X75 Product Guide

Multiple Path Frame Synchronizer, Converter and More …

June 2005

X75 Product Guide

- June 2005
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Contents

Introduction

This guide provides detailed information about the **X75HD™** and **X75SD™** systems, and how each fits into the Video Processing Product line. The following topics are discussed:

Market Requirements

As we move to fully digital and hybrid systems in both standard and high definition formats, the requirements for processing are increasing. On a worldwide basis, high definition is becoming more prevalent — with the use of wide screen and surround sound becoming more popular in home theatre environments.

Because the requirements for processing are increasing, customer demands for more functionality in new 1RU packages are increasing in parallel. This increased functionality includes:

- Up, down, cross and aspect ratio conversion for use in hybrid facilities.
- Analog, digital compressed and embedded audio.
- Multi-channel audio for surround sound and multiple language applications.
- Advanced audio processing such as decompression and compression. This processing (especially audio compression) requires increased video delay for proper lip sync.
- SNMP (Simple Network Management Protocol). This popular protocol, which is used in the telecom industry for monitoring equipment, has become an important requirement in the television industry.
- The ability to take legacy analog signals into the digital domain (with the best processing at the best price). This step is important — especially before upconverting and compressing video signals.
- Interfaces for high definition including optical fiber and DVI-D.
    - ~ Optical fiber is required for long cable runs (>100m / 300ft.).
    - ~ DVI is becoming more popular as an interface into LCD and plasma type picture displays.
- Intelligent input processing for alarming and auto-switchover — for purposes of reducing downtime.
- Increased use of metadata:
    - ~ Digital video and audio are the data “essence” of a program signal.
    - ~ In today’s facilities, there are many forms of “data about the essence” (or metadata) that travel along with the video and audio signals.
    - ~ Requirements vary — in some cases, a transparent metadata pass-through is required. In other cases, you may wish to change the metadata.
- Dual power supplies for increased reliability in critical situations.
- Front-to-back forced airflow.

About the X75

The **X75** is:

- An award winning multiple-path converter, frame synchronizer and more — all in a unique 1RU package designed for hybrid analog, digital and HDTV applications.
- An extension to the frame synchronizer — including *more* functions such as up, down and cross-conversion — all within a networked control environment.
- A product designed for use in standard definition facilities with an upgrade path to high definition.
- Ideal in environments where more audio channels for surround sound and Dolby-E/AC-3 decompression are required.

Positioning Statement

Combining SDTV and HDTV frame syncs, video and audio processing capabilities, and up/down/cross conversion — all in a space-saving 1RU package, the **X75** is the definitive "all-in-one" solution for broadcasters making the transition to HDTV.

Value Propositions

The **X75**:

- Saves space by providing synchronization, processing amplifiers, up/down/cross-conversions, 16 channel audio processing, Dolby® E and Dolby Digital® (AC-3) decompression in a 1RU package.
- Provides an upgrade path from standard to high definition in the field.
- Simplifies operations via networked control.
- Improves monitoring via streaming capabilities.
- Increases format flexibility by handling analog, digital and high definition video signals with optional embedded, analog, digital and compressed audio processing.
- Enhances I/O capability via HDTV optical and DVI-D output interfaces.
- Enhances troubleshooting and maintenance capabilities via enhanced alarm, auto switchover and industry standard SNMP functionality.

Key Message

The **X75** is truly the most versatile video and audio processing for standard and high definition systems in a 1RU package.

Product Overview

The following topics are discussed in this section:

Functionality and Application

The **X75** Multiple Path Converter and Synchronizer provides standard definition processing with field upgradeable high-definition conversion. It combines video and audio synchronization, plus the ability to upconvert, downconvert, and cross-convert from most input video formats to most output video formats.

The **X75** is equally suited for analog, digital or hybrid facilities, and represents the ideal choice for broadcasters making the transition to digital television (DTV and HDTV). Available in standard or high definition formats, video-only and audio/video configurations, the **X75** provides an ideal bridge between analog, digital and high definition systems with analog, digital and embedded audio.

I/O Flexibility

The **X75HD** offers unparalleled I/O flexibility. Up to seven input and eight output formats are provided — depending on the selected options. I/O features include:

- One HDTV optical fiber serial component digital video (HD-SDI) input and output.
- Two HDTV serial component digital video (HD-SDI) inputs and one output.
- Two SDI serial component digital video inputs and outputs.
- Thumbnail streaming video output over primary Ethernet port.
- ¼ VGA full motion streaming option over secondary Ethernet port (future).
- Component analog video (Betacam®) input and output (input optional).
- S-Video (S-VHS/Hi8) input and output (input optional).
- NTSC / PAL-M / PAL-B / SECAM composite video input and output (input optional).
- RGB-S output
- (Optional) DV (IEEE-1394) input or output with transport control (Future?).
- DVI-D output for high definition signals.
- Auto-detecting inputs with user selectable alarms.
- Two input modes for automatic detection and selection — allowing critical program path processing for ingest, bridges between routers/tape transports/servers, mobile broadcast, and edit suites.

Video Processing

Video processing includes:

- Level/color/hue/clip controls.
- 12-bit 3D adaptive color decoding and 12-bit color encoding.
- Noise reduction option.
- Frame synchronization and time base correction for non-synchronous signals.
- Analog-to-digital and digital-to-analog video conversion for hybrid facilities.
- Up or down conversion with aspect ratio conversion for hybrid standard and high definition facilities.
- High definition cross-conversion for broadcast and production facilities with multiple high definition format requirements.
- (Optional) Simultaneous up and down or simultaneous cross and down conversions for hybrid systems applications.

Audio Processing

Processing for audio includes:

- Level/invert/delay controls.
- Analog-to-digital and digital-to-analog conversion.
- Embedding and de-embedding for both SDI and HD-SDI serial digital signals — for interfacing any audio signal in a professional environment.
- Sample rate conversion, synchronization and timing to video — for lip-sync error correction.
- Decompression and processing for embedded, compressed audio signals such as Dolby E and AC-3.
- Multi-channel program signal processing for surround sound applications — before or after compression.
- Audio follow video feature to switch the audio source to a matched video input source.
- Audio summing and voice-over.
- Input and output matrices for channel swapping and assigning inputs to outputs.

Metadata

Embedded metadata within the program stream (e.g., CC [Closed Captioning]) is passed transparently from input to output for standard definition processing. During upconversion, EIA-608 is transcoded to EIA-708 from input line 21 to output line 9. The reverse process takes place during downconversion. For cross conversion EIA-708 is passed through.

Control and Monitoring

Control and monitoring of signals passing through the **X75** is enabled using IP over Ethernet. Instant operator control from the local or remote control panels allows easy manipulation of video and audio signals. The use of two Ethernet ports per unit (one for control, monitoring and video thumbnails, and one for video and audio streaming) makes PC control and monitoring over large networks entirely manageable. A built-in Web Server and optional SNMP (Simple Network Management Protocol) are industry standard means of controlling and monitoring the **X75** over Ethernet. Leitch's CCS (Command and Control System), Co-Pilot and Navigator software further enhance the remote control aspects of the **X75**.

User-selectable Modes

Operational modes for numerous applications are user-selectable:

- **M-PATH**: M-PATH is a means of selecting or detecting input signals to processed output signals.
  - ~ The default M-PATH mode is called "All Output Select" in which a single input is processed to all outputs.
  - ~ In Video Routing mode, M-PATH allows up to four processed paths — you choose the output first, then select which input is to be processed to that output
- **SIMULCAST**: Any two inputs can be switched to standard and high definition outputs.

Remote Flexibility

For **X75** units with a blank front panel, all configuration and control must be performed remotely using one of the following methods:

- Via separate remote control panel — such as the X75-RCP.
- Using a CCS™ (Command and Control System) application such as Co-Pilot™ or Navigator™.
- Via web browser such as Internet Explorer® (IE) or Netscape®.
- Via SNMP (Simple Network Management Protocol).
- Via third party control software using CCS EP (Extended Protocol).

Note that **X75** units with blank front panels only provide a certain number of LEDs for alarm and status monitoring, including the following:

- Major and minor alarm LEDs.
- Status LEDs for power and memory access.

For **X75** units with an installed local control panel, configuration and control can be performed locally. Numerous LEDs that indicate alarm, status and configuration information are available from the front control panel.

Features and Benefits

The following topics are discussed in this section:

Summary — Key Features and Benefits

X75's key features and benefits are:

- **Economy** — enables you to use less equipment for your video and audio processing applications.
- **Processing** — provides **M-PATH** multiple path video processing. Features include:
  - ~ Any input to all outputs.
  - ~ Multiple paths of SDTV/HDTV processing.
  - ~ Simultaneous up/down or cross/down conversion.
  - ~ 16 channel core audio processing.
- **Control** — provides IP-enabled control, monitoring and streaming, including SNMP.

In Depth — Key Features and Benefits

Uses Less Equipment, Saves Space

By enabling you to use less equipment and less space for your advanced processing requirements, **X75** offers a superb economy of scale:

- **X75** saves space by providing synchronization, up/down and cross-conversion, 16-channel audio processing with Dolby decompression, plus networked control and monitoring — all in a 1RU package.
- **X75** handles analog, digital and high definition video signals with optional embedded, analog, digital and compressed audio processing.
- **X75** advanced I/O functionality includes streaming for monitoring purposes, HDTV optical and DVI-D interfaces, enhanced alarm and auto switch-over capability, DV IEEE interface, noise reduction and industry standard SNMP.
- **X75** is easily deployed for use in multiple applications — including production, editing, news, broadcast, mobile and satellite.

M-PATH Video and Audio Processing

The **X75**'s **M-PATH** feature provides a wealth of processing advantages:

- **X75** combines multiple path processing with conversion and synchronization for analog, digital and high definition:
  - ~ Anything in — to everything out.
  - ~ Analog/Digital conversion.
  - ~ Up or down or cross conversion.
  - ~ Simultaneous up and down conversion, or simultaneous cross and down conversion (optional).

- ~ SDTV and HDTV logo generator, source ID.

- For surround sound applications, **X75** includes embedded audio for SDTV and HDTV plus analog and digital audio interfaces:
  - ~ Integrated Dolby E and Dolby Digital (AC-3) audio decompression.
  - ~ Voice-over capability.
  - ~ 16 channels of core audio processing.

IP Enabled Control

Ethernet is the key to **X75**'s IP enabled control flexibility, including:

- CCS (Command and Control System), for use with Navigator and Pilot software.
- Industry standard SNMP (Simple Network Management Protocol).
- Built-in Web Server for control and monitoring using your browser. "Video Thumbnails" are available over the primary Ethernet connection.
- A secondary Ethernet connection provides an optional ¼ screen image for streaming-quality video and audio monitoring.
- Local and remote panels for up to 200 units.

Product Features

This section provides itemized lists of **X75** features:

Processing

X75 processing features include:

- Frame syncs for analog (optional with TBC), SDTV and HDTV.
- Up, down, cross and aspect ratio conversion.
- Analog-to-digital conversion.
- Digital-to-analog conversion.
- Logo generator/source ID for SDTV and HDTV.
- Video proc amps for SDTV and HDTV.
- (Optional) Video proc amps for analog.
- Auto detected inputs with precedence settings and switch delay setting.
- SMART alarms with user settings for threshold and time delay.
- (Optional) Noise reduction and enhancement (SDTV).
- M-PATH operating modes for simultaneous up and down conversion, or cross and down conversion.
- Simulcast mode.
- Clean video and quiet audio switching.

Inputs and Outputs

X75 I/O features include:

- 2 x SDI and 2 x HD-SDI inputs.
- SC fiber interface for HDTV.
- (Optional) FC and ST fiber interface for HDTV.
- (Optional) NTSC / PAL-M / PAL-B / SECAM input and output with TBC, CAV and S-Video Inputs.
- Video test generator.
- Composite, component, SDI, HD-SDI, HD fiber, DVI-D and S-Video outputs.

Audio

X75 audio features include:

- 16 channels of internal audio processing (gain, invert, swap, sync/delay, sum).
- Embedding and de-embedding for four groups for SDI and HD-SDI.
- Optional compressed audio decompressor (Dolby E, AC-3, Pro Logic).
  - ~ **Note**: Pro Logic II not supported.
- 5 x AES inputs and outputs, 75/110 Ohm.
- 4 x analog audio inputs and outputs.
- Audio (and embedded) test generator.
- (Optional) audio limiter.
- (Optional) audio to video timing tool.

Control and Monitoring

X75 control and monitoring features include:

- Local and remote control panels.
- Software GUI control and monitoring using CCS Pilot and Navigator.
- Programmable GPI inputs (2) and outputs (2).
- Built-in web server with video streaming (thumbnail).
- (Optional) video and audio streaming.
- SNMP and third party interfaces.
- Control for up to 200 units from a single control panel.

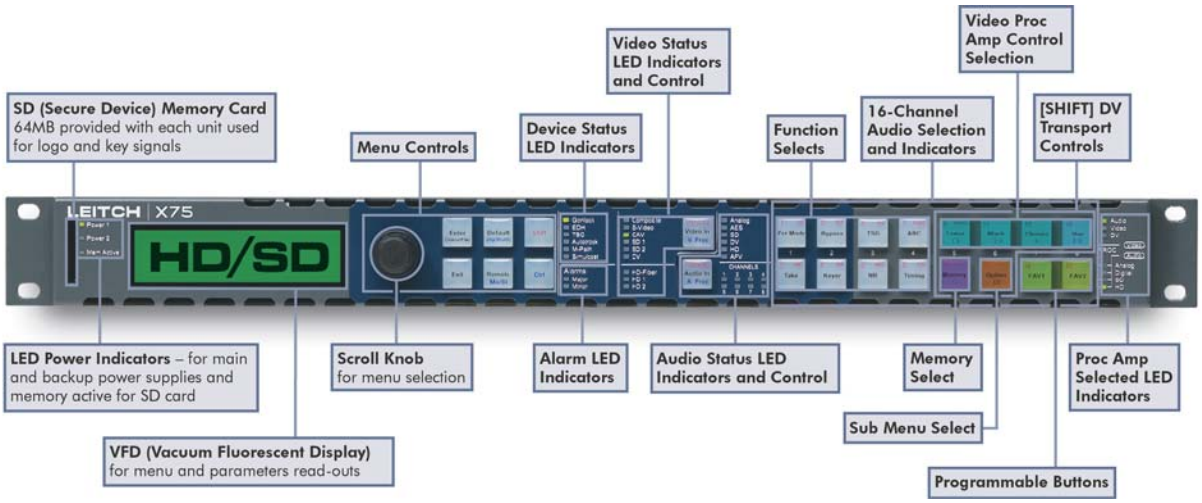
Miscellaneous Features

X75 miscellaneous features include:

- Video-to-audio timing tool using two units.
- SD (Secure Device) removable media, for transferring presets and logo storage (future).
- Color black, tri-level sync and DARS reference inputs.
- Front-to-back airflow.
- Single and dual redundant power supplies.

Front Panel

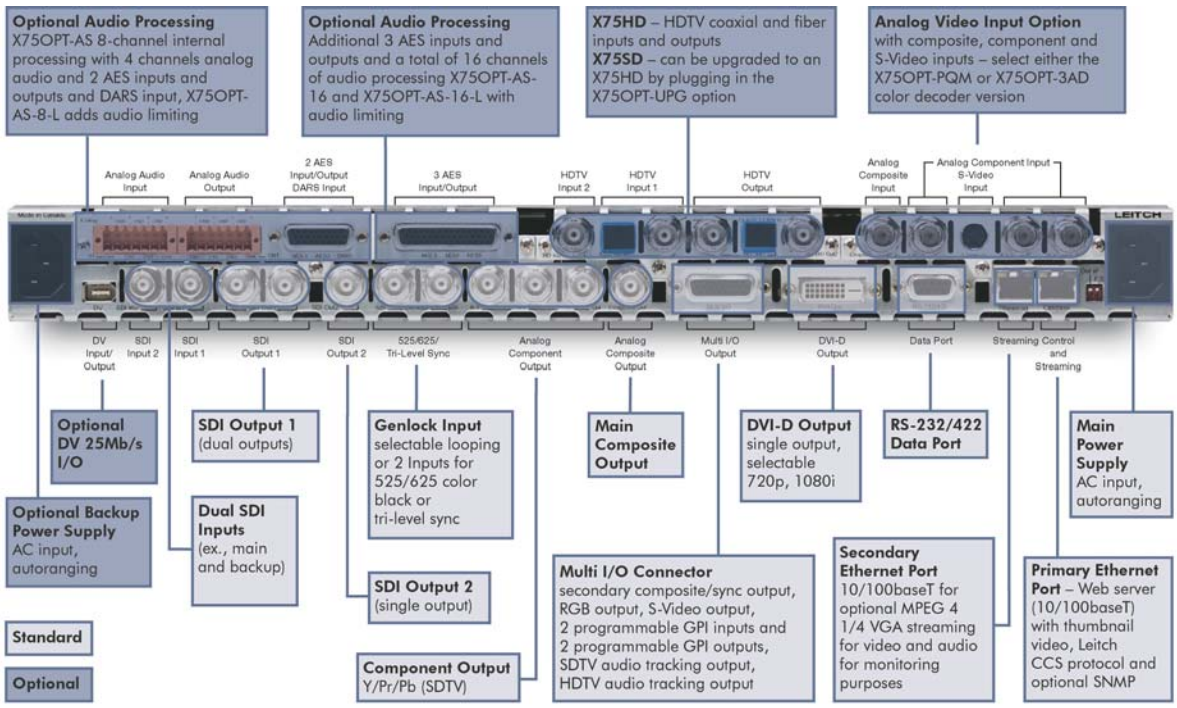
The figure below illustrates the **X75**'s front panel.



X75HD Front Panel

Rear Panel

The figure below illustrates the **X75HD**'s rear panel, with functional sections highlighted:



X75HD Rear Panel — Functional Sections

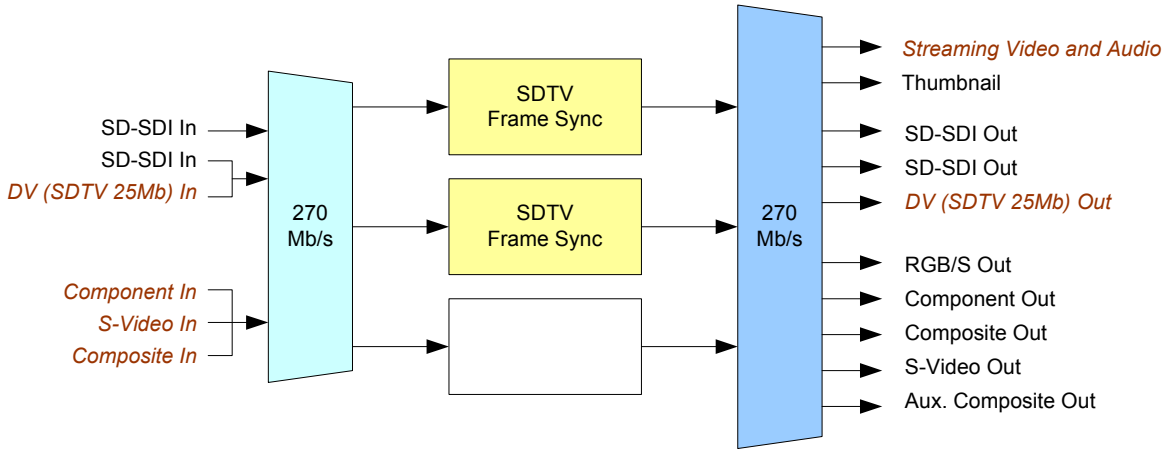
Functional Block Diagrams

This section provides simple functional block diagrams of several X75 models.

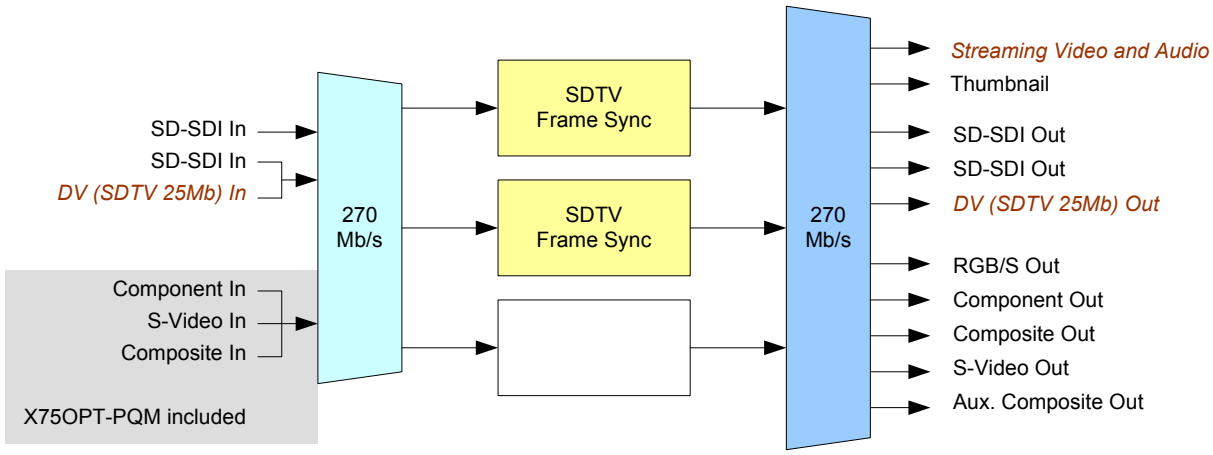
- **Note**: Throughout the diagrams:

Brown Italic Text = Optional

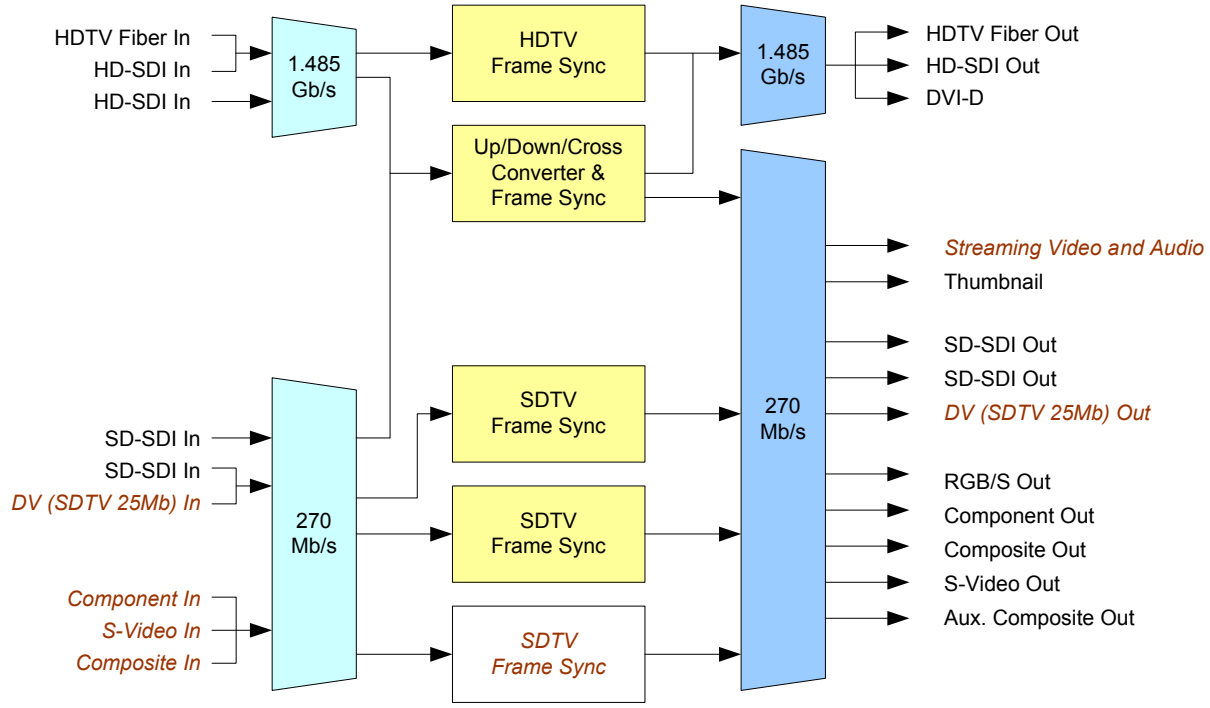
X75SD Base Model



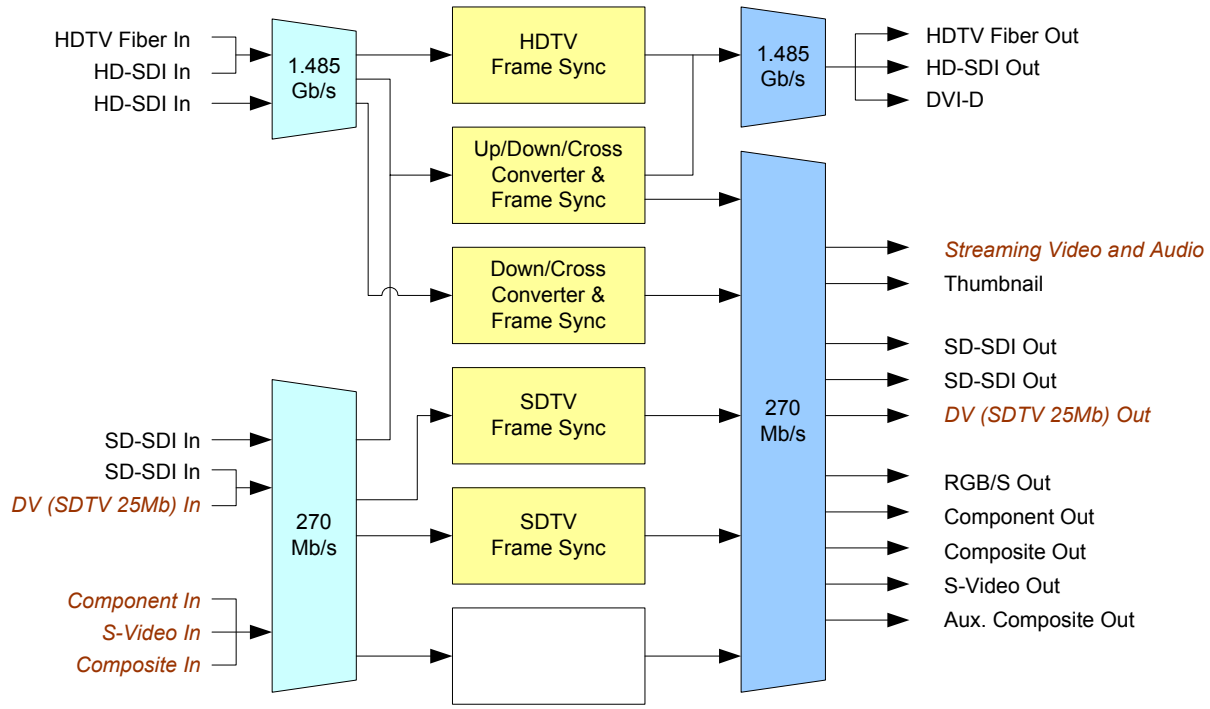
X75-DPS-575 Base Model



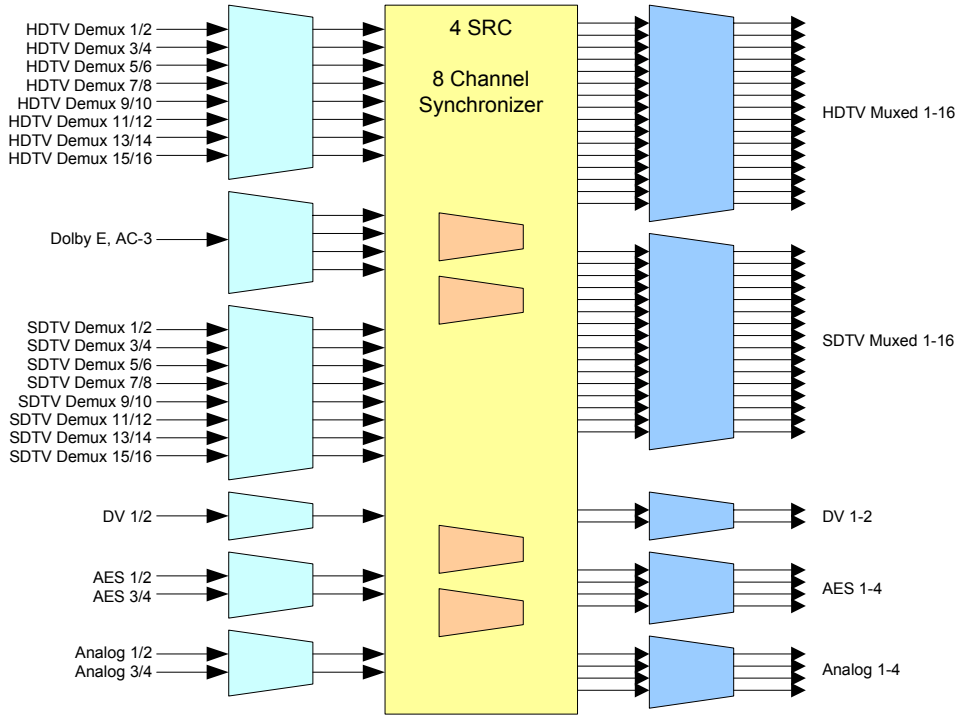
X75HD Base Model



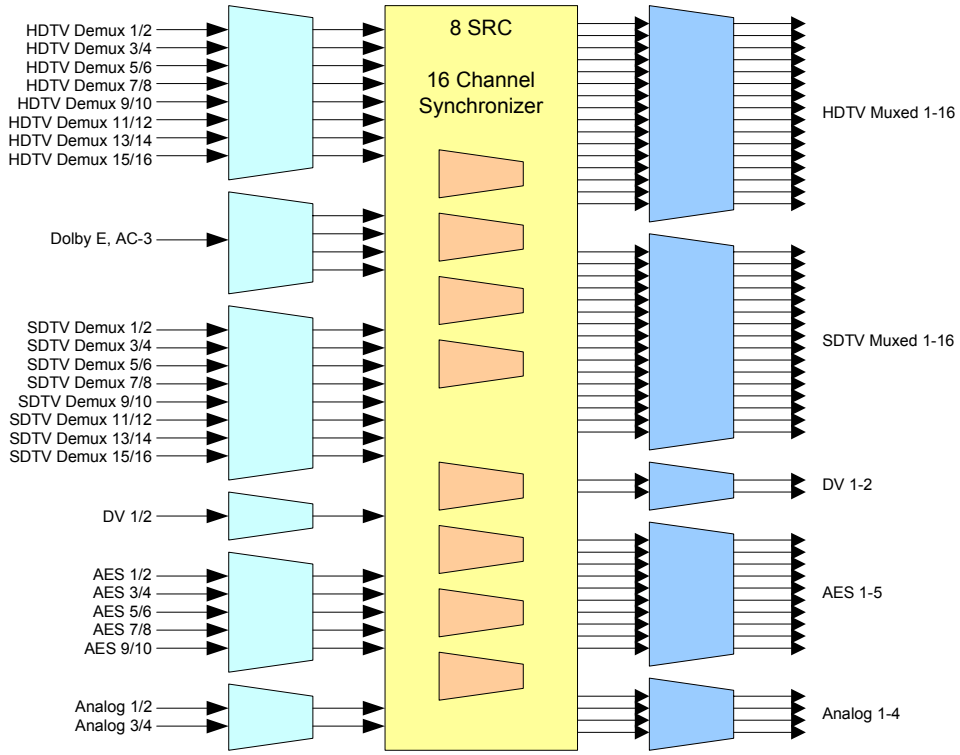
X75HD with X75OPT-HDDUOCON



8 Channel Audio Synchronizer Option



16 Channel Audio Synchronizer Option



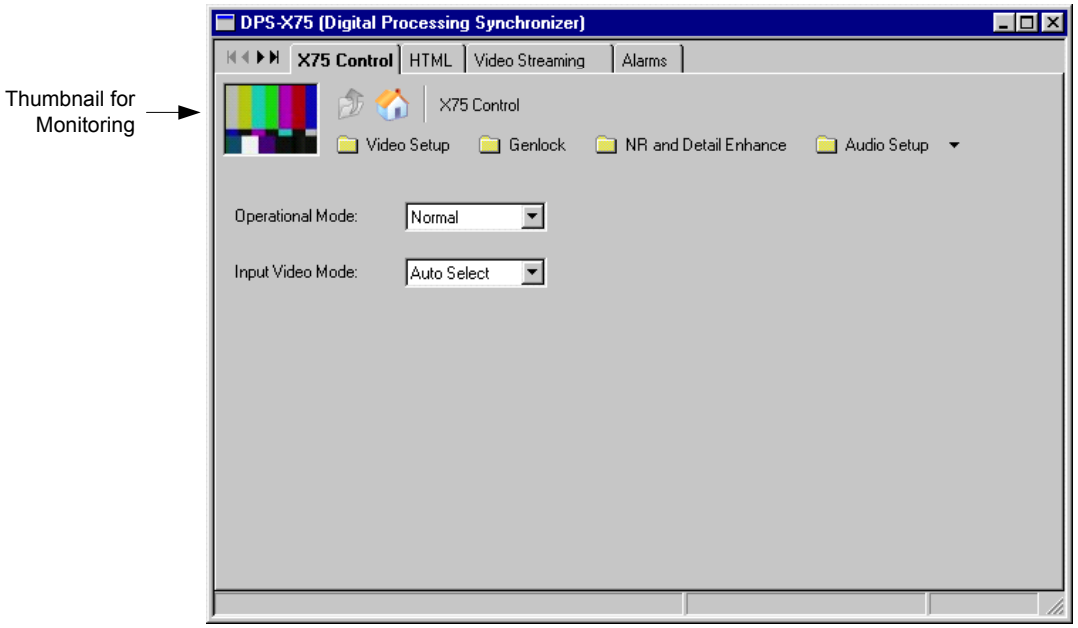
Control Architecture

The **X75** can be equipped with a local control panel, or it can also be controlled in the following ways:

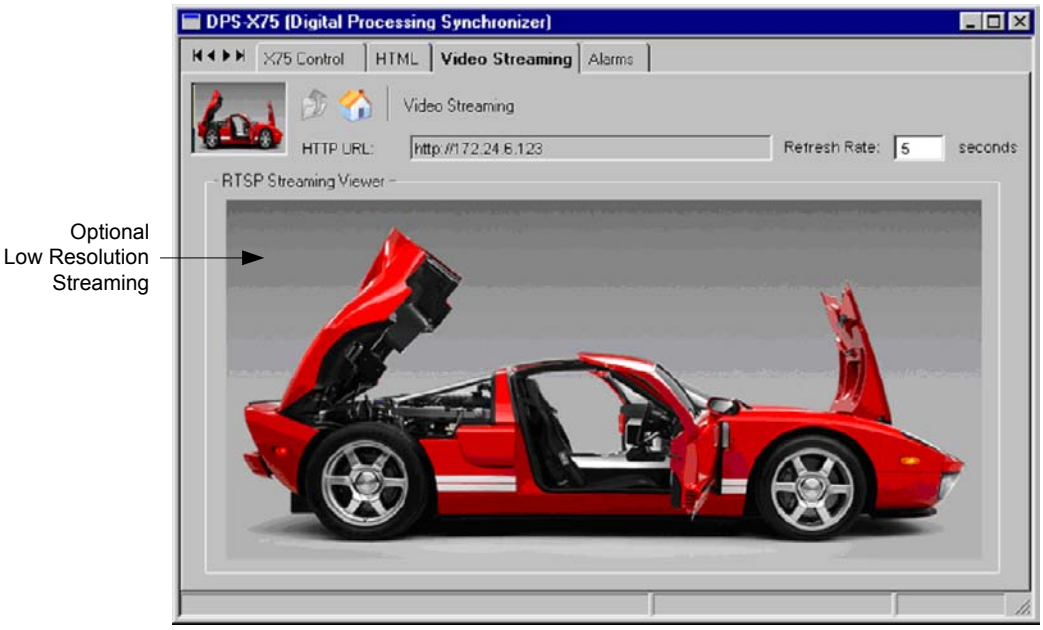
- **Ethernet** — **X75** includes two 10/100-BaseT Ethernet ports:
  - ~ One Ethernet port is dedicated to control, monitoring and low bit-rate streaming, providing a low frame rate video-only thumbnail.
  - ~ The second Ethernet port is dedicated to streaming ¼ screen VGA, full motion video and audio for monitoring purposes.
- **Web Server** — The **X75**'s built-in Web Server allows control via Ethernet, and permits alarms to be monitored on a unit-by-unit basis. A video thumbnail is streamed from the **X75** to the web browser. Refer to the "Web Server Menus" section for details.
- **Remote Panel** — A remote panel with Ethernet capability (and the same control features) is available for controlling up to 200 **X75** and DPS-575s. The **X75** remote panel can monitor and control one **X75** at a time. Note that local and remote control panels associated with installed DPS-575s can control **X75** through the text menu system.
- **SNMP** — For those who have adopted (or may adopt) the industry standard SNMP (Simple Network Management Protocol), an SNMP agent can be added as an option.
- **Binary Protocol** — Binary Protocol (EP Extended Protocol) is available for those who wish to write their own software application for controlling and monitoring the **X75**.
- **CCS** — The **X75** is CCS (Command Control System) compliant for use with Navigator, Pilot, Co-Pilot and the RCP-CCS-1U. A specific GUI (Graphical User Interface) has been developed for control, monitoring and diagnostics purposes. Refer to the "Pilot and Navigator GUI" section for details.

Pilot and Navigator GUI

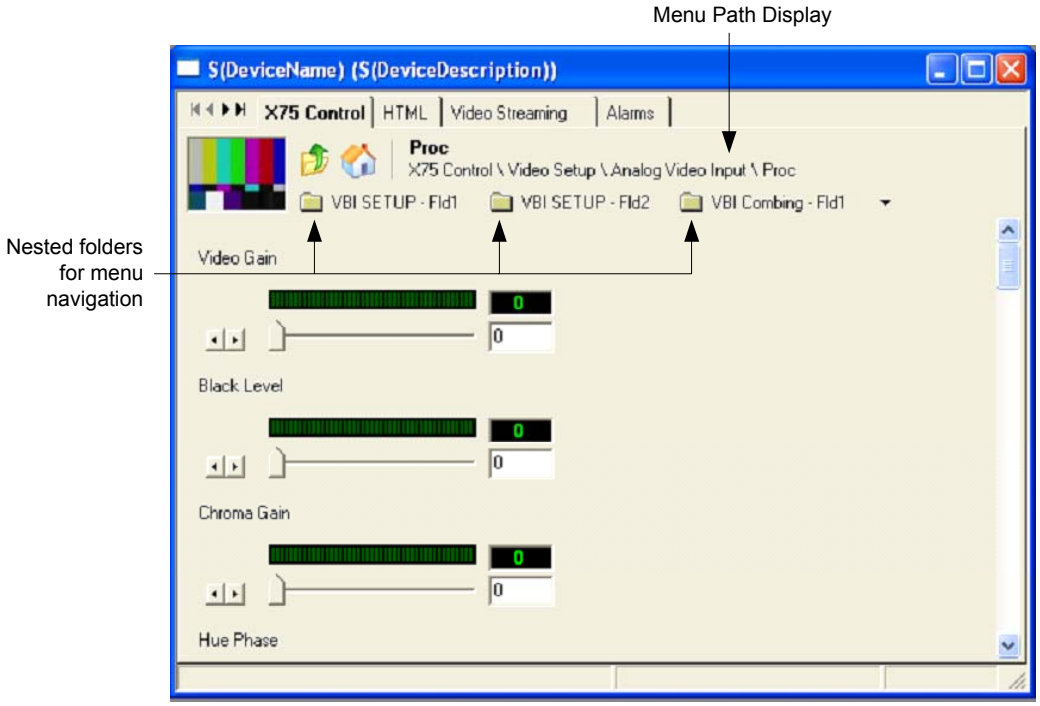
A variety of screen cuts from the **X75**'s Pilot and Navigator GUI are illustrated below.



Pilot / Navigator Screen Cut with Thumbnail



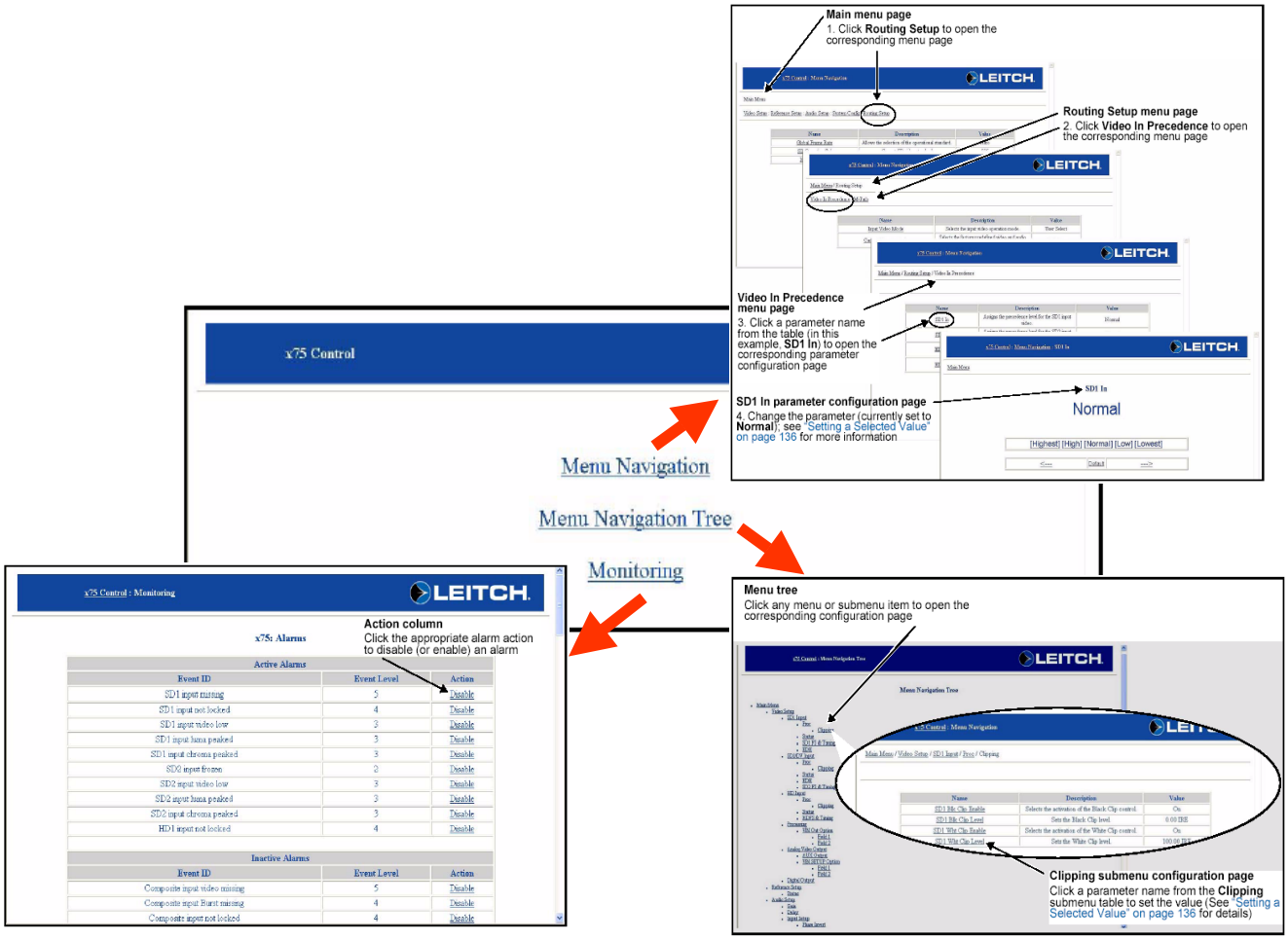
Pilot / Navigator Screen Cut with Streaming Image



Pilot / Navigator Screen Cut with Menu Path and Nested Folders

Web Server Menus

A built-in Web Server for use with web browsers such as IE and Netscape is provided:



Who needs an X75?

X75 customer profiles and categories are listed below:

- **Video Engineers** — looking for frame synchronizers for input processing, timing and lip sync corrections.
- **Audio Engineers** — looking for multi-channel processing for multi-language and surround sound applications, and Dolby® E and Dolby Digital® (AC-3) decompression.
- **Editors** —looking for a "box" to convert and time-base correct all of the analog, digital and high definition signals required — specifically in edit suites supporting high definition and legacy tape machines.
- **Operations Staff** — needing to "tweak" signals for processing purposes.
- **Systems Designers** — looking to fit more processing in a smaller space, a device that can handle all analog, digital and high definition signals with full audio processing, plus field upgradeability to HDTV.
- **DPS-575 Users** — wishing to add-on more processing devices to their system, and who may need high definition in the future.
- Users of first generation competitive high definition products — needing to replace that equipment. HD started in 1998, and most first generation equipment has been (or will be) replaced.

Applications

There is still a requirement for SDTV processing. The **X75SD** fills the need for a 1RU device with future proofing for HDTV. There are more and more processing applications for HDTV worldwide, with requirements in Asia (Japan, Taiwan, Korea, China), Australia, North America and Europe.

Primarily, the **X75** will be used for:

- HDTV Mobile Production
- Live Broadcasts for Sports and Music
- Satellite ingest for genlocking and timing purposes.
- Other applications exist in news and production.

The **X75** is designed for many applications, as described below:

- **Mobile**

  X75 is built for use in mobile environments with fast operator controls, automatic input selection of composite, SDI or HD-SDI inputs to the proper HD output format. These factors combine to make **X75** the easy choice for "live event" input processing. Mobile applications may require a mix of **X75SD** and **X75HD**s. The **X75SD** is future proofed with field upgradeability to HDTV as required.

- **Satellite**

  X75 provides frame synchronization with audio processing and delay for any input signal type to many output signal types. In satellite gathering and uplink facilities, the **X75**'s noise reduction plus audio limiting is ideal — ahead of the compression encoders.

- **Broadcast**

  The **X75SD** can currently perform A to D and D to A conversions for SDTV, with the ability to add-on HDTV processing in the future. The **X75HD** provides the following conversions for HDTV broadcast applications:

  ~ Upconversion for HD output.

  ~ Down conversion for monitoring/logging.

  ~ Cross-conversion for programs that are recorded in other then the native station format.

  As a simple switcher, **X75HD** switches between SD and HD inputs with clean (and quiet) SD and HD outputs with voiceover. Ideal for use with Dolby E and AC-3 compressed audio, the **X75HD** simplifies and reduces the amount of equipment needed to synchronize and time your video and audio signals.

- **News**

  Any tape format can be time-base corrected for use in any news environment — analog, digital or HDTV.

- **Production/Editing**

  For HDTV production applications, support for 24p (1080p-23.98) and 25p (1080p-25) provides for conversion to and from any signal type.

A separate application document is available. Please contact Leitch for details.

Advantages, Strengths and Differentiations

Key X75 Advantages

Following are the top advantages of the **X75**:

- Field Upgrade to HDTV for SDTV versions.
- Entry Level HDTV versions include up, down, cross conversion.
- Software key for simultaneous up and down, or simultaneous cross and down conversion.
- High quality analog video can be added for the input.
- Analog video outputs are included.
- Analog (4 channels) and AES (10 channels) audio inputs and outputs (option).
- Dolby E / Digital (AC-3) integrated de-compressor optional plug-in.
- SNMP built-in with an option to enable.
- Video streaming built-in (thumbnail).
- Plug-in video and audio monitoring streaming (1/4 VGA).
- Built-in web server.
- PAL-M and SECAM capability.

Top Ten Strengths

Following are the top ten strengths of the **X75**:

- More functions in a small space.
- Standard (upgradeable) and high definition versions.
- The most audio processing.
- Power/cooling designed for mobile use with power supply redundancy.
- Multiple video path processing.
- Multiple audio processing.
- DVI-D and HDTV fiber.
- Analog interface for video and audio.
- Future proofed with two Ethernet connections (separate IP addresses).
- Completely forward and backward compatible control, video and audio interfaces.

Key Differentiations

Following are the top key differentiations of the **X75**:

- More functions in a small space.
- SDTV versions upgradeable to HDTV in the field.
- Analog interface for video and audio option in the same package.
- Future proofed with two Ethernet connections (separate IP addresses), DVI-D and HD optical fiber interfaces.
- Dolby decompression.
- Web server, SNMP agent.

Hardware and Software Options

The **X75** can be provided as a direct equivalent replacement to the DPS-575, or as a **X75SD** package, or as a **X75HD** package.

- **Note**: the analog video input is optional for the **X75SD** and **X75HD** packages.

The following topics are discussed in this section:

1RU Packages

DPS-575 Replacement

The following 1RU packages are available as direct replacements to the DPS-575:

- Video only, no control panel.
- Video only, with local control panel.
- Video and audio, no control panel.
- Video and audio with local control panel.

SDTV Applications

The following 1RU packages are available for SDTV applications (with a future proofed field upgrade to HDTV):

- Video only, no control panel.
- Video only, with local control panel.
- Video and audio, no control panel.
- Video and audio with local control panel.
- Video only, no control panel and 2nd power supply.
- Video only, with local control panel and 2nd power supply.
- Video and audio, no control panel and 2nd power supply.
- Video and audio with local control panel and 2nd power supply.

HDTV applications

The following 1RU packages are available for HDTV applications:

- Video only, no control panel.
- Video only, with local control panel.
- Video and audio, no control panel.
- Video and audio with local control panel.
- Video only, no control panel and 2nd power supply.
- Video only, with local control panel and 2nd power supply.

- Video and audio, no control panel and 2nd power supply.
- Video and audio with local control panel and 2nd power supply.

Hardware Options

The following hardware options are available:

- A field upgrade to HDTV for DPS-575 equivalent and **X75SD** models.
- Three choices for an analog video module, providing composite or component Betacam™ or S-Video and TBC (Time Base Corrector) input function.
- Two choices (8 or 16 channel) audio inputs and outputs and embedded processing module.
- Dolby E / Digital (AC-3) decompression module.
- FC or ST connectors for HD fiber input and output (can only be provided at time of order).
- Monitoring streaming module.
- Remote Control Panel.
- Redundant Power Supply.
- Alternate Audio Cables (BNC versions included).
- DVI cable.
- Multi I/O cable.

Software Key Options

The following software options are available:

- Simultaneous up/down or simultaneous cross/down conversion.
- Noise reduction for SDTV.
- Audio limiter.
- SNMP agent.

Ordering Information

X75HD ordering information is provided below.

Packages

The table below lists **X75-DPS-575** equivalent packages:

DPS-575 Equivalent Models with Extras

Model	Description
X75-DPS-575	X75SD equivalent to DPS-575: 1RU Digital Synchronizer, video only, local control panel, includes X75OPT-PQM Analog video input.
X75-DPS-575LC	X75SD Equivalent to DPS-575LC: Video Only, No Control Panel, includes X75OPT-PQM Analog Video input.
X75-DPS-575AV	X75SD Equivalent to DPS-575AV: 1RU Digital Synchronizer, Video and 8 Channel Audio, Local Control Panel, includes X75OPT-PQM Analog Video input.
X75-DPS-575LCAV	X75SD Equivalent to DPS-575LCAV: 1RU Digital Synchronizer, Video and 8 Channel Audio, No Control Panel, includes X75OPT-PQM Analog Video input.

The tables below lists **X75SD** packages:

X75SD Digital Standard Definition

Model	Description
X75SD	1RU Digital Synchronizer, Video Only, Local Control Panel
X75SD-LC	1RU Digital Synchronizer, Video Only, No Control Panel
X75SD-AV	1RU Digital Synchronizer, Video and 8 Channel Audio, Local Control Panel
X75SD-LCAV	1RU Digital Synchronizer, Video and 8 Channel Audio, No Control Panel

X75SD Digital Standard Definition and Redundant Power Supply

Model	Description
X75SD-2PS	1RU Digital Synchronizer, Video Only, Local Control Panel, Redundant Power Supply
X75SD-LC-2PS	1RU Digital Synchronizer, Video Only, No Control Panel, Redundant Power Supply
X75SD-AV-2PS	1RU Digital Synchronizer, Video and 8 Channel Audio, Local Control Panel, Redundant Power Supply
X75SD-LCAV-2PS	1RU Digital Synchronizer, Video and 8 Channel Audio, No Control Panel, Redundant Power Supply

The table below lists **X75HD** packages:

X75HD with Up and Down and Cross Conversion (single channel)

Model	Description
X75HD	1RU Up/Down/Cross Converter & Synchronizer, Video Only, Local Control Panel (for simultaneous Up and Down or simultaneous Cross and Down conversion, the X75OPT-HDDUOCON software key option is required)
X75HD-LC	1RU Up/Down/Cross Converter & Synchronizer, Video Only, No Control Panel (for simultaneous Up and Down or simultaneous Cross and Down conversion, the X75OPT-HDDUOCON software key option is required)
X75HD-AV	1RU Up/Down/Cross Converter & Synchronizer, Video and 16 Channel Audio, Local Control Panel (for simultaneous Up and Down or simultaneous Cross and Down conversion, the X75OPT-HDDUOCON software key option is required)
X75HD-LCAV	1RU Up/Down/Cross Converter & Synchronizer, Video and 16 Channel Audio, No Control Panel (for simultaneous Up and Down or simultaneous Cross and Down conversion, the X75OPT-HDDUOCON software key option is required)

X75HD with Up and Down and Cross Conversion (single channel) and Redundant PSU

Model	Description
X75HD-2PS	1RU Up/Down/Cross Converter & Synchronizer, Video Only, Local Control Panel, Redundant Power Supply (for simultaneous Up and Down or simultaneous Cross and Down conversion, the X75OPT-HDDUOCON software key option is required)
X75HD-LC-2PS	1RU Up/Down/Cross Converter & Synchronizer, Video Only, No Control Panel, Redundant Power Supply (for simultaneous Up and Down or simultaneous Cross and Down conversion, the X75OPT-HDDUOCON software key option is required)
X75HD-AV-2PS	1RU Up/Down/Cross Converter & Synchronizer, Video and 16 Channel Audio, Local Control Panel, Redundant Power Supply (for simultaneous Up and Down or simultaneous Cross and Down conversion, the X75OPT-HDDUOCON software key option is required)
X75HD-LCAV-2PS	1RU Up/Down/Cross Converter & Synchronizer, Video and 16 Channel Audio, No Control Panel, Redundant Power Supply (for simultaneous Up and Down or simultaneous Cross and Down conversion, the X75OPT-HDDUOCON software key option is required)

Hardware Options

The table below lists **X75** hardware options:

X75HD Hardware Options

Model	Description
X75OPT-HDUPG	HDTV sub-module with Up, Down or Cross Conversion, Coax and Optical Input and Output
X75OPT-A3D	Analog Video Input with high performance 3D fully adaptive comb filtering, S-Video, and Analog Component Betacam™ Inputs
X75OPT-A3D-1	Analog Video Input with Industry Leading 3D fully adaptive comb filtering, S-Video, and Analog Component Betacam™ Inputs (with alternate color decoder algorithm)
X75OPT-PQM	Analog Video Input with 3D adaptive comb filtering with, S-Video, and Analog Component Betacam™ Inputs
X75OPT-AS-16	16 Ch. Audio Synchronizer with 4 Ch. Analog / 5 AES / SD & HD 4 Group Embedded Inputs and Outputs, Includes Cable Set
X75OPT-AS-16-L	16 Ch. Audio Synchronizer with 4 Ch. Analog / 5 AES / SD & HD 4 Group Embedded Inputs and Outputs with Audio Limiting, Includes Cable Set
X75OPT-AS-8	8 Ch. Audio Synchronizer with 4 Ch. Analog / 2 AES / SD & HD 2 Group Embedded Inputs and Outputs
X75OPT-AS-8-L	8 Ch. Audio Synchronizer with 4 Ch. Analog / 2 AES / SD & HD 2 Group Embedded Inputs and Outputs with Audio Limiting
X75OPT-DOLBY-1	Dolby E and Digital (AC-3) Integrated decompression
X75OPTFIBER-FC	FC type fiber connectors for HD sub-module
X75OPTFIBER-ST	ST type fiber connectors for HD sub-module
X75-RCP	Remote Control Panel for X75HD and DPS-575
X75OPT-PS	Power Supply Field Retrofit Kit

Software Key Options

The table below lists **X75** software key options:

X75 Software Options

Model	Description
X75OPT-HDDUOCON	Optional Software Key: Adds Simultaneous Up and Down - or - Simultaneous Cross and Down conversions to X75HD models
X75OPT-NR	Motion Adaptive Noise Reduction and Bandwidth Filtering for SDTV input signals
X75OPT-ASL	Audio Limiting Software Keyable Option
X75OPT-SNMP	SNMP Agent Software Keyable Option

Cable Options

The table below lists optional cables for the **X75**:

X75 Cable Options

Model	Description
X75OPTCAB-16-C	Cable Set for 16 Ch. Audio Synchronizer, Unbalanced Coax AES (one set included)
X75OPTCAB-16-X	Cable Set for 16 Ch. Audio Synchronizer, Balanced XLR AES
X75OPTCAB-16-CX	Cable Set for 16 Ch. Audio Synchronizer, Unbalanced Coax AES and Balanced XLR AES
X75OPTCAB-8-C	Cable Set for 8 Ch. Audio Synchronizer, Unbalanced Coax AES (one set included)
X75OPTCAB-8-X	Cable Set for 8 Ch. Audio Synchronizer, Balanced XLR AES
X75OPTCAB-8-CX	Cable Set for 8 Ch. Audio Synchronizer, Unbalanced Coax AES and Balanced XLR AES
X75OPTCAB-MULTI	Cable Set for Multi IO Connector
X75OPTCAB-DVI	Cable for DVI-D Single Link Output

Spares Kit and Extra Manuals

The tables below list the spares kit and extra manuals for the **X75**:

X75 Spares Kit

Model	Description
X75SPR-KIT	Includes 2 fans, 4 stackers, 1 power supply with no connectors, 1 shaft encoder

X75 Manuals

Model	Description
X75MAN	X75 Hardcopy Manual and CD-ROM (CD-ROM contains the manual and parameters list)
X75MAN-RCP	X75 Local and Remote Control Panel Manual and CD-ROM (CD-ROM contains the manual and parameters list)

Specifications

Tables are provided for the following **X75** specifications:

HD-SDI Video Input

HD-SDI Video Input Specifications

Item	Specification
Standard	SMPTE 292M
Connector	BNC (IEC169-8)
Impedance	75 Ω
Return Loss	> 18 dB, typical, from 5 MHz to 1485 MHz
Equalization	Adaptive cable equalization for up to — • 328 ft (100 m), typical, of Belden 8281 co-axial cable, or • 492 ft (150 m), typical, of Belden 1694A co-axial cable

HDTV Fiber Video Input

HDTV Fiber Video Input Specifications

Item	Specification
Standard	SMPTE 292M, Mode B Operation
Number of inputs	1
Connector	Single mode fiber, SC connector standard. (FC or ST type optional)
Input Wavelength	1200 to 1600 nm
Max. Input Power	0 dBm, typical
Sensitivity	Better than -20 dBm

SD-SDI Video Input

SD-SDI Video Input Specifications

Item	Specification
Standard	SMPTE 259M-C, 270Mbps, 525/625 component
Connector	BNC (IEC 169-8)
Impedance	75 Ω
Return Loss	> 18 dB from 5 MHz to 270 MHz
Equalization	> 23 dB Belden 8281 cable

S-Video Input

S-Video Input Specifications

Item	Specification
Standard	NTSC, PAL-M, PAL-B
Connector	4-pin DIN

Analog Composite Video Input

X75OPT-A3D and X75OPT-PQM Analog Composite Video Input Specifications

Item	Specification
Standard	NTSC (SMPTE 170M), PAL-B (ITU624-2), SECAM, PAL-M
Connector	BNC (IEC 169-8)
Quantization	Normal mode, non-TBC: • 12 bits (NTSC, PAL-B, PAL-M) • 8 bits (SECAM) TBC mode • 8 bits (all standards)
Input Level	1.0 V pk-to-pk
Impedance	75 Ω
Return Loss	> 40 dB 0.1 MHz to 6 MHz
Common mode range	5.0 V
CMRR	60 dB @ 50/60 Hz, 5 V pk-to-pk
Setup Level Range	±7.5 IRE
Frequency Response	±0.1 dB 0.1 MHz to 6 MHz
SNR	62 dB, typical (X75OPT-A3D) 58 dB, typical (X75OPT-PQM)
Y/C Gain Error	< 0.1 dB
Y/C Delay error	< 10 ns

Component Input

Component Video Input Specifications

Item	Specification
Format	Betacam
Connector	BNC (IEC 169-8)
Input Level	1.0 V pk-to-pk
Quantization	Normal mode, non-TBC mode CAV • Y: 12 bits • Cb: 10 bits • Cr: 10 bits Normal mode, non-TBC mode S-Video • Luma: 12 bits • Chroma: 10 bits
	TBC mode • CAV: Not supported • S-Video: 8 bits all
Impedance	75 Ω
Return Loss	> 40 dB, 1 kHz to 6 MHz
Common Mode Range	5.0 V
CMRR	60 dB @ 50/60 Hz, 5 V pk-to-pk
Frequency Response	Y: ±0.15 dB to 5.5 MHz Pb/Pr: ±0.10 dB to 3.0 MHz
SNR	> 60 dB

Genlock Input

Genlock Input Specifications

Item	Specification
Connector	BNC (IEC 169-8)
Impedance	75 Ω
Return loss	> 40 dB, 0.1 MHz to 6 MHz
Input Level	1 V pk-to-pk, -5.0 dB to +6.0 dB for NTSC/PAL-B 1 V pk-to-pk, -3.5 dB to +6.0 dB for Tri-level sync (1080i/720p)
Signal Type	NTSC/PAL-B Analog Composite ±300 mV Tri-level sync (1080i / 720p)

HD-SDI Video Output

HD-SDI Video Output Specifications

Item	Specification
Standard	SMPTE 292M
Connector	BNC (IEC169-8)
Impedance	75 Ω
Return Loss	> 18 dB, typical, from 5 MHz to 1485 MHz
Signal level	800 mV ± 10%
DC offset	0.0 V ± 0.5 V
Rise/fall time	<270 ps
Overshoot	<10% of amplitude
Jitter	<135 ps pk-to-pk

HDTV Fiber Video Output

HDTV Fiber Video Output Specifications

Item	Specification
Standard	SMPTE 292M, Mode B Operation
Number of outputs	1
Connector	Single mode fiber, SC-type standard; FC- or ST-type optional
Output wavelength	1310 ± 40 nm
Output power	-7 dBm
Rise/fall time	<270 ps
Jitter	<135 ps pk-to-pk
Laser safety level	Class 1

SD-SDI Video Output

SD-SDI Video Output Specifications

Item	Specification
Standard	SMPTE259M-C, 270 Mbps, 525/625 component
Quantization	10 bits
Connector	BNC (IEC169-8)
Impedance	75 Ω
Return loss	>18 dB from 5 MHz to 270 MHz
Signal level	800 mV ± 10%
DC offset	0.0 ± 0.5 V
Rise/fall time	400 ps to 1500 ps (20% to 80%)
Overshoot	<10%
Jitter	<0.2 UI (pk-to-pk)

Composite Output

Composite Video Output Specifications

Item	Specification
Standard	NTSC, PAL-B, PAL-M
Connector	BNC (IEC169-8)
Quantization	12 bits
Impedance	75 Ω
Return loss	>40 dB (0.1 MHz to 6 MHz)
Frequency response	±0.1 dB (0.1 MHz to 6 MHz)
DC offset	<0.0 ± 0.005 V
Differential gain	<0.5%
Differential phase	<0.5°
Y/C delay	<1 ns
Transient response	<0.5% K Factor
SNR	>63 dB (0.1 MHz to 6 MHz)

Component Output

Component Video Output Specifications

Item	Specification
Format	Betacam
Connector	BNC (IEC 169-8)
Quantization	Y: 12 bits, Cb: 10 bits, Cr: 10 bits
Impedance	75 Ω
Return Loss	> 40 dB (1 kHz to 6 MHz)
Frequency Response	Y: ±0.1 dB to 5.5 MHz Pb/Pr: ±0.10 dB to 3.0 MHz
DC Offset	< 0.0 ±5 mV
Relative Delay	< ±1 ns
SNR	> 63 dB

DVI Output

DVI Output Specifications

Item	Specification
Standard	1080i/59.94, 1080i/50, 720p/59.94, 720p/50
Connector	DVI-D
Rise/Fall Times	75 ps to 0.4 UI (20% to 80%)
Level	1.0 V ± 0.2 V (differential, pk-to-pk)
Jitter	0.25 UI

AES / DARS Input

AES / DARS Input Specifications — Balanced

Item	Specification
Standard	AES3
Type	Balanced, transformer coupled
Connector	2 Female DB-26 / DB-44 Connector with breakout cable
Sensitivity	<200 mV
Impedance	110Ω ± 20% (0.1 MHz to 6 MHz)
Common Mode Rejection	0 V to 7 V (0 kHz to 20 kHz)
Input Audio Rate	32 kHz to 108 kHz

AES / DARS Input Specifications — Unbalanced

Item	Specification
Standard	AES3, SMPTE 276M
Type	Unbalanced, AC coupled
Connector	BNC (IEC169-8)
Sensitivity	<100 mV
Impedance	75 Ω
Return loss	> 25 dB, 0.1 MHz to 6 MHz
Input Audio Rate	32 kHz to 108 kHz

Analog Audio Input

Analog Audio Input Specifications

Item	Specification
Connector	Removable Barrier Strip
Input Impedance	Jumper selectable with J5-J8 • Pin 2-3: 100 kΩ • Pin 1-2: 600 Ω
Input Analog Level	28 dBu to 16 dBu (adjustable by 2 dB increments)
Common mode range	TBD
CMRR	> 80 dB @ 60 Hz, typical
Linearity	< ±0.5 dB (to -100 dBFS)
Frequency Response	< +/-0.05 dB (20 Hz to 20 kHz), typical
THD	> 100 dB (@-1dBFS, 20 Hz to 20 KHz)
SNR	> 100 dB

AES Output

AES Output Specifications — Balanced

Item	Specification
Standard	AES3
Type	Balanced, transformer coupled
Connector	2 Female DB-26 / DB-44 connector with breakout cable
Signal Level	4.0 V (pk-to-pk)
Impedance	110Ω ± 20% (0.1 MHz to 6 MHz)
Jitter	< ± 4 ns, peak value
DC Offset	0.0 ± 50 mV
Rise / Fall Time	5 ns to 30 ns (10% to 90%)

AES Output Specifications — Unbalanced

Item	Specification
Standard	AES3, SMPTE 276M
Type	Unbalanced, AC coupled
Connector	BNC (IEC169-8)
Signal Level	1.0 V ± 10% (pk-to-pk)
Impedance	75 Ω
Return loss	> 25 dB, 0.1 MHz to 6 MHz
Jitter	< ± 4 ns, peak value
DC Offset	0.0 ± 50 mV
Rise / Fall Time	30 ns to 44 ns (10% to 90%)

Analog Audio Output

Analog Audio Output Specifications

Item	Specification
Connector	Removable Barrier Strip
Output Impedance	Jumper selectable with J1-J4, J9-J12 • Pin 2-3: 66 Ω • Pin 1-2: 600 Ω
Output Analog Level	28 dBu to 16 dBu (Adjustable by 2 dB increments)
Linearity	< ±0.5 dB (to -100 dBFS)
Frequency Response	< ±0.1dB (20 Hz to 20 kHz)
THD	>87dB (@ -1dBFS, 20 Hz to 20 KHz)
SNR	> 100 dB

Multi-I/O

Multi-I/O Specifications

Item	Specification
Composite Output	NTSC, PAL-B, SECAM, Sync
Component Output	GBR
Quantization	8 bits all
Time Code	Input
GPI Inputs	Number: 2 • Internally pulled HIGH • External contact closure to ground to trigger
GPI Outputs	Number: 2 • TTL-compatible • 75 Ω impedance • Sink 64 mA, source 32 mA
Connector	DB-26

DV I/O

DV I/O Specifications (Future Use)

Item	Specification
Standard	IEEE-1394
Connector	IEEE-1394, 6 pin molex connector

Control/Streaming I/O

Control/Streaming I/O Specifications (Future Use)

Item	Specification
Connector	RJ-45
Protocols	CCS, SNMP, HTTP

RS-232/RS-422

RS-232/RS-422 Specifications

Item	Specification
Standard	Electrical specifications EIA-232C
Connector	DB-9 • 232/422 switchable • 422 termination can be selected from the menu

Weight and Dimension

Weight and Dimension Specifications

Item	Specification
Weight	Fully loaded unit, no power cords: 11 lbs (4.9 kg) Breakout cables (each): 2.5 lbs (1.1 kg)
Height	1RU, 1.75 in. (4.5 cm)
Width	19 in. (48.3 cm)
Depth (includes extruding knobs and BNCs)	21.5 in. (54.6 cm)

Power

Power Consumption by Individual Component

Component	Description	Power Consumption @ 115V AC
1	X75HD/X75SD frame with main board	17.19 W
2	Local control panel	6.96 W
3	Blank front panel	5.25 W
4	HDTV sub-module	28.35 W
5	8- or 16-channel audio sub-module	19.69 W
6	Analog video in sub-module (A3D or PQM)	7.88 W
7	Streaming sub-module (future use)	3.95 W
8	Second power supply	Adds extra 5% to single power supply system configuration

Power Consumption of Complete Packages — X75HD Models

System Configuration	Individual Components	Description	Power Consumption @ 115V AC
X75HD	1+2+4	X75HD frame with main board, local control panel, and HDTV sub-module	53 W
X75HD-2PS	1+2+4+8	X75HD frame with main board, local control panel, HDTV sub-module, and second power supply	55 W
X75HD-AV	1+2+4+5	X75HD frame with main board, local control panel, HDTV sub-module, and 16-channel audio sub-module	72 W
X75HD-AV-2PS	1+2+4+5+8	X75HD frame with main board, local control panel, HDTV sub-module, 16-channel audio sub-module, and second power supply	76 W
X75HD-LC	1+3+4	X75HD frame with main board, blank front panel, and HDTV sub-module	51 W
X75HD-LC-2PS	1+3+4+8	X75HD frame with main board, blank front panel, HDTV sub-module, and second power supply	53 W
X75HD-LCAV	1+3+4+5	X75HD frame with main board, blank front panel, HDTV sub-module and 16-channel audio sub-module	70 W
X75HD-LCAV-2PS	1+3+4+5+8	X75HD frame with main board, blank front panel, HDTV sub-module, 16-channel audio sub-module, and second power supply	74 W

Power Consumption of Complete Packages — X75SD Models

System Configuration	Individual Components	Description	Power Consumption @ 115V AC
X75SD	1+2	X75SD frame with main board, local control panel	24 W
X75SD-2PS	1+2+8	X75SD frame with main board, local control panel and second power supply	25 W
X75SD-AV	1+2+5	X75SD frame with main board, local control panel and 8-channel audio sub-module	44 W
X75SD-AV-2PS	1+2+5+8	X75SD frame with main board, local control panel, 8-channel audio sub-module and second power supply	46 W
X75SD-LC	1+3	X75SD frame with main board, blank front panel	22 W
X75SD-LC-2PS	1+3+8	X75SD frame with main board, blank front panel and second power supply	24 W
X75SD-LCAV	1+3+5	X75SD frame with main board, blank front panel and 8-channel audio sub-module	42 W
X75SD-LCAV-2PS	1+3+5+8	X75SD frame with main board, blank front panel, 8-channel audio sub-module and second power supply	44 W

Power Consumption of Complete Packages — X75-DPS-575 Models

System Configuration	Individual Components	Description	Power Consumption @ 115V AC
X75-DPS-575	1+2+6	X75SD equivalent frame to DPS-575 with main board, local control panel and PQM analog video in sub-module	32 W
X75-DPS-575AV	1+2+5+6	X75SD equivalent frame to DPS-575AV with main board, local control panel, PQM analog video in and 8-channel audio sub-module	52 W
X75-DPS-575LC	1+3+6	X75SD equivalent frame to DPS-575LC with main board, blank front panel, and PQM analog video in sub-module	30 W
X75-DPS-575LCAV	1+3+5+6	X75SD equivalent frame to DPS-575LCAV with main board, blank front panel, PQM analog video in and 8-channel audio sub-module	50 W

HD Conversion

The **X75HD** model can convert any of the input signals and formats listed below to any of the specified output signals and formats.

- Note: "**Y**" indicates that this format conversion is supported.

X75HD Supported Conversion Formats

		Outputs						
		486i/29.97	720p/59.94	1080i/59.94	576i/25	720p/50	1080i/50	1080p/25
Input	486i/29.97	Y	Y	Y				
	720p/59.94	Y	Y	Y				
	1080i/59.94	Y	Y	Y				
	576i/25				Y	Y	Y	Y
	720p/50				Y	Y	Y	Y
	1080i/50				Y	Y	Y	Y
	1080p/25				Y	Y	Y	Y

Note	New format conversions are being added – call Leitch Technology for details

Frequently Asked Questions

This section contains the following groups of X75 FAQs:

General Questions

What's new in the X75?

- DPS-575 equivalent versions, X75SD versions, X75HD base version with up/down/cross conversion, software key upgrade to simultaneous up/down or cross/down conversion

Can the X75 be used as a "mini-master control switcher?"

- No, the **X75** Multiple Path Converter and Frame Sync is not a "mini-master control switcher." The video goes to black for four frames when switching between SDTV and HDTV signals. This is not a problem for a simple switcher or a backup switcher to a master control. SDTV to/from SDTV switching and HDTV to/from HDTV switching is OK. The audio may not be quiet during switching, especially if the audio levels are different.

What is M-PATH?

- M-PATH is Multiple Path Processing. An **X75HD** has the capability of up to four simultaneous paths of processing with an analog video input option installed. For example, the **X75HD** can provide up and down or cross and down conversions at the same time. The **X75SD** has the capability of up to three paths of processing with an analog video input option installed. For example, the **X75SD** can provide dual SDI paths or analog to digital and digital to analog at the same time.

There are two genlock connectors. How are they implemented?

- The two input genlock connectors can set for looping (one reference) or for two separate reference inputs. If the two genlock inputs are used (e.g., tri-level and color black), you can select which one you wish to use.

What type of test signals will available with the X75?

- A complement of SDTV signals can be provided on the analog and digital SDTV outputs. The **X75HD** adds a complement of HDTV test signals on the HDTV outputs. If the audio option is used, there are four selectable test tones for the embedded, AES and analog outputs.

Are there filters for the fans?

- No. Filters clog up, airflow is reduced, internal temperature goes up, and the unit may stop working (and you don't have to have someone on the night shift spending all of their time vacuuming out and cleaning filters).

Are DPS-575s compatible with X75s?

- Yes, video and audio signals can be passed from unit to unit — providing that standards are observed. For control purposes, a proper Ethernet connection allows communications between units.

Does the X75 replace the DPS-575?

- Yes, the **X75-DPS-575** models provide a direct replacement.

Fiber Optics Questions

Is there a SDTV fiber connection?

- No. But you convert from SD-SDI to optical using 6800+ modular products.

It is possible to change fiber connectors in the field?

- No. The fiber connectors must be provided at time of order.

What fiber connectors are available?

- SC as standard and FC (X75OPT-FIBER-FC) and ST (X75OPTFIBER-ST).

What is fiber wavelength on the input/output of the HDTV option?

- Input: 1200 to 1600 nm.
- Output: 1310nm

Streaming, Compressed and Metadata Questions

How does the X75 handle closed captioning?

- During upconversion, the **X75HD** processes the EIA-608 data on line 21 in the input SDTV signal and "transcodes" it into EIA-708 on line 9 of the output HDTV signal. A reverse processes occurs for downconversion. For cross conversion, CC is passed through in a transparent manner.

Can the X75 provide an EIA-708 output on the data port during upconversion so that closed captioning can be passed to an MPEG coder?

- Yes, this is a software key option. Contact Product Management for more details.

How do we do streaming via the X75HD?

- The **X75** has a web server with control, monitoring and thumbnail streaming. A video only "thumbnail" which is monitoring quality is included for free and is to be used with a web browser connected to a **X75**. The primary Ethernet port is used for this capability. The thumbnail is sent to the web browser, one frame every few seconds.
- There is a plug-in option for video and audio streaming on the secondary Ethernet port that is monitoring quality. This is not MPEG4.1, AVC, AVI, JVT, MPEG4 Part 10 (H.264) or SMPTE VC-1 (WM9 or Windows Media 9). We are using MPEG4; however, it is low bitrate with full motion, and is meant for monitoring purposes, and not for "broadcasting" purposes. The streamed image is 1/4 VGA in size. QuickTime can be used to view the signal.

Does the X75 support MPEG 2 for ATSC or DVB-ASI?

- No. Broadcast compressed video is not supported at this time.

Does the X75 have ASI input and output?

- No. ASI is the Asynchronous Interface that carries one or more compressed program streams. The **X75** does not support compressed video for broadcast purposes at this time.

What algorithm will be used for the streaming video/audio?

- The unit will be compatible with QuickTime and Windows Media Player.

What inputs can be streamed for monitoring purposes?

- Thumbnail inputs: SDI1, SDI2, HD DWN, analog, TSG1, TSG2
- Streaming inputs: Composite, S-Video, CAV, SDI, SDI2, DV, down converted HDF, HD1, HD2.

Is MXF support available on the X75?

- The MXF wrapper is used for compressed video streams. The **X75** does not have compressed video capability at this time.

Is SDTI available on the X75?

- SDTI is an interface standard for carrying compressed streams of video. The **X75** does not have compressed video capability at this time.

Can the X75 display any metadata?

- No, not at this time. However, we are willing to discuss this capability.

Can the X75 read and display timecode?

- No, not at this time. However, we are willing to discuss this capability.

Can the X75 read closed captioning data?

- No, not at this time. However, we are willing to discuss this capability.

Does the X75 have control over the VBI for SDTV signals?

- Yes, information in the VBI can be passed or deleted on a line-by-lie basis. (The analog composite input has been implemented at this time. The SDI and HD-SDI VBI control will be implemented in the future.)

Control Questions

When will the X75 control panel be capable of CCS-TRAX?

- No, not at this time. The RCP-CCS-1U can be used for CCS-TRAX. (August 2005)

Ethernet connections?

- 100baseT is used for Ethernet connectivity. The primary port is used for control/alarm monitoring and thumbnail size video only streaming. The secondary port is being used for video/audio monitoring streaming.

Do the two Ethernet ports have their own IP addresses?

- Yes.

Can you change the IP address from the front panel or from a web browser?

- Yes.

How many presets are available on the X75?

- FAV1 and FAV 2 are for user-selected parameters. For full configuration presets there is one current live preset and 10 on any control panel (local or remote).

Can controls be disabled on the X75 control panels?

- Yes, there will be a future software release for this feature.

How do you select multiple X75s from one remote panel?

- You can control and monitor one **X75** at a time. Pressing the Remote button on RCP brings up a list of **X75s** on the network and you scroll down to the **X75** that you wish to control/monitor and press the **ENTER** key to select.

When will the X75 control panel be capable of CCS-TRAX?

- Yes, there will be a future software release for this feature.

How does the Auto-Detect Setup work?

- The user must set the I/P Video mode parameter to Auto Detect instead of factory default of User Select. Then you can pick the precedence level to set the selected input as primary, secondary, tertiary, etc. inputs for auto-changeover.

Can the RCP-CCS-1U control many X75s?

- Co-Pilot software is used to discover devices (**X75s**) and device parameters (controls on a **X75**). You can drag and drop discovered devices under the RCP-CCS-1U control panel to build its menu hierarchy. The menu hierarchy can be rearranged, and entries can be renamed.
- You can right-click on a device, popup a window with its parameters list, and select which ones to show as favorites. Favorites selections for a device can be copied to another device of the same type. Control panel configurations can be copied to other control panels. Once completed, a control panel configuration is downloaded to the panel. (This is a future software release.)

Can the RCP-CCS-1U control the X75HD, DPS-475 and DPS-575?

- Yes. However, to control the DPS-475 and DPS-575, the CCS-DPS-575 Gateway is required (up to 20 units per gateway). (Available August 2005)

What is the window for audio delay/advancing?

- 8 frames total delay for HDTV, 4 frames total delay for SDTV (1 frame default, enable up to 4 frames) and 1.2 seconds total delay for audio.

Is there variable video delay?

- There is up to 4 frames of delay in the SDTV path and up to 8 frames of video delay in the HDTV path.

If Pilot/Navigator software is being used, can I recall pre-sets by name? (i.e., "Sports Configuration," "News Config," "Studio Config." etc.)

- Yes, the convention naming used by Windows allows for naming presets.

Will the X75 remote and local control panels control DPS-475 and DPS-575?

- Yes, and the DPS-475 and DPS-575 local and remote panels can control **X75s** from the text based menu control.

How can the X75 be controlled from 3rd party automation software?

- The **X75** has a proprietary binary protocol available so that 3rd part control and monitoring can be done over Ethernet.

Video Questions

What technique is used for video upconversion?

- 10-bit resolution processing, adapts to motion for de-interlacing, optional SDTV noise reduction

What technique is used for the (optional) analog to digital video conversion?

- There are two options available: X75OPT-A3D industry leading fully adaptive 3D comb filtering, X75OPT-PQM 2-D 3 line adaptive combing with 3D cross color artifact removal filter. Both have 12-bit resolution with optional SDTV noise reduction.

When will the free software for the logo generators be available?

- Mid-September 2005

Does the X75HD provide frame rate conversion (59.95 <> 50)?

- Frame rate conversion (59.94<>50) for HDTV is not available at this time. However, 3:2 / 2:2 and reverse 2:3 conversions are available (23.98p<>59.94i and 25p<>50i).

Does the X75SD provide standards conversion (525 <> 625)?

- Standards conversion for SDTV (525<>625) is not available.

Does the X75 accommodate a HDTV analog component interface?

- No, not at this time. However, we are willing to discuss this capability.

Does the X75 accommodate a HDV interface?

- No, not at this time. However, this is on the roadmap for the future.

Does the X75 accommodate a HDMI interface?

- No. HDMI is an encrypted signal that carries HDTV video signals from a set top box (cable television or satellite direct-to home services) to a HDTV display/monitor. This format is used in the home environment.

Does the X75 accommodate a Firewire (IEEE 1394) interface?

- Yes. The IEEE 1394 interface is used for DV 25Mb/s SDTV.

Any plans for USB-2?

- No, not at this time.

Does the X75SD version have SDTV ARC (Aspect Ratio Conversion)?

- No. The HDTV option is required for SDTV Aspect Ratio Conversion

Does the X75 provide clipping?

- Yes. There are Black Clip Enable, Black Clip Level, White Clip Enable and White Clip Level controls for each of the Analog, SD1, SD2 and HD inputs.

Does the X75 do proper color space conversions?

- Yes, proper color space conversions are done when converting to/from analog and digital SDTV signals and when converting to/from HDTV signals.

Can the SDI and composite outputs be separately phased? Is it infinite phase?

- The analog FS will phase both analog and SDI outputs. However, the utility delay line can be used to apply the additional delay when added to the path. This applies to having only one input signal.

Can the SDI output be delayed by 1-2 lines from the composite output?

- This can be achieved by the following configuration: SD1 ==> SD1 FS ==> analog output / SD2 ==> SD2 FS ==> SDI output (**Note**: Feed the same SDI signal to SD1 & SD2 inputs and then adjust the timing from both FSs.)

Does the X75HD support 1080p?

- Yes, in particular 1080p-23.98 and 1080p-25.

What is the availability of the optional DV module?

- To be determined at this time.

What does the DVI connector provide on an X75?

- The DVI connector is an output for HDTV signals. The format is a single link DVI-D digital RGB HDTV signal for modern video displays (e.g., Plasma, LCD)

What is DVI-D?

- The connector used to connect VGA monitors to PCs is called an HD-15. This 15-pin connector is the same size as a 9-pin. It carries an RGB signal — typically analog or possibly TTL levels. A new connector that has emerged as a standard for computer displays is DVI.
- DVI is the "Digital Visual Interface" which uses a flat panel connector scheme that incorporates PanelLink's TDMS (transition-minimized differential signaling) as its digital video signal, a regular analog signal (RGB) and DDC (Display Data Channel) for Plug-n-Play compatibility. This means that DVI can drive two monitors from one connector on the PC. There are a few different versions of the DVI connector:
  - ~ DVI-I supports both analog and digital video signals.
  - ~ DVI-D supports only digital video signals.
  - ~ DVI-V supports only analog video signals.
- DVI connectors are not found on broadcast video CRT monitors today — however, you can find them on plasma, some LCD, computer (LCD/CRT) monitors.
- The **X75HD** supports DVI-D with digital HDTV signal outputs (1080i and 720p). Please note the following points:
  - ~ This implementation on the **X75** will be single channel.
  - ~ The DVI-D output on the **X75HD** will be used to monitor HDTV coming out of the X75HD using plasma monitors.
  - ~ NEO SuiteView has a DVI-V input option that supports computer outputs (RGB), but it does not support DVI-D.
  - ~ For the case of monitoring the output of the **X75HD** using NEO SuiteView, the **X75HD** SDI-HD coax output would be used.

What is the propagation delay through the noise reducer? Is there a median filter? Is there a diagonal filter?

- There are two noise reducers available in the **X75**: an HDTV noise reducer and a SDTV noise reducer. The HDTV noise reducer is included with every X75HD. Controls available for the HDTV noise reducer are threshold range, image threshold range and image enhance. There is no additional propagation delay when the HDTV noise reducer is used.
- The SDTV noise reducer is a software key option. The SDTV noise reducer has 3-Dimensional processing. There is impulse noise reduction, Gaussian random noise reduction, compression blocky-ness and mosquito artifact reduction, and sharpening and softening of images. Particularly effective for the reduction of satellite noise, the impulse noise reducer automatically detects impulse noise and applies the median filter when necessary. The recursive 3D directional filter removes Gaussian noise and compression artifacts, which include blocking artifacts and mosquito noise. The directional softening/sharpening filter can be used in various applications.
- For example, the softening filter can be used as compression pre-filter to reduce mosquito noise. The sharpening filter can be used to enhance picture appearance. For MPEG pre-processing applications,

this option provides entropy reduction prior to encoding. The SDTV NR has one field of propagation delay. There is a minimum delay mode which has a propagation delay of one-line and 26H samples.

Can there be different logos with separate on/off control on the HDTV output and SDTV output?

- Yes, there can there be different logos with separate on/off control on the HDTV and SDTV outputs.

Audio Questions

What technique is used for analog to digital audio conversion?

- 24-bit resolution, 48kHz sample rate converted with optional audio to video timing tool

What technique is used for audio de-compression?

- Optional plug-in for Dolby Digital and E.

What audio cables are included?

- The unbalanced are included. The balanced are optional. The unbalanced/balanced are optional.

Is the optional Dolby E and DIGITAL (AC-3) decompressor professional or consumer grade?

- The optional Dolby E and DIGITAL (AC-3) decompressor is professional grade.

What is the default impedance of the audio module?

- 100k ohm on the inputs and 66 ohm on the outputs (can be jumper selected for 600 ohm on the input and output).

Does the X75 have a DARS (Digital Audio Reference Signal) input?

- Yes, on the audio option.

What is the acceptable range of audio input sample rates?

- Input audio rates accepted by the **X75** are 32 kHz to 96 kHz sample rate.

Does embedded audio pass through the X75 when there is no embedded audio option?

- For embedded audio on SD-SDI inputs, the embedded audio will pass through.
- For embedded audio on HD-SDI inputs, the embedded audio will not pass through.

Using the 8 channel audio option.

- The X75OPT-AS-8 (included in X75SD-AV versions) provides two groups (8 channel) embedded audio processing. When processing one SDI signal, embedded audio from the SD-SDI input can be processed with the analog (4 channels) and digital (2 AES, 4 channels) audio and embedded on both of the SD-SDI outputs. When using the M-PATH mode for dual SDI processing, embedded audio from one of the SD-SDI inputs can be processed and embedded on both outputs.

Using the 16 channel audio option.

- The X75OPT-AS-16 (included in X75HD-AV versions) provides four groups (16 channel) embedded audio processing. Embedded audio from the HD-SDI input and SD-SDI inputs can be processed with the analog (4 channels) and digital (5 AES, 10 channels) audio and embedded on both HD-SDI and SD-SDI outputs.

If we use a DOLBY AC-3 encoder, is there enough video delay (7 frames)?

- Yes.

Can the Dolby-E decoder module be field upgradeable?

- Yes.

Can the X75 monitor audio levels on the optional streaming monitor output?

- No, not at this time. However, we are willing to discuss this capability.

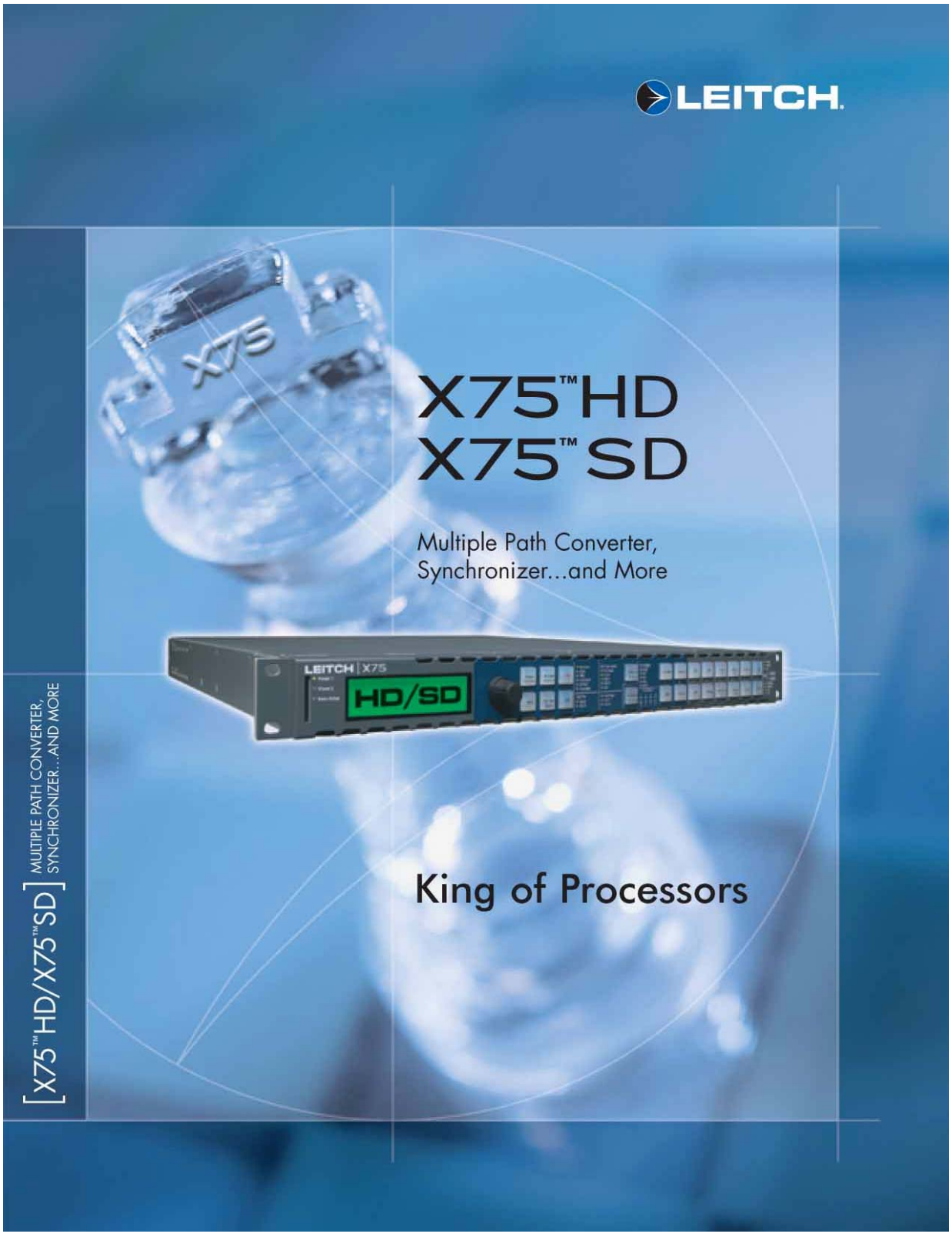
Can the preset audio levels be changed?

- Levels are preset at the factory. They can be changed if required (these are "hidden" parameters, not available to users).

X75 Advertisement

X75HD Brochure

- Page 1



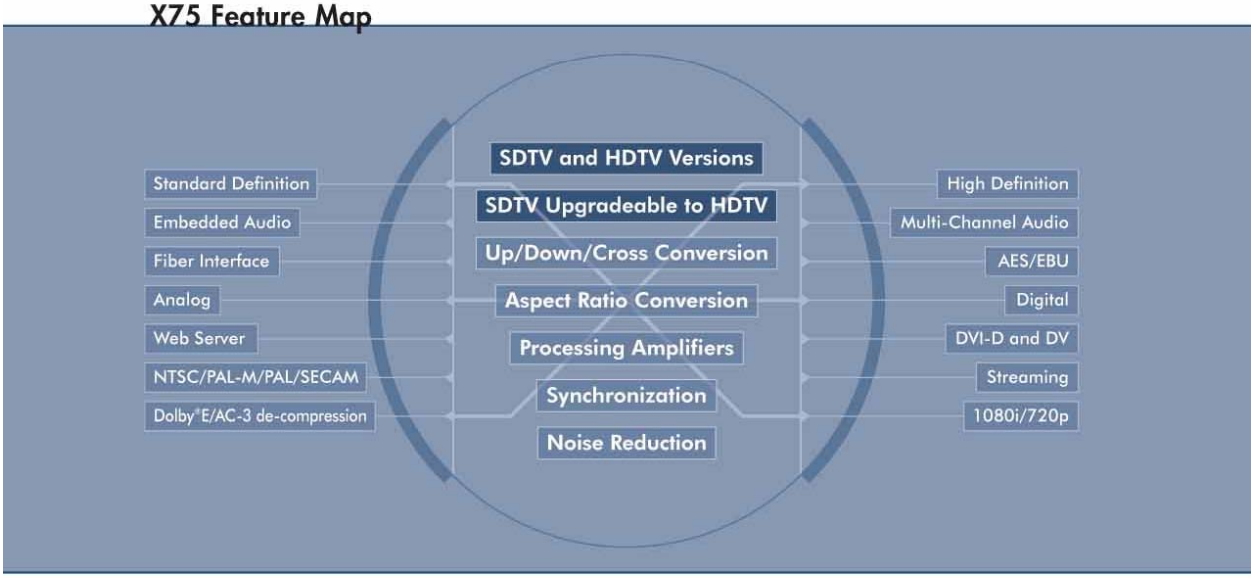
- Page 2

[X75™HD/X75™SD] Does More With Less Equipment

Why Select an X75HD/SD?

High definition is becoming more and more prevalent, with the increasing popularity of wide screen and surround sound in home theatre environments. As broadcast facilities move toward a fully digital or hybrid environment supporting both standard- and high-definition formats, content processing requirements increase significantly, as does the demand for more functionality in less space.

X75 Feature Map



Customers' Evolving Functionality Requirements Include:

- Up, down, cross and aspect ratio conversion with synchronization
- Advanced audio processing – for discrete analog, discrete digital AES, digital AES (compressed), and embedded audio uncompressed and compressed, which may require increased video delay for proper lip sync
- Multi-channel audio required for surround sound and multiple language applications
- SNMP (Simple Network Management Protocol) has become an important requirement in the television industry
- The ability to take legacy analog signals into the digital domain using the highest quality conversions — especially before up-converting and compressing video signals
- Interfaces for high definition including optical fiber and DVI-D
  - Optical fiber is required for long cable runs (>100m / 300ft.)
  - DVI is popular as an interface into LCD and plasma-type picture displays
- Intelligent input processing for alarming and auto-switchover — reducing downtime
- Increased use of metadata:
  - In today's facilities, there are many forms of "data about the essence" (or metadata) that travel along with the video and audio signals
  - Requirements vary — a transparent metadata pass-through may be required or a requirement to modify or replace the metadata.

- Page 3

It's the Right Choice for Transitioning to Digital and HDTV

Combining HD and SD frame sync, video and audio processing capabilities and up/down/cross conversion, all in a space-saving 1RU package, the X75 is the most comprehensive and versatile solution for broadcasters making the transition to DTV and HDTV.

More Than Just a Synchronizer — More Functionality, Less Equipment

- AV synchronizer for analog and digital SDTV with simple upgrade for HDTV
- Analog-to-digital and digital-to-analog video conversion
- Up, cross and down-conversion with aspect ratio conversion
- Analog video processor with auto-switch time base corrector
- Auto-sensing, multi-standard (PAL-B, PAL-M, NTSC/SECAM) for worldwide use
- Digital noise reduction for SDTV and HDTV
- Video level/color controls
- Optional PQM (Phase Quadrature Modulation) or A3D (Adaptive 3-Dimensional) color decoding
- Closed-captioned processing
- Video and Audio Test Signal Generators
- Audio embedding/de-embedding for both SDI and HD-SDI serial digital signals
- 8- or 16-channel audio processing (4 or 8 stereo pairs)
- Integrated Dolby® E and AC-3 decompression option
- Analog-to-digital and digital-to-analog audio conversion
- Surround sound audio processing
- Audio level control
- Audio limiter option
- Simple voice-over
- Redundant power supplies

SDTV to HDTV Upgradeability

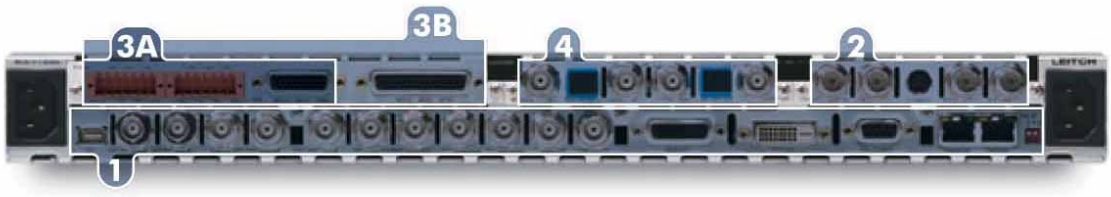
The X75 is fully upgradeable from standard definition to high definition in the field.

1. You can start out with a dual SDI frame synchronizer with analog composite (NTSC, PAL-B, PAL-M, SECAM) outputs. This combination is ideal for today's digital systems for standard-definition video processing.

2. For those who require analog video inputs there are two choices: the A3D (Adaptive 3-Dimensional) and the PQM (Phase Quadrature Modulation) versions. Both optional video input versions include analog composite, Betacam® and S-Video inputs.

3. If audio processing is required, there are two options to choose from:
   a) The first is an 8-channel audio synchronizer with four-channel analog (two stereo pairs) and two AES inputs and outputs for typical stereo program processing.
   b) The second audio option is a 16-channel audio synchronizer with four-channel analog (two stereo pairs) and five AES inputs and outputs, allowing even more audio capability for multiple language or surround sound applications and our optional integrated audio de-compressor for Dolby® E and AC-3 can be added.

4. Then when high definition is required, you can upgrade to HD-SDI coaxial and fiber inputs and outputs with up, down and cross conversion by installing an X75OPT-UPG module.



- Page 4

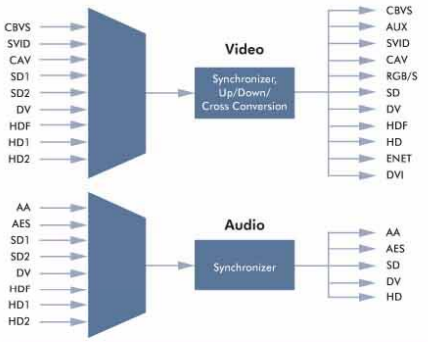
[X75HD/X75SD]

Select Anything In to Everything Out

Infinitely flexible I/O input options for the X75 with the HD upgrade provide up, down and cross-conversion from up to seven input video formats — more than any similar product currently on the market — to almost any output video format. Additionally, the X75 features auto-detection of inputs with auto-changeover and user-selectable alarms to reduce downtime.

Video input format options include HDTV optical fiber, HD-SDI, analog composite/component (Betacam®) and Y/C (S-VHS/Hi-8) inputs. Dual SDI inputs are included. **Ten broadcast-quality outputs** of the same signals are provided, as well as RGBS, DVI-D, auxiliary PAL-B/PAL-M/SECAM/NTSC composite video outputs, and optional streaming video and audio over Ethernet.

The X75 front panel allows quick selection between multiple input devices all simultaneously linked through separate connections for each video input and output format.

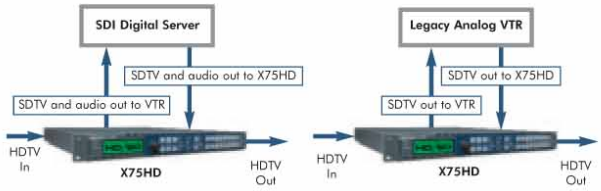


The X75 is designed to convert from one video format to another and from one audio format to another. Both the audio and the video signals are synchronized to the input genlock reference signal. Video and audio adjustments can be carried out on the input signals. (HD version shown.)

M-PATH™ Multiple Path Processing Supports Bi-Directional Processing

The HDTV upgrade enables the following functionality. Leitch's exclusive M-PATH™ feature provides multiple directional connectivity between analog, digital and high-definition tape transports or routing systems. Enabling simultaneous converter and frame synchronizer operation, M-PATH mode routes HDTV optical fiber or HD-SDI and converts and synchronizes directly to the SDTV analog and SDI video outputs, which feed the inputs of analog composite and component and digital tape machines and routing systems. The analog or digital outputs of tape machines or routing systems can be simultaneously connected to one of the synchronizer's SDTV analog or digital inputs where it can be processed and output via the HDTV optical fiber and HD-SDI port. Audio signals are handled in a similar fashion, with eight or sixteen channels of processing in each direction. Analog (two stereo pairs), AES/EBU (two or five inputs and two or five outputs) and embedded HD-SDI and SDI audio are also supported.

M-PATH — Simultaneous UP and DOWN Conversion Example



Simulcast — Switching Between SD/HD with SD and HD Output

Compressed/Embedded Audio — Audio Processing for Discrete Embedded and Compressed Audio

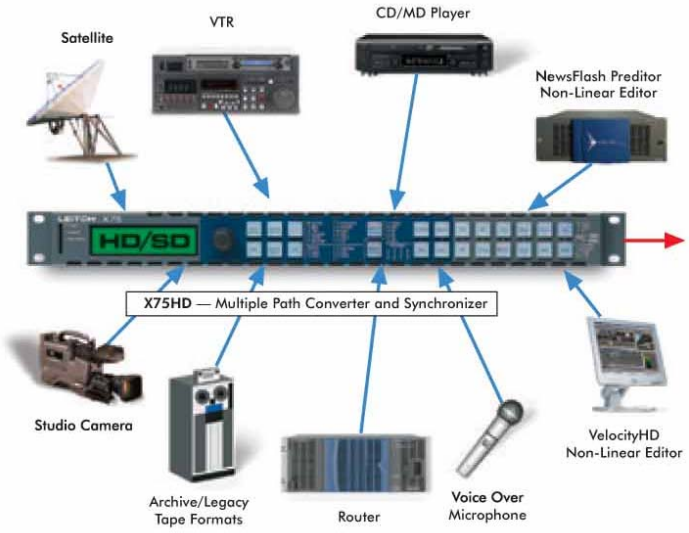
- Page 5

Limitless Applications

Expanding video processing to include "anything in" to "everything out" and M-PATH multiple path and simulcast conversions, Leitch's new X75 is equally suited for use in analog, digital, or high-definition hybrid facilities.

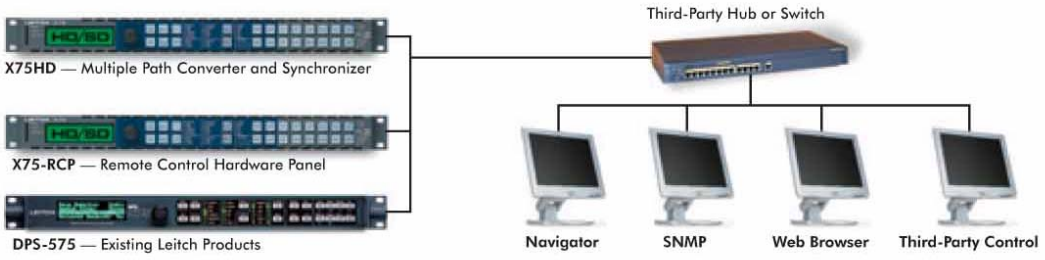
The X75 Provides a Simple Solution for Even the Most Complex Applications

For production and editing, the X75 provides conversion to and from any signal type for HDTV productions. In news environments, it can time base correct any tape format — analog, digital or HDTV. For broadcast, the X75 can perform up-conversion for HD output, down-conversion for monitoring/logging, and cross-conversion for programs that are recorded in other than the native format for the station. As a simple switcher, the X75 can switch between any two inputs. In mobile environments, the X75's fast operator controls provide automatic input select to the proper HD output format, making the X75 an easy choice for live events.



Effortless Control

Control and monitoring of signals passing through the X75 is enabled using IP over Ethernet, and instant operator control from the local or remote control panels allows for easy manipulation of video and audio signals. Using two Ethernet ports per unit (one for control, monitoring and video thumbnails, and one for video and audio streaming) makes PC control and monitoring over large networks entirely manageable. A built-in Web Server and optional SNMP (Simple Network Management Protocol) are industry-standard means of controlling and monitoring the X75 over Ethernet. Leitch's CCS Command and Control System Navigator software further enhances the remote control aspects of the X75 for any application.

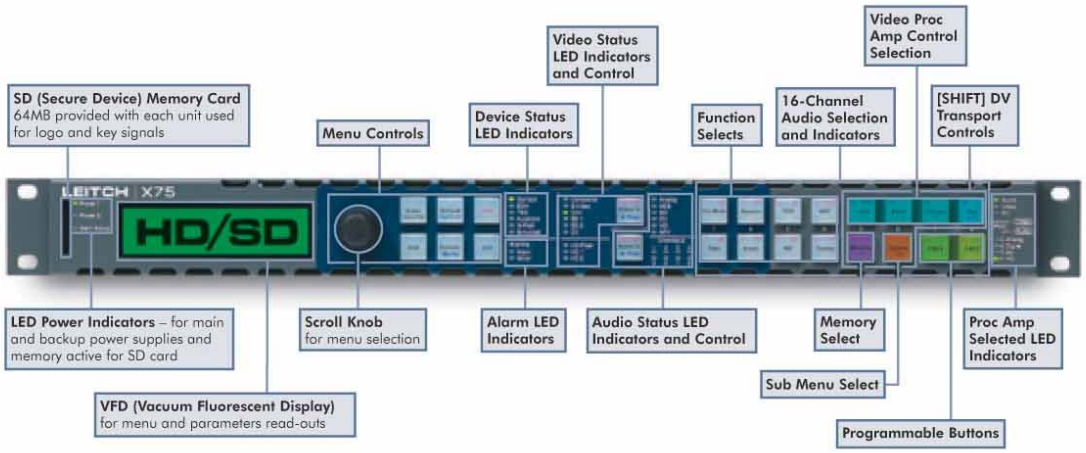


Remote PC-based Software Control and Monitoring Options

- Page 6

[X75HD/X75SD]

Front Panel (or Remote Panel) Controls and Indicators



eXpanded Audio Capability

With the addition of an optional eight- or sixteen-channel audio synchronizer module, the X75 can provide either four stereo or eight stereo audio channels and video synchronization, supporting analog, AES/EBU digital and embedded SDI and HD-SDI audio I/O, including Dolby®E and AC-3 decompression. All outputs are simultaneously active, which allows both analog and digital audio devices to be connected at the same time. Incoming stereo audio pairs can be selected from the analog, digital or embedded SDI or HD-SDI inputs. All audio channels dynamically track the internal delay of the video synchronizers, whenever auto-track mode is enabled. Video and audio delay can be specified, ensuring proper lip sync regardless of the program source. All audio parameters are controlled from an easy-to-use front panel menu. Four separate audio tone generators enable different frequency test tones to be applied to each channel for easy left/right channel identification. The optional Audio Limiter feature will provide improved audio output performance by limiting the hard clip effect and preventing audio distortion. Integrated Dolby®E and Dolby® Digital decompression can be added on as an option bringing even more functionality. When using the 16-channel audio option, five AES inputs and outputs facilitate the use of external audio codecs simultaneously. This is ideal for all broadcasters, post production facilities, cable companies, Telcos and many other applications requiring added audio control.

Analog Video is Still Here for Awhile

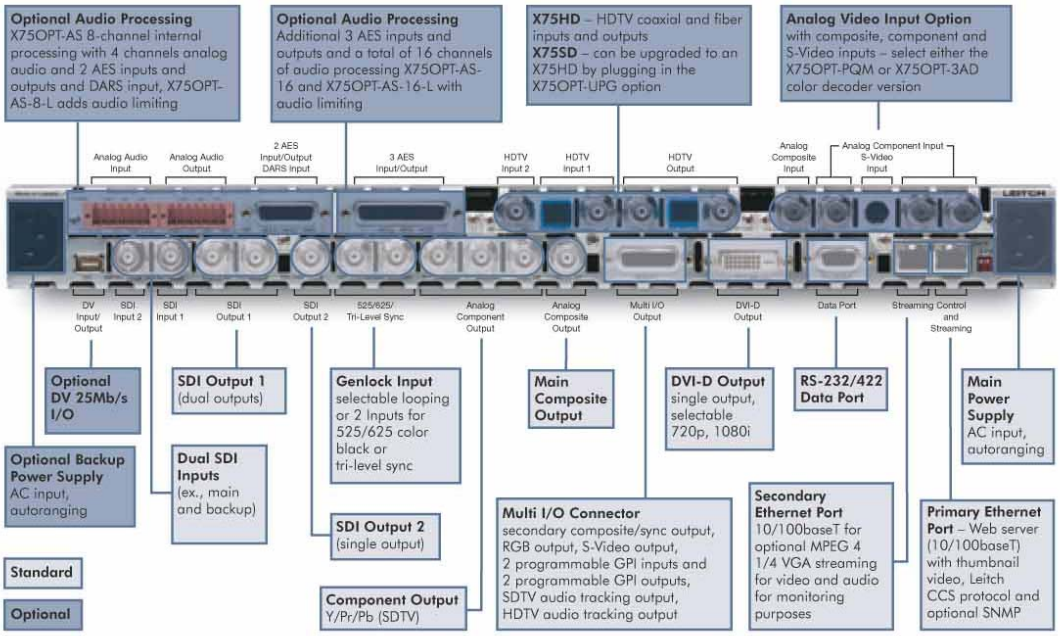
All X75 models support analog video outputs. Composite (main and auxiliary), component Betacam® and RGB and S-Video are built-in. For those who wish to convert analog composite to digital SDTV or HDTV, the most critical requirement for a component digital synchronizer is the ability to accurately decode composite NTSC and PAL signals. In that respect, the "A3D" optional 12-bit adaptive 3-dimensional comb filter decoder used in the X75 offers unparalleled decoding ability. For those looking for a more cost-effective solution, the "PQM" version is available. Three combing modes are available for the "A3D" and "PQM": Simple, Adaptive 2-dimensional and Adaptive 3-dimensional. Utilizing Leitch's Adaptive 3-D Comb Filter Decoder Technology, the 3D Combing virtually eliminates residual subcarrier artifacts, such as cross luminance and cross chrominance.

PAL-M and SECAM Capability for Worldwide Use

Digital SDI and HD-SDI signals can be processed to PAL-M and SECAM outputs. Either of the analog video input options provides PAL-M and SECAM processing to all analog, digital and HDTV outputs.

- Page 7

Back Panel Connectivity



3-Dimensional SDTV Digital Noise Reduction

With the optional Digital Noise Reduction feature, convenient front panel controls permit adjustments for impulse noise reduction, Gaussian random noise reduction, compression blocky-ness and mosquito artifact reduction, and sharpening and softening of images. Particularly effective for the reduction of satellite noise, the impulse noise reducer automatically detects impulse noise and applies the median filter when necessary. The recursive 3D directional filter removes Gaussian noise and compression artifacts, which include blocking artifacts and mosquito noise. The directional softening/sharpening filter can be used in various applications. For example, the softening filter can be used as compression pre-filter to reduce mosquito noise. The sharpening filter can be used to enhance picture appearance. For MPEG pre-processing applications, this option provides entropy reduction prior to encoding.

Closed-Captioning Capabilities

Another unique feature broadcasters will appreciate is programmable, line-by-line, vertical interval bypass for analog, digital and HDTV signals. Closed Captioning (CC) in SDTV (EIA-608) on line 21 is transcoded to EIA-708 on line 9 in HDTV when upconverting. Alternately, HDTV CC is transcoded to SDTV during down-conversion.

Testing, Testing

The X75 supports video test signals for analog and digital. If the high-definition upgrade is installed, high-definition video test signals are supported. If one of the audio options is installed, analog, digital (AES) and embedded test signals are supported. An option to facilitate timing of video and audio for an X75 in a local location is provided by video-to-audio timing information sent from an X75 in a remote location. This test provides a video-to-audio timing measurement so that the operator can adjust lip sync without guessing.

Designed for a Changing World

With firmware updates easily installed in the field, the X75 is able to stand the test of challenging times, making it a solid investment for a transitioning market.

Engineered for the Real World

The rugged, yet lightweight chassis is ideal for mobile use. The all-metal front panel provides expanded function buttons and additional status LEDs. A vacuum fluorescent graphical display (VFD) features variable sized fonts for readability and can be dimmed to suit control room lighting conditions.

- Page 8

[X75™ HD/X75™ SD] MULTIPLE PATH CONVERTER, SYNCHRONIZER...AND MORE

About Leitch

Leitch Technology is a 34-year global leader in the design and distribution of high-performance video systems for the professional television industry. Leitch offers products and systems that enable operations of any size to streamline workflow, achieving a truly Integrated Content Environment for content production, processing, transmission, management and test and measurement. With a sole focus on and commitment to the television industry, Leitch provides premium customer support.

Standard Warranty

With every Leitch product, you'll receive a set of standard warranty services, backed by the manufacturer, which includes 9x5 technical phone support, After-Hour "Emergency" Support, 5-day Advance Exchange of Parts, Software Updates & Bug Fixes and Access to Technical Knowledge Bank. To maximize your product warranty, you can continue warranty services with a Basic Service package or upgrade your services to a Gold Service package, which includes 24x7 technical phone support and Next-day Advance Exchange of Parts for up to five additional years of coverage.

Professional Services

At Leitch, we take our Professional Services business extremely seriously, offering integrated support solutions designed to help with every phase of your business. Our extensive service portfolio features Startup Services, including ReadyConfiguration Setup Services, QuickStart Commissioning and 90-day Elite Services; Operation Services, including Preventive Tracker, Educational/Training Program and RemoteLinx Monitoring Services; and Long-Term ServicePAKs, including Basic ServicePAK, Gold ServicePAK and Site ServicePAK.

At Leitch, we are committed to customer service excellence and strive to provide the highest level of support in the industry.

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Europe	+44 (0) 1344 446000
France	+33 (1) 42 87 09 09
Italy	+39 02 3655 3450
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