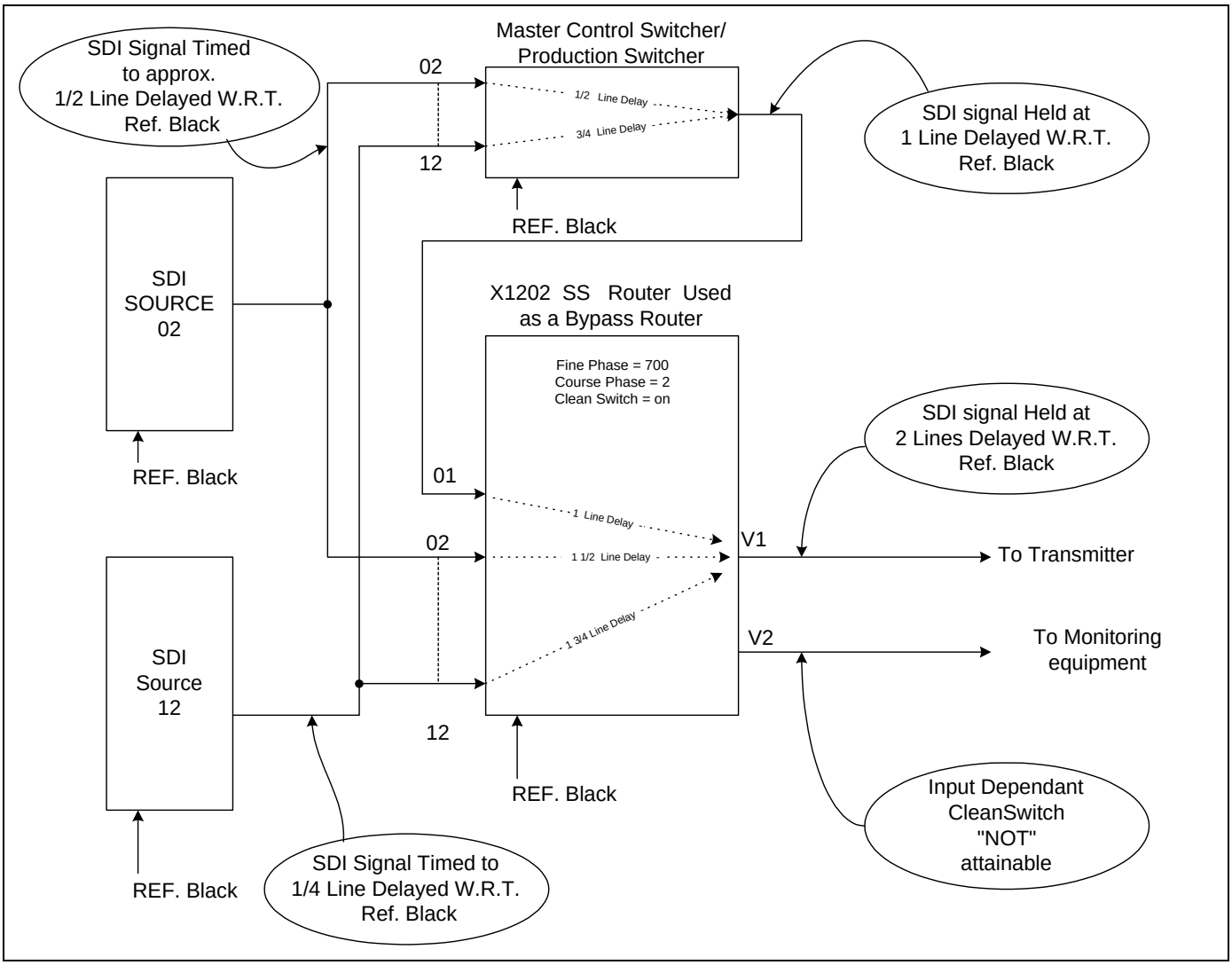

Figure 7-5: Timing Example 5 – Bypass Router for Production Switcher

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