# HARRIS®

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# X75™HD / X75™SD

## Multiple Path Converters and Frame Synchronizers

### Installation and Operation Manual
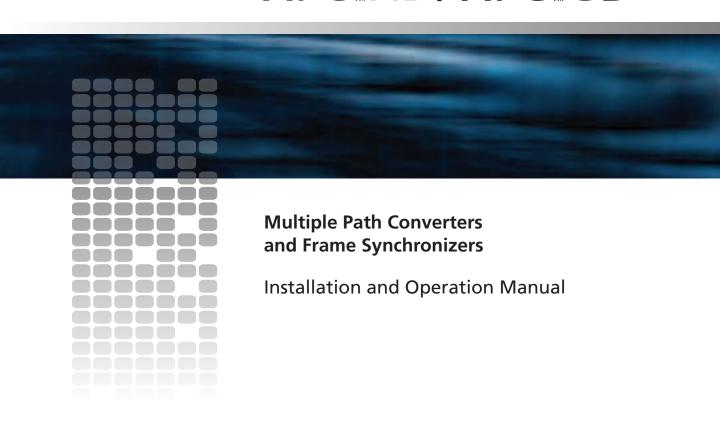
## LEITCH.

A brand of Harris Corporation

# X75HD/X75SD

## Multiple Path Converters and Frame Synchronizers

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## Installation and Operation Manual

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**X75HD/X75SD Installation and Operation Manual**

# Preface

# Manual Information

## Purpose

This manual details the features, installation procedures, operational procedures, and specifications of the X75HD/X75SD Multiple Path Converters and Frame Synchronizers.

## Audience

This manual is written for engineers, technicians, and operators responsible for the installation, setup, and/or operation of the X75HD/X75SD Multiple Path Converters and Frame Synchronizers.

## Revision History

**Table P-1.** Manual Revision History

| Edition | Date | Details |
|---|---|---|
| Preliminary | December 2004 | Preliminary release |
| A | January 2005 | Initial release |
| B | April 2005 | Addition of SD capabilities, new packages, options, and index |
| C | June 2005 | Addition of X75OPT-HDDUOCON option, software upgrade procedures, and alarms list |
| D | March 2006 | Addition of streaming and video/audio timing options, improved alarms list, specifications and features changes |
| E | July 2006 | Addition of 32-channel audio information |
| F | February 2007 | Addition of Dolby encoding hardware and software |

# Writing Conventions

To enhance your understanding, the authors of this manual have adhered to the following text conventions:

**Table P-2.** Writing Conventions

| Term or Convention | Description |
|---|---|
| Bold | Indicates dialog boxes, property sheets, fields, buttons, check boxes, list boxes, combo boxes, menus, submenus, windows, lists, and selection names |
| *Italics* | Indicates email addresses, the names of books or publications, and the first instances of new terms and specialized words that need emphasis |
| CAPS | Indicates a specific key on the keyboard, such as ENTER, TAB, CTRL, ALT, or DELETE |
| Code | Indicates variables or command-line entries, such as a DOS entry or something you type into a field |
| > | Indicates the direction of navigation through a hierarchy of menus and windows |
| hyperlink | Indicates a jump to another location within the electronic document or elsewhere |
| Internet address | Indicates a jump to a Web site or URL |
| Note | Indicates important information that helps to avoid and troubleshoot problems |

# Obtaining Leitch Documents

Leitch documents can be viewed or downloaded from the Leitch Web site at www.leitch.com (go to **Support > Documentation**). Alternatively, contact your Leitch customer service representative to request a document.

# Unpacking/Shipping Information

Leitch has carefully inspected, tested, and calibrated this product before shipment to ensure years of stable and troublefree service.

1. Check equipment for any visible damage that may have occurred during transit.

2. Confirm that you have received all items listed on the packing list.

3. Contact your Leitch dealer if any item on the packing list is missing.

4. Contact the carrier if any item is damaged.

5. Remove all packaging material from the product and its associated components before you install the unit.

Keep at least one set of original Leitch packaging, in the event that you need to return a product for servicing. If the original packaging is not available, you can purchase replacement packaging from Leitch at a modest cost, or supply your own packaging as long as it meets the following criteria:

• Withstands the weight of the product

• Holds the product rigid within the packaging

• Leaves at least two inches of space between the product and the container

• Protects the corners of the product

Ship products back to Leitch for servicing prepaid and, if possible, in the original packaging material. If the product is still within the warranty period, Leitch will return the product prepaid after servicing.

# Safety Terms and Symbols

## Terms and Symbols Used in this Manual

**WARNING** statements and icons identify conditions or practices that can result in personal injury or loss of life. High voltage is present. Uninsulated dangerous voltage within the product's enclosure may be sufficient to constitute a risk of electric shock to persons.

**CAUTION** statements and icons identify conditions or practices that can result in damage to the equipment or other property. Important operating and maintenance (servicing) instructions are included in the literature accompanying the product.

**CAUTION** statements and icons identify conditions or practices that can result in damage to the equipment or other property if proper care during use and transport is not taken.

## Terms and Symbols Found on the Product

**DANGER:** Indicates a hazard for high voltage, fire, or personal injury immediately accessible as one reads the marking

**WARNING**: Indicates a personal injury hazard not immediately accessible as one reads the marking

**CAUTION**: Indicates a hazard to property, including the product, or the need to take attention and refer to the manual

Protective ground (earth) terminal

**FUSE**: Replace with same type and rating of fuse

Observe precautions for handling electrostatic-sensitive devices

# Third-Party Software Licensing Agreement

If the software embedded in a Leitch product incorporates the VxWorks Run-Time Module, the following paragraphs are applicable:

You are prohibited from:

a) copying the Run-Time Module, except for archive purposes consistent with your archive procedures;

b) transferring the Run-Time Module to a third party apart from the Leitch product containing the Run-Time Module;

c) modifying, decompiling, disassembling, reverse engineering or otherwise attempting to derive the source code of the Run-Time Module;

d) exporting the Run-Time Module of underlying technology in contravention of applicable U.S. and foreign export laws and regulations, and

e) using the Run-Time Module other than in connection with operation of the Leitch product in which it is embedded.

Any further distribution of the Run-Time Module is subject to the same restrictions set forth herein. Wind River Systems, Inc. and its licensors are third party beneficiaries of the End User License Agreement and the provisions related to the Run-Time Module are made expressly for the benefit of, and are enforceable by, Wind River Systems, Inc. and its licensors.

The laws of the Province of Ontario shall govern this Agreement. Updated January, 2005.

# Section I—Startup

This section contains the following topics:

The content contained in this section will give you a general understanding of the X75HD/X75SD models. Features and options are described, along with details on how to install the system and begin operation.

Chapter 1
# Introduction

# Overview

Leitch Technology's X75™HD/SD models are standard and high-definition utility synchronizers and converters that combine video and audio processing capabilities with the ability to upconvert, downconvert, and crossconvert from most common input and output video formats.

X75HD/X75SD models are available in HD-SDI, SD-SDI, and DPS-575-compatible versions in both simultaneous or single-channel configurations. They are equally suited for analog, digital, or hybrid facilities—the ideal choice for broadcasters making the transition to digital and high-definition television (DTV and HDTV). Available in standard or high definition formats, video-only and audio/video configurations, the X75 provides a bridge between analog, digital and high-definition systems with analog, digital, and embedded audio.

This chapter describes the main features and applications of the X75HD/X75SD products, under the following topics:

# General Description

Offering unparalleled flexibility, the X75HD/X75SD provides up to nine video inputs and ten video output formats, depending upon the following available options:

- One HDTV optical fiber serial component digital video input and output
- Two HDTV serial component inputs (one can be selected as optical fiber) and one HDTV output (two coaxial and one fiber)
- Two SD-SDI serial component digital video inputs and outputs
- One 128 x 96 thumbnail streaming source and one 352 x 240 pixel (525) or 352 x 288 pixel (625) streaming-over-IP video/audio output
- Component analog video (Betacam™) input and output
- S-video (S-VHS/Hi8) input and output
- NTSC/PAL-M/PAL-B/SECAM composite video input and output
- RGB-S output
- DVI-D output

See for descriptions of some typical applications using these options.

## Inputs

Inputs are capable of auto-detection, with user-selectable SMART alarms. Two input modes (both of which allow for either automatic detection or user-selection of inputs) are available for processing critical program paths for ingest, and bridging between routers/tape transports/servers, mobile broadcast, and edit suites.

## Video Processing

Processing for video includes level/color control, aspect ratio conversion, 3D-adaptive color decoding, noise reduction, frame synchronization and time base correction for non-synchronous signals, analog-to-digital and digital-to-analog video conversion.

Other capabilities include the following:

- Up and down conversion
- Aspect ratio control
- High-definition cross-conversion

### Audio Processing

Processing for audio includes level control, analog-to-digital and digital-to-analog conversion, and SD-SDI and HD-SDI serial digital signal embedding and de-embedding.

Other capabilities include the following:

- Sample rate conversions, synchronization, and timing-to-video for correction of lip sync errors
- Embedding/de-embedding of signals such as Dolby E™ and AC-3™
- Processing of multiple channel program signals for surround-sound applications before or after compression
- Audio-follow-video routing
- Converting, adjusting, timing, demultiplexing, and multiplexing

### Signal Control and Monitoring

You can control and monitor signals passing through the X75HD/X75SD using a variety of methods:

- Local X75HD/X75SD control panels
- Remote X75-RCP control panels
- Web server software
- Local DPS-575 control panels
- Remote RC-575 control panels
- CCS™ software applications and QuickTime Player

### Operating Modes

There are three main operational modes: Auto Detect (default mode) M-Path (multiple path) processing, and Simulcast processing.

- The Auto Detect default mode detects any one input and processes it to all outputs.
- M-Path selects or detects input signals to processed output signals. The Default M-Path mode is **All Output Select**, for which a single input is processed to all outputs. In **Video Routing Mode,** M-Path allows for up to 4 processed paths; you choose the output first, and then select which input is to be processed to that output.
- Simulcast operation makes it possible for you to switch any two inputs to standard and high definition outputs.

See for more information on modes of operation.

# Main Features

You can access all of the features and functions of the X75HD/X75SD models from an X75HD/X75SD local control panel, an X75-RCP remote control panel, a CCS software application such as Pilot or Navigator, or a supported Web browser. Details of the available features begin in the "Available Packages" section (page 12) and the "Options" section (page 17). The following standard and optional features are described in the next pages:

### General Functionality

- Upgradability from SDTV to HDTV

- Frame syncs for analog, SDTV and HDTV

- Upconversion, downconversion, crossconversion, and aspect ratio conversion

- Analog-to-digital conversion

- Digital-to-analog conversion

- Proc amps for analog, SDTV and HDTV

- Video test generation

- Optional video noise reduction and enhancement

- 8, 16, or 32 channels of internal audio processing (gain, invert, swap, sync/delay, sum)

- Embedding and de-embedding for SD-SDI and HD-SDI

- Compressed audio capability (Dolby E™ and AC-3™)

- Video and audio timing correction

- Streaming video capability

- SD memory card parameter settings storage

- Audio (and embedded) test generation

- Audio limiting capability

- Built-in Web server with thumbnail monitoring capability

- Redundant power supply

## Note

Simultaneous up, down, and cross conversion requires the X75OPT-HDDUOCON software key option. Contact your Leitch sales representative to enable this option.

**Input/Outputs**

- Auto-detected inputs
- Two SD-SDI and two HD-SDI inputs
- Color black, tri-level sync and DARS reference inputs
- Optional NTSC/PAL-M/PAL-B/SECAM input with CAV and S-video inputs
- Ability to provide many outputs, including composite, component, SD-SDI, HD-SDI, HDTV fiber, DVI-D, and S-video
- SC and optional FC/ST fiber interface for HDTV
- Two or five AES inputs and outputs, at 75 or 110Ω
- Four analog audio inputs and outputs
- GPI inputs and outputs

**Operation, Control, and Monitoring**

- Three operating modes: Auto Detect, M-Path (multiple-path) and Simulcast
- Clean video and quiet audio switching capability
- Local and remote control panels
- Control for up to 200+ units from a single control panel
- X75 Web server software application
- Software GUI control and monitoring using CCS Pilot and Navigator, or monitoring using CoPilot
- SNMP and third-party interfaces
- *SMART* alarms (global parameters for all inputs—allowing custom-definitions for how and when alarms are activated, including priority settings for main and backup inputs)

**Hardware Features**

- SD (Secure Digital) removable media for storage of parameter settings; 128 MB included (the maximum size supported by the X75HD/X75SD is 1 GB)
- Front-to-back air flow
- Single and dual redundant power supplies

### Summary of Benefits

Among the many benefits provided by the X75HD/X75SD, a major advantage is a reduction in the amount of equipment needed to perform everything that the X75HD/X75SD can do in just one 1RU. In a single system, the X75HD/X75SD combines HDTV frame synchronization along with up/down and cross/down conversion. It provides analog inputs and outputs with SD-SDI, HD-SDI, and HDTV optical, and delivers analog, digital, and embedded audio. The optional Dolby E™/AC-3™ decompressor is built-in, thereby saving more rack space. Voice-over is part of the 8/16-channel audio option. The internal socket below the audio submodule allows the optional Dolby E/AC-3 submodule to be plugged in, thereby saving more rack space.

# Front and Rear Panels

## Front Panel Description

Figure 1-1 and Figure 1-2 illustrate front blank, and front control panels, respectively.

X75HD/X75SD units with a blank front panel, must be configured and controlled remotely, using one of the following methods:

- Separate control panel such as an X75-RCP
- Local control panel on an X75HD/X75SD or DPS-575 unit
- CCS applications such as Pilot or Navigator
- Web server application using a common Web browser such as Internet Explorer™ or Netscape™
- SNMP (Simple Network Management Protocol) and third-party control software offered through Leitch CCS Protocol

Blank front panels provide LEDs for alarm and status monitoring, (including major and minor alarm LEDs), and status LEDs for power and memory access.

Local and remote control panels contain LEDs that indicate alarm, status, and configuration information. For more detailed information on LCP controls and indicators, see the *Control Panels for X75 Systems Installation and Operation Manual.*

> ### Note
>
> DPS-575 units do not have the **Ctrl** button found on X75HD/X75SD models. Button shortcuts on X75HD/X75SD models that require the **Ctrl** button are not accessible remotely via a DPS-575 unit. In these cases, the affected parameters must be accessed through the menu structure.



**Figure 1-1.** Blank X75HD/X75SD Front Panel

## Rear Panel Description

Figure 1-3 on page 11 illustrates a typical rear panel with all module options installed. For more information on back panel connections, see page 61.
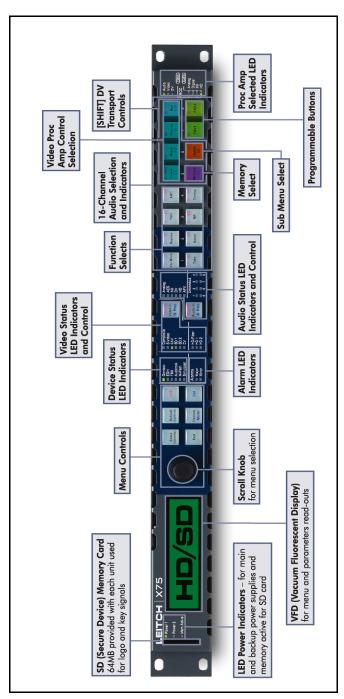
**Figure 1-2.** Front View of X75HD/X75SD with Local Control Panel
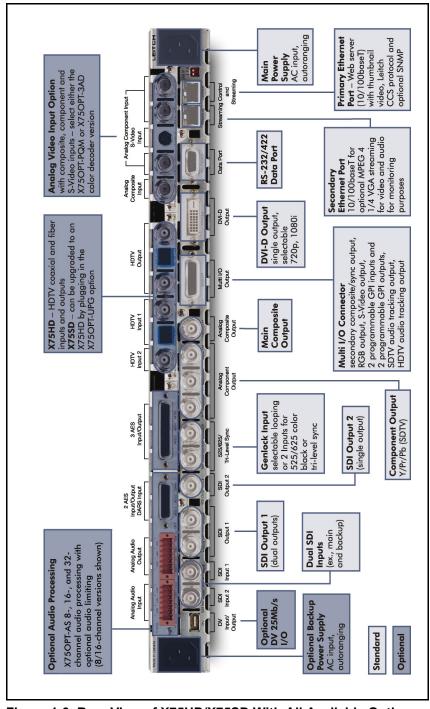
**Figure 1-3. Rear View of X75HD/X75SD With All Available Options**

# Product Packages

X75HD/X75SD models are available in a wide range of product packages, and with a large number of options for modules, connectors, cables, software, and documentation. All of the frames described in the next pages are capable of single-channel up, down, and cross conversion. By purchasing the X75OPT-HDDUOCON software key (see page 22), you can enable simultaneous conversion capability on any of these frames.

See the following tables for more information:

- Table 1-1: "X75HD/X75SD Single-Channel Module and System Packages" below
- "X75HD/X75SD System Options" on page 17

## Available Packages

Table 1-1 describes the various X75HD/X75SD product packages that you can order.

**Table 1-1.** X75HD/X75SD Single-Channel Module and System Packages

| Product Code | Description | Major Features |
|---|---|---|
| **X75HD Modules and Systems** | | |
| X75HD | 1RU up/down/cross converter and synchronizer (video only), with local control panel | • 1RU frame with local control panel, single power supply and power cable<br>• Auto-sensing standard (SDTV/HDTV) serial digital component synchronizer<br>• Test signal generator<br>• SD-SDI and HD-SDI inputs and outputs<br>• Analog video outputs<br>• Optional analog video inputs<br>• 12-bit conversion<br>• Multiple operational modes<br>• SMART alarms and thumbnail streaming capability |
| X75HD-2PS | 1RU up/down/cross converter and synchronizer (video only), with local control panel and redundant power supply | • Same features as the X75HD (including local control panel)<br>• Additional power supply and power cable for full redundancy |

**Table 1-1.** X75HD/X75SD Single-Channel Module and System Packages *(Continued)*

| Product Code | Description | Major Features |
| --- | --- | --- |
| X75HD-AV | 1RU up/down/cross converter and synchronizer (video and audio), with local control panel | • Same features as the X75HD (including local control panel)<br>• Internal 16-channel digital audio synchronizer module, providing separate/embedded audio<br>• Coax cable set |
| X75HD-AV-2PS | 1RU up/down/cross converter and synchronizer (video and audio), with local control panel and redundant power supply | • Same features as the X75HD (including local control panel)<br>• Additional power supply for full redundancy<br>• Internal 16-channel digital audio synchronizer module, providing separate/embedded audio<br>• Coax cable set |
| X75HD-LC | 1RU up/down/cross converter and synchronizer (video only), with blank front panel | • Same features as the X75HD, excluding the local control panel<br>• Blank front panel |
| X75HD-LC-2PS | 1RU up/down cross converter and synchronizer (video only), with blank front panel and redundant power supply | • Same features as the X75HD, excluding the local control panel<br>• Additional power supply and power cable for full redundancy<br>• Blank front panel |
| X75HD-LCAV | 1RU up/down/cross converter and synchronizer (video and audio), with blank front panel | • Same features as the X75HD, excluding the local control panel<br>• Internal 16-channel digital audio synchronizer module, providing separate/ embedded audio<br>• Blank front panel<br>• Coax cable set |

**Table 1-1.** X75HD/X75SD Single-Channel Module and System Packages *(Continued)*

| Product Code | Description | Major Features |
|---|---|---|
| X75HD-LCAV-2PS | 1RU up/down/cross converter and synchronizer (video and audio), with blank front panel and redundant power supply | • Same features as the X75HD, excluding the local control panel<br>• Additional power supply for full redundancy<br>• Internal 16-channel digital audio synchronizer module, providing separate/embedded audio<br>• Blank front panel<br>• Coax cable set |
| **X75SD Modules and Systems** | | |
| X75SD | 1RU digital synchronizer (video only), with local control panel | • 1RU frame with local control panel, single power supply and power cable, and fan modules<br>• Auto-sensing standard<br>• Test signal generator<br>• SD-SDI inputs and outputs<br>• Analog video outputs<br>• 12-bit processing<br>• Multiple operational modes<br>• SMART alarms and thumbnail streaming capability<br>• Available X75OPT-AS-8 internal 8-channel digital audio synchronizer |
| X75SD-2PS | 1RU digital synchronizer (video only), with local control panel and redundant power supply | • Same features as the X75SD (including local control panel)<br>• Additional power supply and power cable for full redundancy |
| X75SD-AV | 1RU digital synchronizer (video and audio), with local control panel | • Same features as the X75SD (including local control panel)<br>• Internal 8-channel digital audio synchronizer module, providing separate/embedded audio<br>• Coax cable set |

**Table 1-1.** X75HD/X75SD Single-Channel Module and System Packages *(Continued)*

| Product Code | Description | Major Features |
|---|---|---|
| X75SD-AV-2PS | 1RU digital synchronizer, (video and audio), local control panel, and redundant power supply | • Same features as the X75SD, including local control panel<br>• Additional power supply for full redundancy<br>• Internal 8-channel digital audio synchronizer module, providing separate/embedded audio<br>• Coax cable set |
| X75SD-LC | 1RU digital synchronizer (video only), with blank front panel | • Same features as the X75SD, excluding the local control panel<br>• Blank front panel and fan connection board |
| X75SD-LC-2PS | 1RU digital synchronizer (video only) with blank front panel, and redundant power supply | • Same features as the X75SD, excluding the local control panel<br>• Additional power supply and power cable for full redundancy<br>• Blank front panel and fan connection board |
| X75SD-LCAV | 1RU digital synchronizer (video and audio), with blank front panel | • Same features as the X75SD, excluding the local control panel<br>• Internal 8-channel digital audio synchronizer module, providing separate/embedded audio<br>• Blank front panel and fan connection board<br>• Coax cable set |
| X75SD-LCAV-2PS | 1RU digital synchronizer, (video and audio), with blank front panel and redundant power supply | • Same features as the X75SD, excluding the local control panel<br>• Additional power supply for full redundancy<br>• Internal 8-channel digital audio synchronizer module, providing separate/embedded audio<br>• Blank front panel and fan connection board<br>• Coax cable set |
| **X75 DPS Equivalents** | | |
| X75-DPS-575 | 1RU digital video synchronizer, with PQM submodule and local control panel | • Same features as the X75SD<br>• Includes X75OPT-PQM submodule, which supports component, composite, S-video, SD-SDI inputs, and SD-SDI outputs |

**Table 1-1.** X75HD/X75SD Single-Channel Module and System Packages *(Continued)*

| Product Code | Description | Major Features |
|---|---|---|
| X75-DPS-575AV | 1RU digital synchronizer, with PQM video submodule, 8-channel digital audio synchronization, and local control panel | • Same as X75-DPS-575<br>• Includes X75OPTPT-AS-8 internal 8-channel digital audio synchronizer module for separate/embedded audio<br>• Provides separate/embedded audio, 2 AES coax unbalanced input/outputs and coax unbalanced DARS input |
| X75-DPS-575LC | 1RU digital video synchronizer, with PQM submodule and blank front panel | Same as X75-DPS-575, but excludes local control panel |
| X75-DPS-575LCAV | 1RU digital synchronizer, with PQM video submodule, 8-channel digital audio synchronization, and blank front panel | Same as X75-DPS-575AV, but excludes local control panel |

# Options

Table 1-2 describes the various options available for X75HD/X75SD systems. Some can be installed in the factory at the time of purchase, while other options and upgrades can be ordered and installed at a later time. The X75OPT-HDDUOCON software key option (see page 22) is required for simultaneous up, down, and cross conversion.

For further information on the cables described in this table, see"Module and Back Panel Descriptions" on page 61 .

**Table 1-2.** X75HD/X75SD System Options

| Product Code | Description | Major Features |
|---|---|---|
| **System Options** | | |
| X75OPT-A3D | Analog video input submodule with 3D adaptive comb filtering, composite, S-video, and analog component Betacam™ inputs | Field upgradable or factory installed |
| X75OPT-A3D-1 | Same as the X75OPT-A3D, but with alternate color decoder algorithm | Field upgradable or factory installed |
| X75OPT-AS-8 | 8-channel audio synchronizer with 4-channel analog / 2 AES / 2 groups of SD and HD de-embedding and embedding possible | Mounts inside any X75HD/X75SD system, and includes the following:<br>• Analog, AES/EBU, and embedded SD-SDI and HD-SDI audio I/O<br>• Eight-channel processing<br>• Audio analog-to-digital conversion<br>• Audio digital-to-analog conversion<br>• SD/HD audio embedding<br>• SD/HD audio de-embedding<br>• Audio synchronizing<br>• Audio delay insertion<br>• Audio processing amplification<br>• Coaxial breakout cables set |
| X75OPT-AS-8-L | Audio synchronizer module with audio limiter | Same as X75OPT-AS-8, but with optional audio limiter soft key option |

**Table 1-2.** X75HD/X75SD System Options*(Continued)*

| Product Code | Description | Major Features |
|---|---|---|
| X75OPT-AS-16 | 16-channel audio synchronizer with 4-channel analog / 5 AES / 4 groups of SD and HD de-embedding and embedding possible | Mounts inside any X75HD/X75SD system, and includes the following:<br><br>• Analog, AES/EBU, and embedded SD-SDI and HD-SDI audio I/O<br><br>• 16-channel processing<br><br>• Audio analog-to-digital conversion<br><br>• Audio digital-to-analog conversion<br><br>• SD/HD audio embedding<br><br>• SD/HD audio de-embedding<br><br>• Audio synchronizing<br><br>• Audio delay insertion<br><br>• Audio processing amplification<br><br>• Coaxial breakout cables set |
| X75OPT-AS-16-L | Audio synchronizer module with audio limiter | Same as X75OPT-AS-16, but with optional audio limiter soft key option |
| X75OPT-AS-32 | 32-channel audio synchronizer with 8 AES inputs and outputs / 4 groups of SD and HD de-embedding and embedding | Mounts inside any X75HD/X75SD system, and includes the following:<br><br>• AES/EBU, and embedded SD-SDI and HD-SDI audio I/O<br><br>• 32-channel processing<br><br>• SD/HD audio embedding<br><br>• SD/HD audio de-embedding<br><br>• Audio synchronizing<br><br>• Audio delay insertion<br><br>• Audio gain, sum, invert<br><br>• Coaxial breakout cables set |
| X75OPT-AS-32-L | Audio synchronizer module with audio limiter | Same as X75OPT-AS-32, but with optional audio limiter soft key option |

**Table 1-2.** X75HD/X75SD System Options*(Continued)*

| Product Code | Description | Major Features |
|---|---|---|
| X75OPT-DOLBY-1 | Internal Dolby E decoder submodule | Dolby E and Digital (AC3) integrated decompression; includes firmware upgrade |
| X75OPT-DOLBY-2 | Internal Dolby E encoder submodule | Dolby E and Digital (AC3) integrated compression; includes firmware upgrade |
| X75OPTFIBER-FC | FC-type fiber connectors | FC-type fiber connectors (factory installed) |
| X75OPTFIBER-ST | ST-type fiber connectors | ST-type fiber connectors (factory installed) |
| X75OPT-HDUPG | HDTV submodule with up, down, or cross conversion | Inputs and outputs are coaxial and optical |
| X75OPT-PS | Power supply field power supply retrofit kit, including AC internal connection | Field upgradeable |
| X75OPT-PQM | Analog video input submodule with 3D adaptive comb filtering, composite, S-video, and analog component Betacam™ inputs | • Provides the same inputs as the X75OPT-A3D module, but with slightly lower quality combing and decoding technology<br>• Field upgradable or factory installed |
| X75OPT-STR | Optional video and audio streaming for Ethernet monitoring (SDTV and down-converted HDTV) | Streaming submodule, field-upgradable |
| X75-RCP | Remote control panel for X75HD/X75SD | Can control DPS-475/575 |

**Table 1-2.** X75HD/X75SD System Options*(Continued)*

| Product Code | Description | Major Features |
|---|---|---|
| **Cable Options** | | |
| X75OPTCAB-MULTI | Cable set for multi input/output connectors<br>• Sync/comp out<br>• Blue, Green, and Red out<br>• Y/C out<br>• SDTV and HDTV audio delay<br>• GPI1 and GPI2 in<br>• GPI1 and GPI2 out | 1 ft (30 cm) multi I/O breakout cable with the following connector types:<br>• DB26(M) to 6 x BNC(F), 1 x XLR(F), 1 x MiniDin4(F), and 4 x RCA(F) |
| X75OPTCAB-DVI | Cable for DVI-D single-link output | DVI-D to DVI-D (digital-single link) cable |
| X75OPTCAB-8-C | 1 cable set for 8-channel audio synchronizer, with the following unbalanced coax AES connectors:<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out | 1 ft (30 cm) breakout cable with the following connector types:<br>• DB26(M) to 5 x BNC(F) |
| X75OPTCAB-8-X | 1 cable set for 8-channel audio synchronizer, with the following balanced XLR AES connectors:<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out | 1 ft (30 cm) breakout cable with the following connector types:<br>• DB26(M) to 3 x XLR(F)<br>• 2 x XLR(M) |
| X75OPTCAB-8-CX | 1 cable set for 8-channel audio synchronizer, with the following unbalanced coax AES and XLR connectors:<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out | 1 ft (30 cm) breakout cable with the following connector types:<br>• DB26(M) to 5 x BNC(F)<br>• 3 x XLR(F)<br>• 2 x XLR(M) |

**Table 1-2.** X75HD/X75SD System Options*(Continued)*

| Product Code | Description | Major Features |
|---|---|---|
| X75OPTCAB-16-C | 2 cable sets for 16-channel audio synchronizer, with unbalanced coax AES connectors<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out<br>• AES3, AES4, and AES5 in<br>• AES3, AES 4, and AES 5 out | 2 X 1 ft (30 cm) breakout cables with the following connector types:<br>• DB26(M) to 5 x BNC(F)<br>• DB44(M) to 6 x BNC(F) |
| X75OPTCAB-16-X | 2 cable sets for 16-channel audio synchronizer, with balanced XLR AES connectors<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out<br>• AES3, AES4, and AES5 in<br>• AES3, AES 4, and AES 5 out | 2 X 1 ft (30 cm) breakout cables with the following connector types:<br>• DB26(M) to 3 x XLR(F) and 2 x XLR(M)<br>• DB44(M) to 3 x XLR(F) and 3 x XLR(M) |
| X75OPTCAB-16-CX | 2 cable sets for 16-channel audio synchronizer, unbalanced coax AES and balanced XLR AES<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out<br>• AES3, AES4, and AES5 in<br>• AES3, AES 4, and AES 5 out | 2 X 1 ft (30 cm) breakout cables with the following connector types:<br>• DB26(M) to 5 x BNC(F), 3 x XLR(F), and 2 x XLR(M)<br>• DB44(M) to 6 x BNC(F), 3 x XLR(F), and 3 x XLR(M) |
| X75OPTCAB-32-C | 3 cable sets for 32-channel audio synchronizer, with unbalanced coax AES connectors<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out<br>• AES3, AES4, and AES5 in and out<br>• AES6, AES7, and AES8 in and out | 3 X 1 ft (30 cm) breakout cables with the following connector types:<br>• DB26(M) to 5 x BNC(F)<br>• 2 X DB44(M) to 6 x BNC(F) |

**Table 1-2.** X75HD/X75SD System Options*(Continued)*

| Product Code | Description | Major Features |
|---|---|---|
| X75OPTCAB-32-X | 3 cable sets for 32-channel audio synchronizer, with balanced XLR AES connectors<br><br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out<br>• AES3, AES4, and AES5 in and out<br>• AES6, AES7, and AES8 in and out | 3 X 1 ft (30 cm) breakout cables with the following connector types:<br><br>• DB26(M) to 3 x XLR(F) and 2 x XLR(M)<br>• 2 X DB44(M) to 3 x XLR(F) and 3 x XLR(M) |
| X75OPTCAB-32-CX | 3 cable sets for 32-channel audio synchronizer, unbalanced coax AES and balanced XLR AES<br><br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out<br>• AES3, AES4, and AES5 in and out<br>• AES6, AES7, and AES8 in and out | 3 X 1 ft (30 cm) breakout cables with the following connector types:<br><br>• DB26(M) to 5 x BNC(F), 3 x XLR(F), and 2 x XLR(M)<br>• 2 X DB44(M) to 6 x BNC(F), 3 x XLR(F), and 3 x XLR(M) |
| **Software Upgrades** | | |
| X75OPT-ASL | Audio limiter for X75OPT-AS-32, X75OPT-AS-16, or X75OPT-AS-8 digital audio synchronizers | Field-upgradable software key |
| X75OPT-HDDUOCON | Software key, required for simultaneous up, down, or cross conversions. | Field-upgradable software key |
| X75OPT-NR | SDTV noise reducer | Three-dimensional SDTV digital noise reduction with the following features:<br><br>• Impulse noise reduction<br>• Gaussian random noise reduction<br>• Compression "blocky-ness" and mosquito artifact reduction<br>• Directional softening/sharpening filter |

**Table 1-2.** X75HD/X75SD System Options*(Continued)*

| Product Code | Description | Major Features |
|---|---|---|
| X75OPT-SNMP | Software upgrade that permits the X75HD/X75SD to communicate using SNMP over an Ethernet network | Field-upgradable software key |
| X75OPT-V2A | Automatic video/audio timing correction for lip sync problems | Field-upgradable software key |
| **Spare Replacement Kit (X75SD and X75HD)** | | |
| X75SPR-KIT | Replacement parts for in-field servicing | Includes the following parts:<br>• 2 fans<br>• 4 stackers<br>• 1 power supply with no connectors<br>• 1 shaft encoder |

**Table 1-2.** X75HD/X75SD System Options*(Continued)*

| Product Code | Description | Major Features |
|---|---|---|
| **Available Documentation** | | |
| X75MANUAL | *X75HD/X75SD Multiple Path Converters and Frame Synchronizers Installation and Operation Manual* (hardcopy) plus documentation CD | The *Documentation for X75HD/X75SD Systems and Control Panels* CD includes PDFs of the following documents:<br><br>• *X75HD/X75SD Multiple Path Converters and Frame Synchronizers Installation and Operation Manual*<br><br>• *Control Panels for X75HD/X75SD Systems Installation and Operation Manual*<br><br>• *X75HD/X75SD Multiple Path Converters and Frame Synchronizers Quick Start Guide*<br><br>• *X75HD/X75SD Module Installation Note*<br><br>The CD also includes the *Control Parameter List* HTML document that contains specific descriptions about available menus, submenus, parameters, or options.<br><br>All documentation is also available for download from the Leitch Web site at www.leitch.com. |
| X75MANUAL-RCP | *Control Panels for X75HD/X75SD Systems Installation and Operation Manual* (hardcopy) plus documentation CD | See above. |

# Typical Control Configurations

The X75HD/X75SD models can be configured, controlled, and monitored using the following methods:

- Local control panel on X75HD/X75SD models (see the *Control Panels for X75 Systems Installation and Operation Manual* for details)

- X75-RCP remote control panel (see the *Control Panels for X75 Systems Installation and Operation Manual* for details)

- Local control panel on DPS-575 frames on the same network

- RC-575 Remote control panel

- Web server control, viewable on a browser program such as Internet Explorer™ (IE) or Netscape™ (see "Configuring for HTTP Control via Web Browser" on page 110 or "Web Server Software Control" on page 141 for details)

- CCS™ (Command and Control System) applications such as Pilot or Navigator (see the CCS application online help for details)

- SNMP (Simple Network Management Protocol) and third-party control software through Leitch CCS Protocol (see "Configuring Third-Party SNMP Software Control" on page 335 for details)

All remote methods of operation involve Ethernet connections. See Figure 1-4 on page 26 for an illustration of these various control configurations.

### Note

The maximum recommended length for a standard 10/100Base-T cable is 328 ft (100 m).
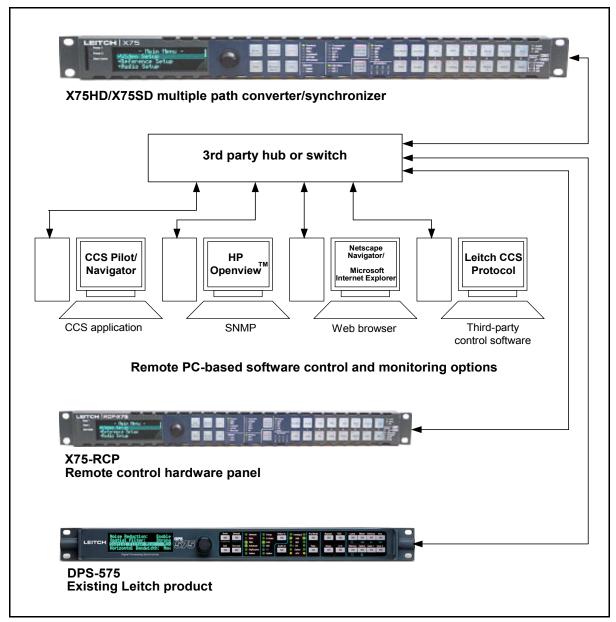
**Figure 1-4.** Typical Configuration, Control, and Monitoring Methods

# Overview of Operating Modes

## Video Functional Block Diagram

Fully loaded X75HD/X75SD frames are the aggregate of discrete modular solutions as indicated in Figure 1-5. The X75HD/X75SD contains four independent video frame synchronizers (each with its own video processing capabilities) and support for multiple processing functions including up/cross/down conversion, test signal generation, noise reduction, and aspect ratio conversion. Single or multiple input video processing is possible, allowing either one input signal to be sent to all outputs, or independent synchronization, phasing and processing capabilities for up to four video channels.
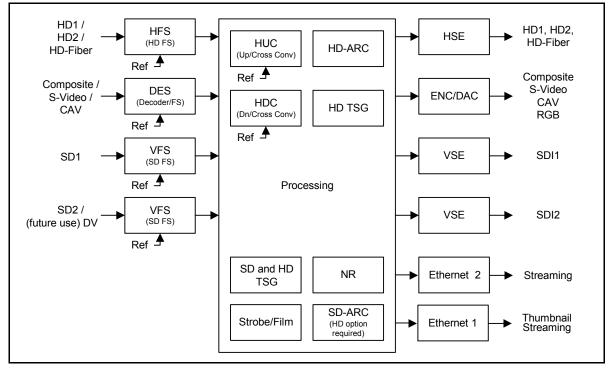


**Figure 1-5.** Video Functional Block Diagram

The controls for those processing blocks are located in the submenu located at **Video Setup > Processing**, and will appear automatically as the respective hardware and software options are installed.

# Default (Auto Detect) vs. Video Routing and Simulcast Modes

There are two main operational modes for defining the input video: M-Path (multiple-path) processing, and Simulcast processing. A third, Auto Detect, is the default mode.

X75HD/X75SD units are shipped with *Auto Detect* video mode as the factory default setting. This mode sets the X75HD/X75SD to automatically detect analog, SD1, SD2, HD-F, HD1, HD2, composite, and S-video inputs. When video is connected to any of these inputs, the X75HD/X75SD automatically selects the applied input video and then sends the converted video to all outputs. The Video Input LEDs on the front panel show the selected video source.

In the video routing mode, an output is selected, and then the input to be processed to that output is selected. Depending on the configuration, up to four paths can be set up.

To operate an X75HD/X75SD frame in *Simulcast* mode (where any two inputs are selected to switch simultaneously between determined outputs, such as SDTV and HDTV), you will need to set up the unit to process signal information differently. To do this, see "Simulcast Operation" on page 35.

For more information on the conversion capabilities and options provided by the X75HD/X75SD, see "HD Conversion Capabilities" on page 369.

# X75OPT-HDDUOCON Option

An X75 provides up, down, or crossconversion. With the addition of the HDDUOCON option, simultaneous up and down, or cross and down conversions are possible.

**Table 1-3.** "DUOCON" Conversion Capability

| Conversion | With X75OPT-HDDUOCON | Without X75OPT-HDDUOCON |
|---|---|---|
| Upconversion and downconversion | Yes | No |
| Upconversion and crossconversion | No | No |
| Downconversion and crossconversion | Yes | No |

📝 **Note**

If you have routed a particular input feed to an output, (or series of outputs) for up, down, or cross-converting, and then begin setting up a new conversion pattern, the existing conversion will be disrupted immediately.

📝 **Note**

Analog component video inputs are only available if your X75HD/X75SD system includes an X75OPT-PQM or X75OPT-A3D module.

By selecting the M-Path mode, you can quickly route a particular input source to all of the X75's outputs simultaneously. To do this, use the **All Out Select** parameter. Follow this path: **Video Setup > Routing Setup > All Out Sel**.

Several examples of M-Path video processing are illustrated in and .

When you need a single input video source to be processed and sent to all outputs, press the **Video In** button or select the **Video Setup > Routing Setup > All Out Sel** parameter to select the desired input video source to be processed. The X75HD/X75SD automatically routes the selected input to all outputs and inserts any selected processing blocks.

When multiple and independent video channel processing is required, the Video M-Path parameter in **Video Setup > Routing Setup** menu allows each video output group to be assigned an input source.

Press the **Audio In** button or select the **Audio Setup > Routing > Audio In Src Select** parameter to select a single audio group type to be synchronized, processed and sent to all outputs. Depending on the selected input audio group type, the software automatically handles all internal processing, including de-multiplexing, signal routing, synchronization, and re-embedding.

The available input audio group types for selection are the following:

- User—When more than one audio input group types is selected
- Analog—Selects all four analog audio inputs for processing
- AES—Selects all AES inputs for processing

- SD—Selects the demuxed audio from SDI input for processing
- DV—Selects the DV input audio for processing (future release)
- HD—Selects the demuxed audio from HD-SDI input for processing
- Dolby Dec—Selects the internally decoded Dolby audio signals for processing

For complex audio processing applications, you can also manually route the signal by changing the parameters. Follow this path:

**Audio Setup > Routing > Input** and **Audio Setup > Routing > Output**

Each SRC can be independently configured to accept one of the available stereo audio inputs using the controls under the **Audio Setup > Routing > Input** menu.

The controls under the **Audio Setup > Routing > Output** menu allow each mono audio output to be independently derived from any of the SRCs, audio mute, or test tones.

**Note**

DV input and output is reserved for future use.
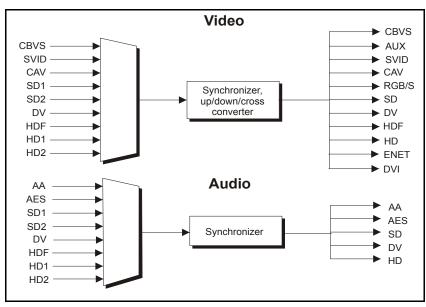


**Figure 1-6.** M-Path Single-Source Video and Audio Processing
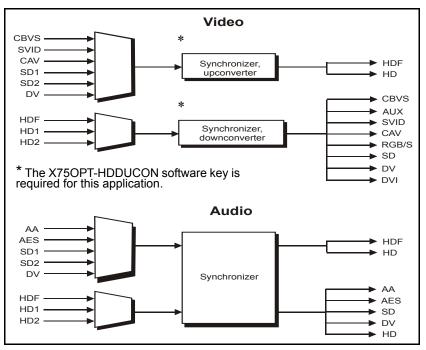
**Figure 1-7.** M-Path (Dual Source Video and Audio) Processing

### Audio Processing

Depending upon your unit's options, the X75HD/X75SD can process up to 32, 16 or 8 channels of audio simultaneously with video. Any combination of audio is assigned from the inputs (4-channel analog audio, 8/5/2 AES balanced or unbalanced, up to 4 groups demuxed from the SD-SDI and HD-SDI input) into the 16-channel processor.

Processed audio signals can be mapped to all outputs. When you select one audio input set, mono channels are mapped intelligently to provide outputs to all available channels. Audio outputs include the following: 4-channel analog audio, 8/5/2 AES balanced and unbalanced, up to 4 groups muxed into the SD-SDI and HD-SDI outputs.

Figures 1-8, 1-9, and 1-10 show the audio processing flow in 8-, 16-, and 32-channel applications, respectively.
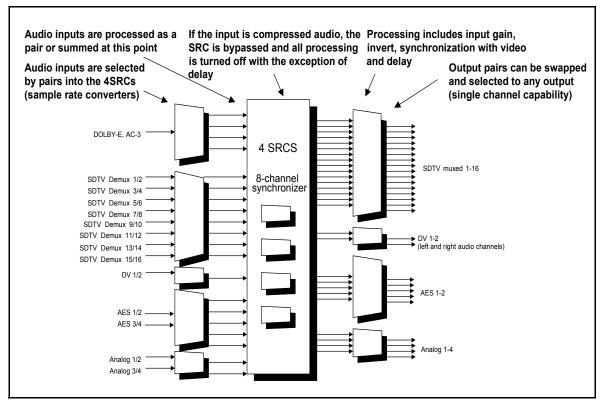
**Figure 1-8.** Audio Functional Block Diagram-8 Channel
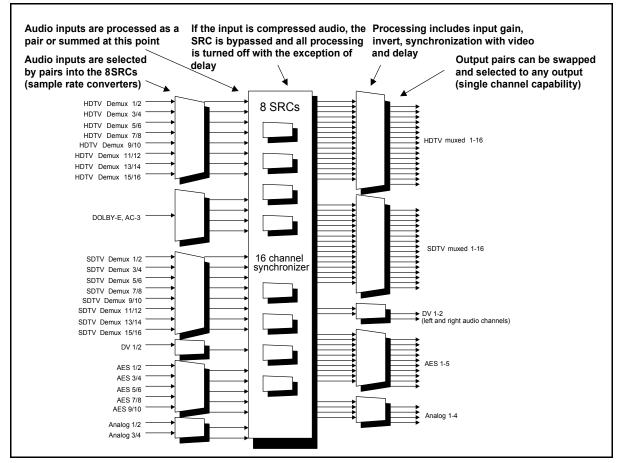
**Figure 1-9.** Audio Functional Block Diagram (16-Channel)
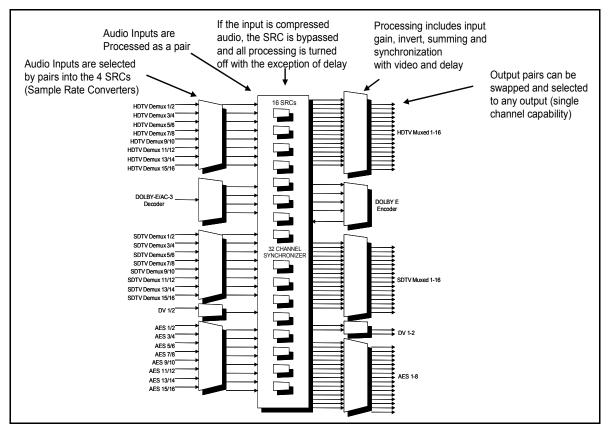
**Figure 1-10.** Audio Functional Block Diagram (32-Channel)

# Simulcast Operation

## General Description

Using the Simulcast mode, you can quickly switch between the two input sources (Input A, and Input B) out of the many possible inputs. Select the video sources to both Input A and Input B via the following path: **Video Setup > Routing Setup > Simulcast**.

The **Simulcast Sel** parameter switches between the two inputs. This switching can also be activated from the GPI input. To operate the unit in Simulcast mode, use the **I/P Video Mode** parameter in the **Routing Setup** menu.

When you enable the Simulcast mode, the X75HD/X75SD can switch SDTV and HDTV inputs to simultaneous, deterministic SDTV and HDTV outputs. Use this mode when you need to alternate between both HDTV and SDTV signals and broadcast them together (for example, if you have an HDTV satellite feed carrying the programming and an SDTV local feed carrying the advertisements). Figure 1-11 shows a simplified illustration. For more information on selecting inputs for Simulcast processing, see "Processing Modes" on page 113.
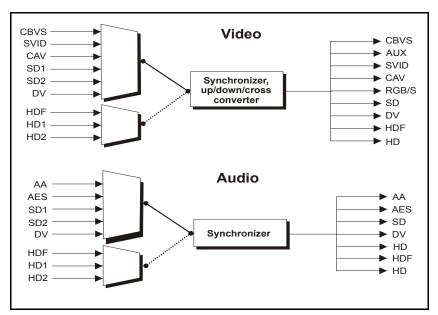


**Figure 1-11.** Simulcast Processing

**Switcher Application**

As a switcher, the X75HD switches between two SDTV inputs with clean outputs and voice-over (see Figure 1-12).
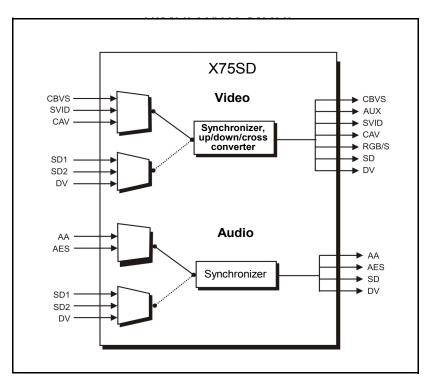


**Figure 1-12.** Simulcast Switcher Application

# Applications

## Overview

X75HD and X75SD units function in many different ways, taking on a wide variety of roles. This chapter includes some common applications that may apply in your facility:

The multi-conversion and frame synchronization abilities of the X75HD/X75SD make it ideal for hybrid SDTV and HDTV broadcasts in cable, satellite, mobile, and production facilities.

In the following pages, a variety of typical applications are described, along with the settings required for quick setup.

# Input Video Processing

This section includes the following common input video processing applications:

**Table 2-1.** Input Video Processing for Mobile or Outside Broadcast Vehicles

| Description | Products |
|---|---|
| The X75HD auto-detects a composite, SD-SDI or HD-SDI input and then sends it through the video processing engine to provide multiple types of outputs.<br><br>The X75HD automatically converts any composite, SD-SDI or HD-SDI signal to the required output format. A single BNC connector on the bulkhead of a mobile or outside broadcast vehicle feeds a wideband distribution amplifier. The wideband distribution amplifier feeds into the composite, SD-SDI and HD-SDI inputs of the X75HD. The X75HD is set up to auto-detect any of the three types of inputs and provide processed video to all of the outputs.<br><br>You can preset the HDTV output to provide the required format (for example, 1080i or 720p) for production.<br><br>If the precedence of all the inputs is set the same (for example, if all of the Auto Detect Setup options are set to Normal as shown below), the the priority of switching is defined by the menu list order. | X75HD with these options:<br><br>• X75OPT-A3D analog video input option<br><br>• INT-EX6X1 (16 channel video wideband distribution amplifier) |



| Parameter Paths |
|---|
| Video Setup > Routing Setup > I/P Video Mode > Auto Detect |
| Video Setup > Routing Setup > Auto Detect Setup > Analog In > Normal |
| Video Setup > Routing Setup > Auto Detect Setup > SD 1 In > Normal |
| Video Setup > Routing Setup > Auto Detect Setup > HD 1/HD-Fiber In > Normal |
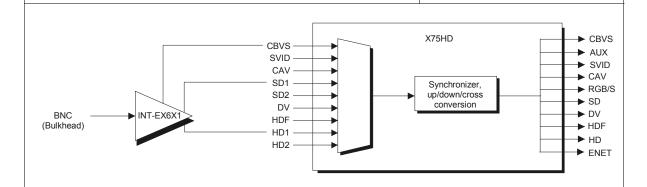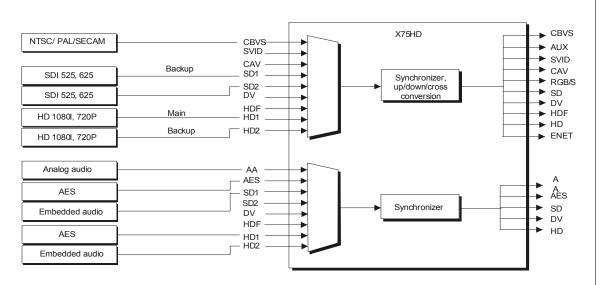
**Table 2-2.** Critical Input Video Processing for Satellite/Microwave Reception

| Description | Products |
|---|---|
| The X75HD auto-detects and then switches HD-SDI main and backup receivers (with an SDTV backup receiver) through the video processing engine to provide multiple types of outputs.<br><br>Main (primary) and backup (secondary) HDTV receivers provide inputs which are automatically switched and processed to the required output format. A tertiary SDTV receiver provides a backup if both HDTV receivers do not have outputs. | X75HD-AV with X75OPT-A3D analog video input option |



**Parameter Paths**

Video Setup > Routing Setup > I/P Video Mode > Auto Detect

Video Setup > Routing Setup > Auto Detect Setup > HD 1/HD-Fiber In > Highest

Video Setup > Routing Setup > Auto Detect Setup > HD 2 In > High

Video Setup > Routing Setup > Auto Detect Setup > SD 1 In > Normal

Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-Aud Follows Vid > On

Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-HD1 > AES1a/1b

Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-HD2 > HDX1/2

Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-SD 1 > SDX1/2

**Additional Factory Default Settings**

**Table 2-2.** Critical Input Video Processing for Satellite/Microwave Reception *(Continued)*

| |
|---|
| Audio Setup > Routing > Output > AA Out1 > SRC1a |
| Audio Setup > Routing > Output > AA Out2 > SRC1b |
| Audio Setup > Routing > Output > AES1 OutA > SRC1a |
| Audio Setup > Routing > Output > AES1 OutB > SRC1b |
| Audio Setup > Routing > Output > SD 1/HD1 OutA > SRC1a |
| Audio Setup > Routing > Output > SD 1/HD1 OutB > SRC1b |
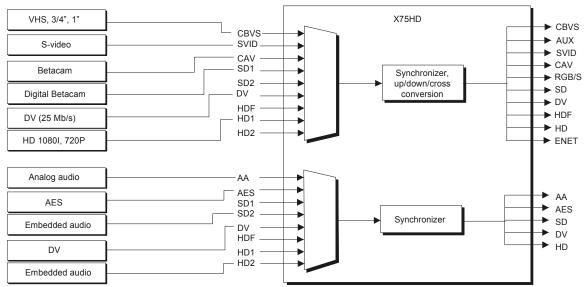
**Table 2-3.** Input Video Processing for News Production

| Description | Products |
|---|---|
| The X75HD selects and accepts inputs from various composite, SD-SDI or HD-SDI tape machines, and then sends the signal through the video processing engine to provide multiple types of outputs.<br><br>Select and convert any tape format to the required output format. | X75HD-AV with X75OPT-A3D analog video input option |



**Parameter Paths**
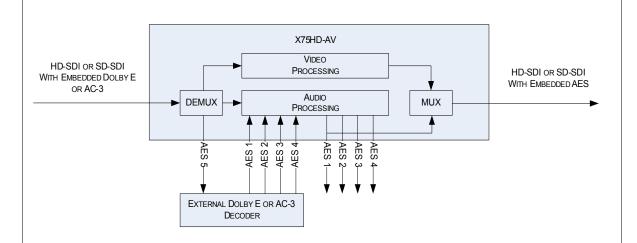
Button Shortcut: Video In
or Video Setup > Routing Setup > All Out Sel > Composite/S-Video/CAV/SD 1/DV/HD 1 (Select one)

Button Shortcut: Audio In
or Audio Setup > Routing > Audio In Src Select > Analog, AES, SD, DV, HD (Select one)

**Table 2-4.** Ingest Input Video Processing with Audio Decompressing and Processing

| Description | Products |
|---|---|
| The X75HD processes HD-SDI signals with embedded compressed audio using an external audio decompressor.<br><br>The system will also de-embed an embedded compressed audio stream and provide it as an AES stream into the audio decompressor. The X75HD processes decompressed audio streams (four AES, eight channels) and times them with the video signal. A discrete audio input can be used for a voice-over channel. | X75HD and audio decompressor (for example, Dolby™ Digital AC-3™, or E™). |



**Parameter Paths**

Button Shortcut: Video In or Video Setup > Routing Setup > All Out Sel > HD1

Button Shortcut: Audio In > SRC Select > AES
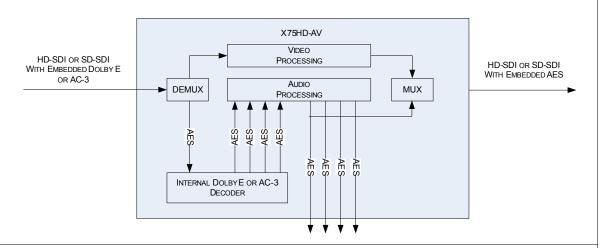
Audio Setup > Routing > Input > SRC5 Input Select > HDX1/2

Audio Setup > Routing > Routing > Output > AES5 OutA >SRC5a

Audio Setup > Routing > Routing > Output > AES5 OutB > SRC5b

**Table 2-5.** Ingest Input Video Processing with Internal Audio Decompression and Processing

| Description | Products |
|---|---|
| HD-SDI video with embedded compressed audio is processed using the X75HD with the optional internal audio decompressor.<br><br>The embedded compressed audio stream is de-embedded and provided as an AES stream into the internal audio decompressor. The decompressed audio streams (four AES, eight channels) are processed and timed with the video signal. | X75HD with optional Dolby-X75 internal audio decompressor |



**Parameter Paths**

| |
|---|
| Button Shortcut: Video In or<br>Video Setup > Routing Setup >All Out Sel > HD1 |
| Audio Setup > Routing > Input > Dolby Input Select > HDX1/2 (assuming the compressed audio is in Group 1: channels 1 and 2) |
| Audio Setup > Routing > Input > SRC1 Input Select > Dolby1/2 |
| Audio Setup > Routing > Input > SRC2 Input Select > Dolby3/4 |
| Audio Setup > Routing > Input > SRC3 Input Select > Dolby5/6 |
| Audio Setup > Routing > Input > SRC4 Input Select > Dolby7/8 |
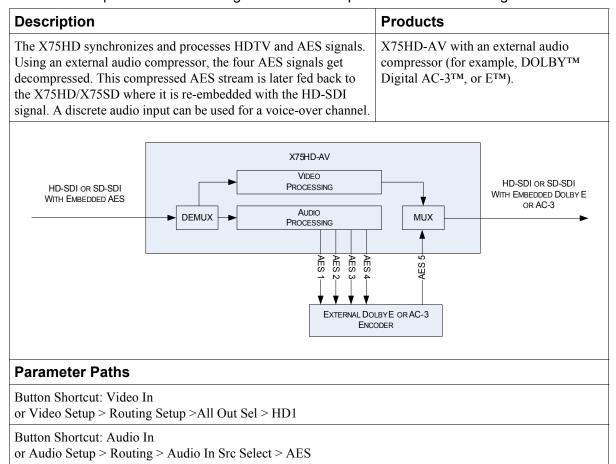
# Output Video Processing

Table 2-6 describes a sample output video processing application commonly used with audio compression and processing.

**Table 2-6.** Output Video Processing with Audio Compression and Processing

| Description | Products |
|---|---|
| The X75HD synchronizes and processes HDTV and AES signals. Using an external audio compressor, the four AES signals get decompressed. This compressed AES stream is later fed back to the X75HD/X75SD where it is re-embedded with the HD-SDI signal. A discrete audio input can be used for a voice-over channel. | X75HD-AV with an external audio compressor (for example, DOLBY™ Digital AC-3™, or E™). |



| Parameter Paths |
|---|
| Button Shortcut: Video In<br>or Video Setup > Routing Setup >All Out Sel > HD1 |
| Button Shortcut: Audio In<br>or Audio Setup > Routing > Audio In Src Select > AES |

# Input Video and Audio Processing

Tables 2-7 and 2-8 describe common input video and audio processing applications.

**Table 2-7.** Input Video, Embedded Audio, and Compressed Audio Processing with External Audio Compression and Decompression

| Description | Products |
|---|---|
| The X75HD processes HD-SDI video with embedded audio and embedded compressed audio using an external audio decompressor and compressor.<br><br>The system also processes HDTV video and AES program signals. Embedded compressed audio is sent to an audio decompressor, providing three AES (5.1) signals to the X75HD. The X75HD processes the audio signals and then sends them to an audio compressor. The compressed audio signal is sent to the X75HD where it is embedded into the output processed program video signal. | X75HD-AV and external audio compressor and decompressor (for example, Dolby™ Digital (AC-3™) or E™). |



| Parameter Paths |
|---|
| Button Shortcut: Video In or Video Setup > Routing Setup > All Out Sel > HD1 |
| Button Shortcut: Audio In or Audio Setup > Routing > Audio In Src Select > AES |
| Audio Setup > Routing > Input > SRC6 Input Select > HDX1/2 |
| Audio Setup > Routing > Output > AES5 OutA > SRC6a |
| Audio Setup > Routing > Output > AES5 OutB > SRC6b |
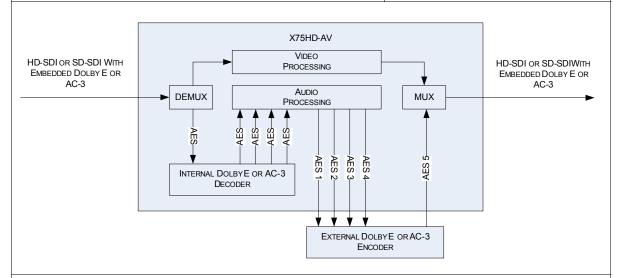
**Table 2-8.** Input Video, Embedded Audio, and Compressed Audio Processing with External Audio Compression and Internal Audio Decompression

| Description | Products |
|---|---|
| HD-SDI video with embedded audio and embedded compressed audio is processed using the X75HD, an internal audio decompressor, and an external audio compressor. <br><br> The HDTV video and AES embedded program signals are processed through the X75HD. Embedded compressed audio is sent to an internal audio decompressor, providing three AES (5.1) signals to the X75HD audio processor. Two embedded program audio streams are sent to the X75 audio processor. The X75HD processes the audio signals. The processed 5.1 audio signals are sent to an external audio compressor which feeds the compressed (5.1) signals into the X75HD where they are embedded into the program signal. The processed program audio signals are embedded into the output. | X75HD-AV, Dolby-X75 internal audio decompressor, and external audio compressor (for example Dolby E™, AC-3™) |



**Parameter Paths**

Button Shortcut: Video In or Video Setup > Routing Setup > All Out Sel > HD1

Audio Setup > Routing > Input > Dolby Input Select > HDX1/2 (Assuming the compressed audio is in Group1: channels 1 and 2)

Button Shortcut: Audio In or Audio Setup > Routing > Audio In Src Select > Dolby Dec

Audio Setup > Routing > Input > SRC5 Input Select > AES5a/5b

**Table 2-8.** Input Video, Embedded Audio, and Compressed Audio Processing with External Audio Compression and Internal Audio Decompression *(Continued)*

| |
|---|
| Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC1 > HD Out |
| Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC2 > HD Out |
| Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC3 > HD Out |
| Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC4 > HD Out |
| Video Setup > Processing > HD Input Frame Delay > x frames (You may need to add user video delay to match the audio delay.) |

**Table 2-9.** Internal Audio Encoding

| Description | Products |
|---|---|
| The X75HD provides extended audio capability. Processed surround sound mixes and a stereo mix can be encoded into Dolby E using an internal optional Dolby E encoder.<br><br>This example takes eight channels embedded from HD1 input and encodes it to Dolby E in Group1: channels 1 and 2. | X75HD-AV, X75OPT-DOLBY-2 integrated Dolby E encoder |



**Parameter Paths**

Button Shortcut: Video In or Video Setup > Routing Setup > All Out Sel > HD1

Button Shortcut: Audio In or Audio Setup > Routing > Audio In Src Select > HD

Audio Setup > Routing > Input > SRC1 Input Select > HDX1/2

Audio Setup > Routing > Input > SRC2 Input Select > HDX3/4

Audio Setup > Routing > Input > SRC3 Input Select > HDX5/6

Audio Setup > Routing > Input > SRC4 Input Select > HDX7/8

Audio Setup > Routing > Input > SRC5 Input Select > DolbyEnc

Audio Setup > Routing > Output > Dolby E Encoder > DolbyEnc In1 > SMX/HMX 1/2 (for 8/16-channel audio modules)

Audio Setup > Routing > Output > Dolby E Encoder > DolbyEnc In2 > SMX/HMX 3/4 (for 8/16-channel audio modules)
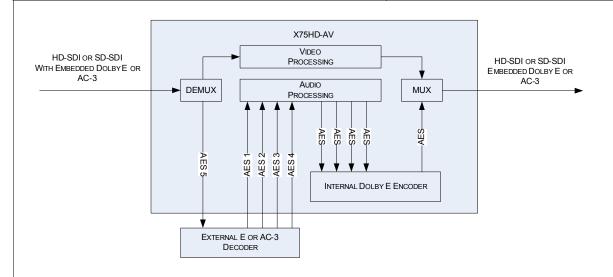
Audio Setup > Routing > Output > Dolby E Encoder > DolbyEnc In3 > SMX/HMX 5/6 (for 8/16-channel audio modules)

**Table 2-9.** Internal Audio Encoding *(Continued)*

| |
|---|
| Audio Setup > Routing > Output > Dolby E Encoder > DolbyEnc In4 > SMX/HMX 7/8 (for 8/16-channel audio module) |
| Audio Setup > Routing > Output > DolbyEnc In1 > SRC1a (for 32-channel audio module) |
| Audio Setup > Routing > Output > DolbyEnc In2 > SRC1b (for 32-channel audio module) |
| Audio Setup > Routing > Output > DolbyEnc In3 > SRC2a (for 32-channel audio module) |
| Audio Setup > Routing > Output > DolbyEnc In4 > SRC2b (for 32-channel audio module) |
| Audio Setup > Routing > Output > DolbyEnc In5 > SRC3a (for 32-channel audio module) |
| Audio Setup > Routing > Output > DolbyEnc In6 > SRC3b (for 32-channel audio module) |
| Audio Setup > Routing > Output > DolbyEnc In7 > SRC4a (for 32-channel audio module) |
| Audio Setup > Routing > Output > DolbyEnc In8 > SRC4b (for 32-channel audio module) |
| Audio Setup > Routing > Output > SMX/HMX 1 > SRC5a |
| Audio Setup > Routing > Output > SMX/HMX 2 > SRC5b |
| Audio Setup > Routing > Output > SMX/HMX 3 > Mute |
| Audio Setup > Routing > Output > SMX/HMX 4 > Mute |
| Audio Setup > Dolby E Encoder > Ref Mux Sel > HD |
| Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC1 > HD Out |
| Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC2 > HD Out |
| Video Setup > Processing > HD Input Frame Delay > x frames (You may need to add user video delay to match the audio delay.) |

**Table 2-10.** External Audio Decoding and Internal Audio Encoding

| Processing | Products |
|---|---|
| The X75HD provides extended audio capability. For processing previously encoded audio, the X75 can process audio from an external decoder with gain, channel swap and invert. Then the signal can be timed to video and encoded internally at the output.<br><br>This example decompresses and re-compresses the Dolby audio and passes the PCM audio as shown below:<br><br>• Input: Group1 Ch1&2 = Compressed Audio, Ch3&4 = PCM<br><br>• Output: Group1 Ch1&2 = Compressed Audio, Ch3&4 = PCM | X75HD-AV, X75OPT-DOLBY-2 integrated Dolby E encoder |



**Parameter Paths**

Button Shortcut: Video In or Video Setup > Routing Setup > All Out Sel > HD1

Audio Setup > Routing > Input > SRC1 Input Select > DolbyEnc (output from Dolby encoder)

Audio Setup > Routing > Input > SRC2 Input Select > HDX3/4 (channels 3/4 from HD input)

Audio Setup > Routing > Input > SRC3 Input Select > AES1a/1b (decoded external Dolby 1/2 channels)

Audio Setup > Routing > Input > SRC4 Input Select > AES2a/2b (decoded external Dolby 3/4 channels)

Audio Setup > Routing > Input > SRC5 Input Select > AES3a/3b (decoded external Dolby 5/6 channels)

Audio Setup > Routing > Input > SRC6 Input Select > AES4a/4b (decoded external Dolby 7/8 channels)

**Table 2-10.** External Audio Decoding and Internal Audio Encoding *(Continued)*

| |
|---|
| Audio Setup > Routing > Input > SRC7 Input Select > AES5a/5b (setting does not matter) |
| Audio Setup > Routing > Input > SRC8 Input Select > HDX1/2 (channels 1/2 of compressed audio from HD input) |
| **8/16-Channel Audio Modules** |
| Audio Setup > Routing > Output > Dolby E Encoder > DolbyEnc In1 > SMX/HMX 5/6 (source to Dolby encoder channels 1/2) |
| Audio Setup > Routing > Output > Dolby E Encoder > DolbyEnc In2 > SMX/HMX 7/8 (source to Dolby encoder channels 3/4) |
| Audio Setup > Routing > Output > Dolby E Encoder > DolbyEnc In3 > SMX/HMX 9/10 (source to Dolby encoder channels 5/6) |
| Audio Setup > Routing > Output > Dolby E Encoder > DolbyEnc In4 > SMX/HMX 11/12 (source to Dolby encoder channels 7/8) |
| **32-Channel Audio Modules** |
| Audio Setup > Routing > Output > DolbyEnc In1 > SRC3a (source to Dolby encoder channel 1) |
| Audio Setup > Routing > Output > DolbyEnc In2 > SRC3b (source to Dolby encoder channel 2) |
| Audio Setup > Routing > Output > DolbyEnc In3 > SRC4a (source to Dolby encoder channel 3) |
| Audio Setup > Routing > Output > DolbyEnc In4 > SRC4b (source to Dolby encoder channel 4) |
| Audio Setup > Routing > Output > DolbyEnc In5 > SRC5a (source to Dolby encoder channel 5) |
| Audio Setup > Routing > Output > DolbyEnc In6 > SRC5b (source to Dolby encoder channel 6) |
| Audio Setup > Routing > Output > DolbyEnc In7 > SRC6a (source to Dolby encoder channel 7) |
| Audio Setup > Routing > Output > DolbyEnc In8 > SRC6b (source to Dolby encoder channel 8) |
| **Additional Settings** |
| Audio Setup > Routing > Output > AES5 OutA > SRC8a (compressed audio on AES5 output to Dolby Decoder) |
| Audio Setup > Routing > Output > AES5 OutB > SRC8b (compressed audio on AES5 output to Dolby Decoder.) |
| Audio Setup > Routing > Output > SMX/HMX 1 > SRC1a (remuxing compressed audio to channel 1) |
| Audio Setup > Routing > Output > SMX/HMX 2 > SRC1b (remuxing compressed audio to channel 2) |
| Audio Setup > Routing > Output > SMX/HMX 3 > SRC2a (remuxing PCM audio to channel 3) |
| Audio Setup > Routing > Output > SMX/HMX 4 > SRC2b (remuxing PCM audio to channel 4) |
| Audio Setup > Dolby E Encoder > Ref Mux Sel > HD |

**Table 2-10.** External Audio Decoding and Internal Audio Encoding *(Continued)*

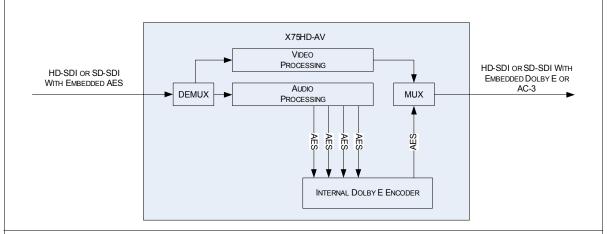| Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC1 > HD Out |
| --- |
| Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC2 > HD Out |
| Video Setup > Processing > HD Input Frame Delay > x frames (You may need to add user video delay to match the audio delay.) |

**Table 2-11.** Compressed Audio with Internal Audio Codecs

| Processing | Products |
|---|---|
| The X75HD provides extended audio capability. For processing previously encoded audio, the X75 can decode and process audio from an internal decoder with gain, channel swap and invert. Then the signal can be timed to video and encoded internally at the output. This arrangement is used to synchronize audio and video.<br><br>This example decompresses and re-compresses the Dolby audio and passes the PCM audio as shown below:<br><br>• Input: Group1 Ch1&2 = Compressed Audio, Ch3&4 = PCM<br>• Output: Group1 Ch1&2 = Compressed Audio, Ch3&4 = PCM | X75HD-AV, X75OPT-DOLBY-1 integrated Dolby E/AC-3 decoder and X75OPT-DOLBY-2 integrated Dolby E encoder |
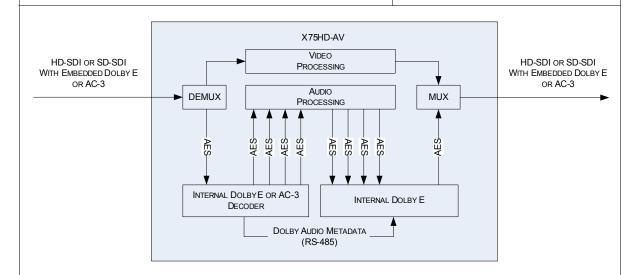


**Parameter Paths**

Button Shortcut: Video In or Video Setup > Routing Setup > All Out Sel > HD1

Audio Setup > Routing > Input > SRC1 Input Select > DolbyEnc (output from Dolby encoder)

Audio Setup > Routing > Input > SRC2 Input Select > HDX3/4 (channels 3/4 from HD input)

Audio Setup > Routing > Input > SRC3 Input Select > Dolby1/2 (decoded internal Dolby 1/2 channels)

Audio Setup > Routing > Input > SRC4 Input Select > Dolby3/4 (decoded internal Dolby 3/4 channels)

Audio Setup > Routing > Input > SRC5 Input Select > Dolby5/6 (decoded internal Dolby 5/6 channels)

Audio Setup > Routing > Input > SRC6 Input Select > Dolby7/8 (decoded internal Dolby 7/8 channels)

**Table 2-11.** Compressed Audio with Internal Audio Codecs*(Continued)*

| |
|---|
| Audio Setup > Routing > Input > SRC7 Input Select > Dolby9/10 (setting does not matter) |
| Audio Setup > Routing > Input > Dolby Input Select > HDX1/2 (channel 1/2 of compressed audio from HD input) |
| **8/16-Channel Audio Modules** |
| Audio Setup > Routing > Output > Dolby E Encoder > DolbyEnc In1 > SMX/HMX 5/6 (source to Dolby encoder channels 1/2) |
| Audio Setup > Routing > Output > Dolby E Encoder > DolbyEnc In2 > SMX/HMX 7/8 (source to Dolby encoder channels 3/4) |
| Audio Setup > Routing > Output > Dolby E Encoder > DolbyEnc In3 > SMX/HMX 9/10 (source to Dolby encoder channels 5/6) |
| Audio Setup > Routing > Output > Dolby E Encoder > DolbyEnc In4 > SMX/HMX 11/12 (source to Dolby encoder channels 7/8) |
| **32-Channel Audio Modules** |
| Audio Setup > Routing > Output > DolbyEnc In1 > SRC3a (source to Dolby encoder channel 1) |
| Audio Setup > Routing > Output > DolbyEnc In2 > SRC3b (source to Dolby encoder channel 2) |
| Audio Setup > Routing > Output > DolbyEnc In3 > SRC4a (source to Dolby encoder channel 3) |
| Audio Setup > Routing > Output > DolbyEnc In4 > SRC4b (source to Dolby encoder channel 4) |
| Audio Setup > Routing > Output > DolbyEnc In5 > SRC5a (source to Dolby encoder channel 5) |
| Audio Setup > Routing > Output > DolbyEnc In6 > SRC5b (source to Dolby encoder channel 6) |
| Audio Setup > Routing > Output > DolbyEnc In7 > SRC6a (source to Dolby encoder channel 7) |
| Audio Setup > Routing > Output > DolbyEnc In8 > SRC6b (source to Dolby encoder channel 8) |
| **Additional Settings** |
| Audio Setup > Routing > Output > SMX/HMX 1 > SRC1a (remuxing compressed audio to channel 1) |
| Audio Setup > Routing > Output > SMX/HMX 2 > SRC1b (remuxing compressed audio to channel 2) |
| Audio Setup > Routing > Output > SMX/HMX 3 > SRC2a (remuxing PCM audio to channel 3) |
| Audio Setup > Routing > Output > SMX/HMX 4 > SRC2b (remuxing PCM audio to channel 4) |
| Audio Setup > Dolby E Encoder > Ref Mux Sel > HD |
| Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC1 > HD Out |
| Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC2 > HD Out |
| Video Setup > Processing > HD Input Frame Delay > x frames (You may need to add user video delay to match the audio delay.) |

# Video and Audio Converting

describes a common video and audio converting application, using a wrap-around for tape transports. (The X75OPT-HDDUOCON software key option is required for this application.)

### 📝 Note

Many input and output choices are possible. This example is based on SD 1+AES1 inputs for up-conversion and CVBS+AA (analog audio) outputs for down-conversion.

**Table 2-12.** Wrap-Around for Tape Transports

| Description | Products |
|---|---|
| The X75HD provides conversion and processing for video and audio for HDTV and all SDTV formats. Video and audio connections through the X75HD provide conversion and synchronization (along with time base correction, if required) for standard definition and high definition tape transports.<br><br>This example uses SD1-to HD output and HD1 input to SD1 output with embedded audio. | X75HD-AV |

**Table 2-12.** Wrap-Around for Tape Transports *(Continued)*

| Parameter Paths |
| --- |
| Video Setup > Routing Setup > Video M-Path > HD Out Sel > SD 1 |
| Video Setup > Routing Setup > Video M-Path >SDI 1 Out Sel > HD 1 |
| Audio Setup > Routing > Input > SRC1 Input Select > HDX1/2 |
| Audio Setup > Routing > Input > SRC1 Input Select > HDX3/4 |
| Audio Setup > Routing > Input > SRC1 Input Select > SDX1/2 |
| Audio Setup > Routing > Input > SRC1 Input Select > SDX3/4 |
| Audio Setup > Routing > Output > SMX/HMX1 > SRC1a |
| Audio Setup > Routing > Output > SMX/HMX2 > SRC1b |
| Audio Setup > Routing > Output > SMX/HMX3 > SRC2a |
| Audio Setup > Routing > Output > SMX/HMX4 > SRC2b |
| Audio Setup > Routing > Output > SD1 Embedding Audio > SMX1 Input 1 > SRC3a |
| Audio Setup > Routing > Output > SD1 Embedding Audio > SMX1 Input 2 > SRC3b |
| Audio Setup > Routing > Output > SD1 Embedding Audio > SMX1 Input 3 > SRC4a |
| Audio Setup > Routing > Output > SD1 Embedding Audio > SMX1 Input 4 > SRC4a |
| Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC1 > HD Out |
| Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC2 > HD Out |
| Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC3 > SD Out |
| Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC4 > SD Out |

# Bridging Router Switchers

> **Note**
>
> The X75OPT-HDDUOCON software key option is required for this application.

Table 2-13 describes a common application for bridging router switchers. To configure the X75HD for this application, use the parameter settings shown for "Wrap-Around for Tape Transports" on page 56.

**Table 2-13.** Bridging Between Routing Switchers with Different Formats

| Description | Products |
|---|---|
| The X75HD provides conversion and processing for video and audio for HDTV and all SDTV formats.<br><br>Video and audio can be converted through the X75HD providing bridges between sources and destinations in hybrid facilities. | X75HD, Panacea and Integrator Routing Systems |

# Simulcast Switching

Table 2-14 describes a common application for simulcast switching of SDTV and HDTV signals.

**Table 2-14.** Simulcast Switching of Standard and High Definition Signals

| Description | Products |
|---|---|
| You can configure the X75HD to do an A/B switch using any two inputs; all inputs are provided simultaneously. In this example, A=HD, and B=SD. Simultaneous HD and SD outputs are available. You can perform the A/B switch manually or by GPI. | X75HD-AV |



| Parameter Paths |
|---|
| Video Setup > Routing Setup > I/P Video Mode > Simulcast |
| Video Setup > Routing Setup > Simulcast > Input A > HD1 |
| Video Setup > Routing Setup > Simulcast > Input B > SD1 |
| Video Setup > Routing Setup > Simulcast > Simulcast Sel > Input A<br>or System Config > Setup >GP-1 Function > Simulcast A/B |
| Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-Aud Follows Vid > On |
| Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-HD 1 > HDX1/2 |
| Audio Setup > Routing > Audio Follow Video > SRC 1 > Ch1-AFV-SD 1 > AES1a/1b or SDX1/2 |

# Module and Back Panel Descriptions

## Overview

This chapter briefly describes the X75HD/X75SD modules and their corresponding back panels, including card-edge LEDs and controls, jumper settings, and connector information. The following topics are included:

- "X75OPT-AS-32 /X75OPT-AS-16 /X75OPT-AS-8 Modules and Back Panels" on page 62
- "X75OPT-A3D Module and Back Panel" on page 70
- "X75OPT-PQM Module and Back Panel" on page 72
- "X75HD Module and Back Panel" on page 75
- "X75OPT-STR Module and Back Panel" on page 77

See the following chapters for more information on back panel cables and connectors, servicing, and performance specifications:

- "Cables and Pinouts" on page 207
- "Servicing" on page 273

# X75OPT-AS-32 /X75OPT-AS-16 /X75OPT-AS-8 Modules and Back Panels

## General Description

The X75OPT-AS-16/8 audio modules and associated back panels provide 5 or 2 AES inputs and outputs, respectively, one DARS input, a four-channel analog audio input, and a four-channel analog audio output.

The X75OPT-AS-32 provides 8 AES inputs and outputs, in SD-SDI and HD-SDI.

Using these modules, the X75HD/X75SD can process, embed, and de-embed either 32, 16, or 8 channels of audio from/to SDTV and from/to HDTV. The back panels for these modules are located in the top, left corner of the frame, above the SDTV video connectors.
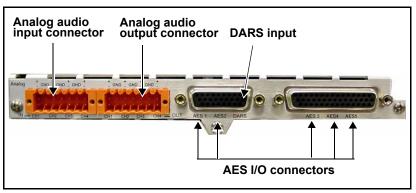


**Figure 3-1.** X75OPT-AS-16/X75OPT-AS-8 Back Panel
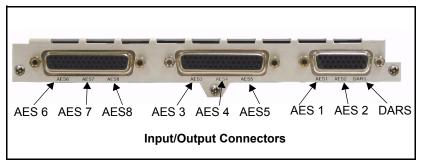


**Figure 3-2.** X75OPT-AS-32 Back Panel

This module provides all audio processing for the X75HD/X75SD and is required to access, configure, and enable audio parameters in the **Audio Setup** submenu, including gain, delay, tone, mute, voice-over, and AFV (audio follow video).

# Required Jumper Settings and Local Configuration

### Setting Jumpers

To configure the impedances of analog audio inputs and outputs on the X75OPT-AS-16 and X75OPT-AS-8 modules, you must set specific jumpers. The X75OPT-AS-32 does not require jumper settings.

Jumpers **1** through **12** are located at the rear of the X75OPT-AS-16 and X75OPT-AS-8 modules. Figure 3-3 on page 65 shows the location of the jumpers. See Table 3-1 for the correct placement of the jumpers. The white triangle next to each jumper indicates pin 1.

**Table 3-1.** Analog Audio Input and Output Impedance Jumper Settings (X75OPT-AS-16 and X75OPT-AS-8 modules)

| Input Settings | | | | |
|---|---|---|---|---|
| **Input Number** | **Jumper Numbers** | **Channel** | **Pin Numbers** | **Setting** |
| 1 | J5 | Left (1A) | 1 and 2 | 600Ω |
| | | | 2 and 3 | 100kΩ |
| 2 | J6 | Right (1B) | 1 and 2 | 600Ω |
| | | | 2 and 3 | 100kΩ |
| 3 | J7 | Left (2A) | 1 and 2 | 600Ω |
| | | | 2 and 3 | 100kΩ |
| 4 | J8 | Right (2B) | 1 and 2 | 600Ω |
| | | | 2 and 3 | 100kΩ |
| **Output Settings** | | | | |
| **Output Number** | **Jumper Numbers** | **Channel** | **Pin Numbers** | **Setting** |
| 1 | J1 and J9 | Left (1A) | 1 and 2 | 600Ω |
| | | | 2 and 3 | 66Ω |
| 2 | J2 and J10 | Right (1B) | 1 and 2 | 600Ω |
| | | | 2 and 3 | 66Ω |
| 3 | J3 and J11 | Left (2A) | 1 and 2 | 600Ω |
| | | | 2 and 3 | 66Ω |
| 4 | J4 and J12 | Right (2B) | 1 and 2 | 600Ω |
| | | | 2 and 3 | 66Ω |
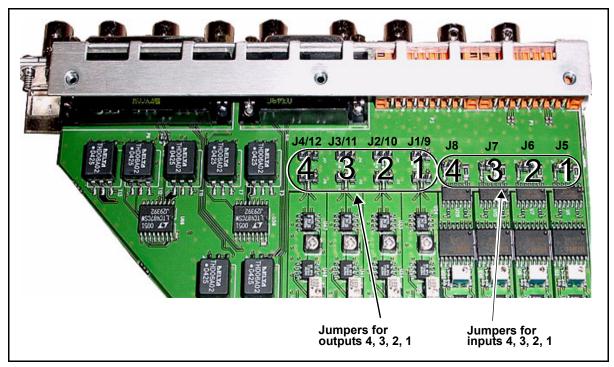
**Figure 3-3.** Jumper Locations for X75OPT-AS-16 and X75OPT-AS-8 Modules

## Installing Audio Receptacles

To make analog audio input and output connections, you need to properly connect stripped wires for each audio channel to the provided audio receptacle. Once done, install the wired receptacle to the back panel audio input and output connectors. Follow these steps:

1.  Insert a small, flathead screw driver into a rectangular hole of the audio receptacle.

    The corresponding round wire hole will open either directly above or directly below the screwdriver (see Figure 3-4).

2.  Heeding the positive (+), negative (-), and ground (GND) markings on the back panel, place an appropriate stripped audio wire into the open hole.

    The top row of wire connection holes alternate between positive and ground. The bottom row of wire connection holes alternate between negative and ground. See Figure 3-4.
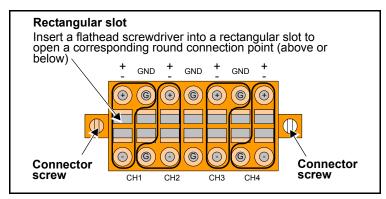


**Figure 3-4.** Installing Analog Audio Receptacles

3.  Remove the screwdriver to lock the wire into place.

4.  Repeat for other wire connections.

5.  Once all wiring in completed, plug the receptacle into the analog audio input ports (each labelled **CH1 CH2 CH3 CH4**), and then secure the receptacle into place with the attached connector screws.

# Special Control Considerations

For the AES input signals on DB-26 and DB-44 connectors, you can select either an **Unbalanced** or **Balanced** input from the **Audio Setup** submenu (accessed from the **Main** menu). For coaxial connections, select the default setting **Unbalanced**. For XLR connections, select the **Balanced** setting.

# X75OPT-AS-32, X75OPT-AS-16, or X75OPT-AS-8-L Audio Limiters

Audio limiters are available as software options on all of the X75OPT-AS audio synchronizers. The audio limiters have the following available options:

- Soft Limit Level
- Slope
- Attack Rate
- Attack Time
- Decay Rate
- Decay Time
- Noise Gate Level
- Noise Gate Time

Figure 3-5 shows the transfer function of the audio limiter. Table 3-2 on page 69 describes the various options of the audio limiter.
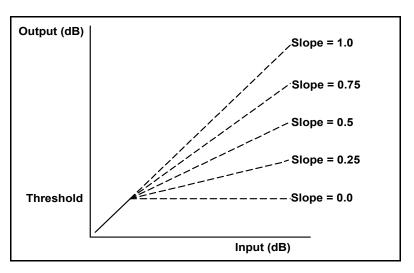
**Figure 3-5.** Audio Limiter Transfer Function

**Table 3-2.** Audio Limiter Options

| Option | Description |
|---|---|
| Soft Limit Level | • Sets the threshold level for the input audio signal, measured in dB (decibels), where the audio signal limiter's attack and decaying function will be based<br><br>• When a signal exceeds this level, compression will be applied |
| Slope | • Sets the amount a signal is reduced by the compressor<br><br>• When the slope is set to 0.25, the audio input signal exceeding the soft limit threshold level will be reduced by the factor of 4 at the output. |
| Attack Rate | Controls the rate of attack soft limiting |
| Attack Time | • Activates limiter only after the input audio level remains over the Soft Limit Level for the duration specified in the Attack Time option<br><br>• Audio that exceeds the specified Soft Limit Level for less than the specified Attack time will not activate the limiter<br><br>• Attack Time indicates how long it takes for the compressor to act after a signal has exceeded the threshold level |
| Decay Rate | Controls the rate of decay soft limiting. |
| Decay Time | • Once the input audio signal has exceeded the Soft Limit Level and the limiter has been activated, the limiter remains active until the audio signal has returned below the Soft Limit Level for the duration specified in the Decay Time option<br><br>• If the input audio signal returns below the Soft Limit Level for less than the specified Decay Time, the limiter remains active |
| Noise Gate Level | • Sets the noise gate threshold level, measured in dB.<br><br>• When an input signal falls below this level, the noise gate will be applied. |
| Noise Gate Time | Indicates how long it takes for the noise gate to start or stop acting after the input signal has fallen below or risen above the threshold level. |

# X75OPT-A3D
# Module and Back Panel

## General Description

The optional X75OPT-A3D analog video input module and associated back panel provide selectable analog composite, component Betacam (CAV), and S-video inputs (see Figure 3-6).

The composite input is processed through a high-performance industry-leading 3D adaptive comb filter. The TBC mode is always used when the S-video input is selected. When component analog video is selected as the input, it is converted to digital and then further processed as required.

Looking from the rear, this back panel is located in the top, right corner of the frame, above the dual Ethernet ports.
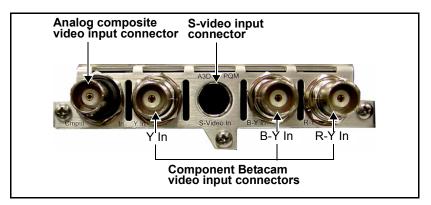


**Figure 3-6.** X75OPT-A3D Module Back Panel

To access, configure, and enable the analog video parameters associated with this module, enter the **Video Setup** parameter.

# Special Control Considerations

Unlike SD-SDI inputs, only a single analog video source can be auto-detected. Therefore, you must pre-select the desired analog input video source (composite, S-video, or CAV) in order for the auto-detection to work across the HD-SDI/SD-SDI/analog inputs. To select a desired input, follow this path through the menu structure: **Video Setup > Analog Input > Analog Video Source**.

Additionally, set the **I/P Video Mode** parameter to **Auto Detect.**

For more information, see "Input Video Modes" on page 114.

# X75OPT-PQM Module and Back Panel

## General Description

The optional X75OPT-PQM module and associated back panel provide selectable analog composite, component Betacam (CAV), and S-video inputs (see Figure 3-7). This module is an economical alternative to the X75OPT-A3D option.

Composite input is processed through a 3D-adaptive comb filter. The TBC mode is always used when the S-video input is selected. When the component analog video input is selected, it is converted to digital and then further processed as required.

Looking from the rear, this back panel is located in the top, right corner of the frame, above the dual Ethernet ports.
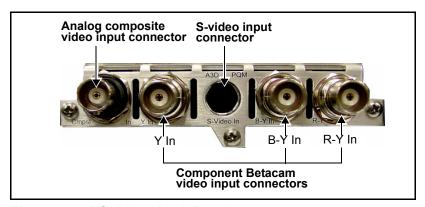


**Figure 3-7.** PQM-X75 Back Panel

To access, configure, and enable the analog video parameters associated with this module, enter the **Video Setup** parameter.

# Special Control Considerations

Unlike SD-SDI inputs, only a single analog video source can be auto-detected. Therefore, you must pre-select the desired analog input video source (composite, S-video, or CAV) in order for the auto-detection to work across the HD-SDI/SD-SDI/analog inputs. To select a desired input, follow this path through the menu structure: **Video Setup** > **Analog Input** > **Analog Video Source**. Additionally, you must set the **I/P Video Mode** parameter to **Auto Detect**.

For more information see "Input Video Modes" on page 114.

# Alternate PQM Color Decoding Algorithm (NTSC Only)

The current version of the PQM decoder code provides a superior separation of luma and chroma for the digital domain (SDI output). In some cases, however, when the luma and chroma are re-combined in the encoder, the resulting image may appear "soft" (see Figure 3-8).
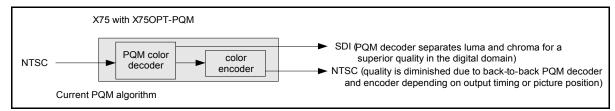


**Figure 3-8.** Current PQM Algorithm

## Note

The alternate PQM algorithm results in diminished quality in the digital domain. If the SDI output is not being used, the alternate can be selected for an improved NTSC output.

When this condition occurs, the X75HD/X75SD has a useful alternate NTSC decoding algorithm that may provide better results. If an NTSC output is required (via back-to-back decoder/encoder), you can enable or disable the alternate PQM algorithm by following this path:

**Video Setup > Analog Input (PQM) > Proc > Chroma Bandpass**.
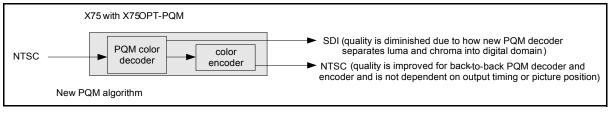
**Figure 3-9.** Alternate PQM Algorithm

# X75HD Module and Back Panel

## General Description

The X75HD (or X75OPT-HDUPG) module and associated back panel provides two HDTV coaxial inputs, two HDTV coaxial outputs, one HDTV fiber input, and one HDTV fiber output. This module provides and processes on-board up/down/cross-conversions.

The back panel is located in the top, middle of the frame, above the Multi I/O and DVI-D ports. X75HD modules are factory-installed in all X75HD systems, and available as an upgrade (X75OPT-HDUPG) for all X75SD and X75-DPS frames.
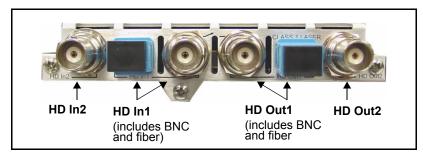


**Figure 3-10.** HD-X75 Back Panel

This module provides up, down, and crossconversion with both coaxial and fiber interfaces for HD. To access, configure, and enable the HDTV input and output parameters, enter the **Video Setup** parameter.

**⚠ Caution**

USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED IN THIS MANUAL MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

**Precautions**

The HD-X75 fiber optic module is a CLASS 1 laser product.

Avoid looking directly at a laser. Laser radiation is invisible and can cause serious eye damage.

**!DANGER!**
Class 1 Laser Product
**LASER** **Avoid Direct Exposure**

For more information on handling and connecting fiber optics, see "Understanding and Working With Fiber Optics" on page 275.

# Special Control Considerations

The selection between HD1 and HD-Fiber is not automatic. You must pre-select the desired input video source first in order for auto-detection to work across the HD-SDI/SD-SDI/analog inputs. To select a desired input, follow this path through the menu structure: **Video Setup** > **HD Input** > **HD1/HDF Input Select**.

For more information, see"Input Video Modes" on page 114.

# X75OPT-STR Module and Back Panel

## General Description

X75HD/X75SD units provide the following two types of streaming:

- A small "thumbnail" 128 x 96 pixel feed, which is available from the **Ctrl/Strm** port on all X75 frames (see page 150 for details)

- An optional, higher-quality 352 x 240 pixel (525) or 352 x 288 pixel (625) feed provided at the **Streaming** Ethernet port, which is generated by the X75OPT-STR module

The optional higher-quality (1/4 VGA) streaming uses MPEG4 codec video compression. The image can be displayed at up to 30 frames per second (25 fps for PAL) with a bit rate of 200 Kbps, adjustable up to 1Mbps (the frame rate drops each time you lower the bit rate). The streaming is viewable on Quicktime™ version 7.0 or above, and requires v. 1.7 or later X75 firmware. The X75OPT-STR module provides both audio and video streaming, delayed approximately four seconds. Although the thumbnail and the higher-quality streaming feeds are provided by different modules, they both show the same output image.

The following "broadcast" standards are among those that are *not* supported as a streaming output from the X75OPT-STR module:

- AVC

- AVI

- JVT

- MPEG4 Part 10 (H.264)

- SMPTE VC-1 (WM9 or Windows Media 9)

To select the *video* source for the X75OPT-STR module, follow this path:

**Video Setup > Routing > Video M-Path > StrV Out Sel**

To select the *audio* streaming sources, follow this path:

**Audio Setup > Routing > Output > Stream Out A** (left channel) and/or **Stream Out B** (right audio channel)

# Minimum Requirements

The PC that monitors the X75HD/X75SD's streaming video using QuickTime should have the following minimum specifications when the lowest bit rate is used (200 KBps):

- Pentium 3 processor (16 MHz)
- 512 MB SD-RAM
- 300 MB free disk space
- 10 BaseT network connection
- 19-inch monitor

At the highest setting (1Mbps), the minimum requirements are the following:

- Pentium 4 processor, 3.0 GHz
- 512 MB SD-RAM
- 300 MB free disk space
- 100 BaseT network connection
- 19-inch monitor

For installation and configuration instructions, see .

# System Installation and Connections

## Overview

This chapter contains the following information:

# Checking the Packing List

Before unpacking your product, read the "Unpacking/Shipping Information" on page xv.

**Standard Items**

The following items are included with every X75HD/X75SD system:

• One X75HD/X75SD Multiple Path Converters and Frame Synchronizers

• One AC power cable (773-254 or 773-505)

• Two rear support brackets (741-983A) and corresponding hardware

• Two cable relief support brackets (164-000306-00) and one corresponding cable relief bar (164-000305-00)

The following items are only included with X75HD/X75SD-AV and -LCAV systems:

• Two 2x7 analog audio terminal blocks (134-000228-00)

• Eight-channel audio module with X75OPTCAB-8-C breakout cable

Or

• Sixteen-channel audio module with X75OPTCAB-16-C and X75OPTCAB-8-C coax breakout cables

**Optional Items**

You may have additional items included in your shipment if you have ordered any of the available options or upgrades. Some options may include the following:

• X75OPT-A3D high performance 3D-adaptive decoder, composite, component Betacam, and S-video input

• X75OPT-AS-8/16/32 digital audio synchronizers

• X75OPT-ASL audio limiter software key for X75OPT-AS-8/16/32 digital audio synchronizers

• X75OPT-DOLBY-1 internal Dolby E decoder submodule with software key

• X75OPT-DOLBY-2 internal Dolby E encoder submodule with software key

• X75OPT-FIBER-FC and -ST fiber connectors

• X75OPT-HDUPG-HDTV submodule

- X75OPT-PS power supply kit
- X75OPT-PQM video module
- X75OPT-STR streaming module
- X75-RCP remote control panel
- X75OPTCAB-MULTI breakout cable
- X75OPTCAB-32-C breakout cable set
- X75OPTCAB-32-X breakout cable set
- X75OPTCAB-32-XC combination BNC/XLR audio breakout cable set
- X75OPTCAB-16-C breakout cable set
- X75OPTCAB-16-X breakout cable set
- X75OPTCAB-16-XC combination BNC/XLR audio breakout cable set
- X75OPTCAB-8-C breakout cable
- X75OPTCAB-8-XC breakout cable
- X75OPTCAB-8-X breakout cable
- X75OPTCAB-DVI cable
- X75OPT-ASL audio limiter
- X75OPT-HDDUOCON software upgrade key
- X75OPT-NR digital noise reduction and digital bandwidth filtering software key
- X75OPT-SNMP software upgrade
- X75OPT-V2A automatic video-to-audio timing tool
- X75SPR-KIT spare parts kit

## Replaceable Parts Kit

The replaceable parts kit (X75SPR-KIT) includes the following items:

- 2 fans
- 4 stackers
- 1 power supply with no connectors
- 1 shaft encoder

# Preparing for Installation

Prior to installing your system, ensure that certain environmental and electrical conditions are met.

## Meeting Electrical Requirements

The X75HD/X75SD power supply has a universal input of 100-240 VAC at 47 to 63 Hz (nominal). There is no voltage selector switch. Ensure that a proper power supply source is available prior to operating your system.

Table F-25 and Table F-26 on page 366 describe the power consumption of individual components and system packages. These ratings refer to the total module power consumption (excluding that of the power supply) allowable within a X75HD/X75SD frame. The limits are based on the ability of the unit to dissipate heat over a temperature range of 32° to 122°F (0° to 45°C).

Each X75HD/X75SD frame has space for two power supplies; however, a single power supply can meet the requirements of a fully-loaded frame. An optional second power supply can be purchased to provide full backup redundancy. See "Installing a Redundant Power Supply" on page 313 for more information.

## Meeting Environmental Requirements

⚠️ **Caution**

To ensure proper ventilation and to prevent overheating, keep the front panel closed.

X75HD/X75SD units are cooled by forced air drawn in from the front and exhausted through vents at the rear. There must be free passage for air flow at the front and back of each unit to allow for adequate ventilation. Take care to select a dry, well-ventilated location with a minimum of dust.

X75HD/X75SD units are designed for mounting in a standard 19-in. (48-cm) rack using front-mounting ears and rear support brackets, occupying a 1RU vertical space of 1.75 in. (4.4 cm). When installing an X75 in a rack, ensure that there is adequate space behind the mounting ears and clearance for the rear connecting cables. Allow about 10 inches (25 cm) of slack in the rear connecting cables for frame access and maintenance.

After unpacking the unit, and before installing into a console or rack, allow at least 30 minutes for temperatures to equalize and to eliminate any condensation that may have developed. The X75 requires an ambient temperature of between 41° to 113°F (5° to 45°C), with a relative humidity of 10-90% (non condensing). Proper operating temperatures can be maintained only when the front panel is properly installed.

# Installing Rack Support Brackets and Cable Relief Bar

Although the front-mounting ears provide the main support for the X75 within a rack, you must install additional brackets and a cable relief bar at the rear of the unit to support the weight of cabling and frame stacking. The following procedure describes how to install an X75HD/X75SD unit in a standard 19-inch rack using the provided front-mounting ears, rack support brackets, and cable relief bar.

1.  Locate two sets of rack support brackets in the packing box, along with the cable relief bar and the provided screws.

    Each support bracket comes in two pieces and requires assembly. The cable relief bar is a single piece. (See Figure 4-1.)
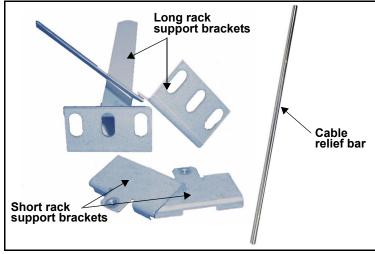


**Figure 4-1.** Rack Support Brackets

2.  Attach the short rack support brackets to the sides of the X75HD/X75SD frame using the screws that are provided in the frame holes. (See Figure 4-2 on page 85.)

**Installing short rack support bracket**
Remove this screw from the frame, place the
short bracket over the hole, and then secure
the bracket to the frame with the screw.
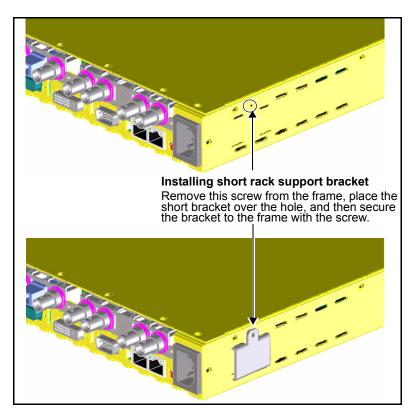
**Figure 4-2.** Location of Short Bracket Support Screw

3. Attach the cable relief bar between the long rack support brackets
   using the provided screws.

   You can secure the cable relief bar through any of the screw holes
   on the rack support bracket. (See Figure 4-3.)



**Cable relief bar**   **Long rack
                        support bracket**

**Inside view**
(between support
brackets)              **Outside view**

Secure the cable relief bar to the long rack support
bracket through any of the bracket's screw holes.
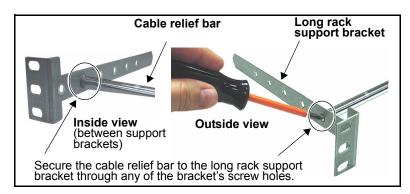
**Figure 4-3.** Installed Cable Relief Bar

4. Using the screws that are provided, attach the ends of the rack support brackets to the rear of the rack.

   Ensure that the holes on the rack support brackets face outward, away from the frame. (See Figure 4-4.)



**Long rack support bracket**

Secure this end to the rack.

Holes point away from the frame (for example, this bracket will support the right side of the frame, rear view).
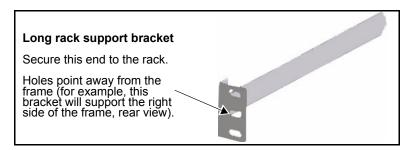
**Figure 4-4.** Long Rack Support Bracket

5. Push the X75HD/X75SD into the front of the rack, ensuring that the rack support brackets slide into the slotted rack supports. (See Figure 4-5.)



Slide the frame onto the installed rack support brackets, ensuring that the long brackets slide into the short, slotted brackets attached to the frame.
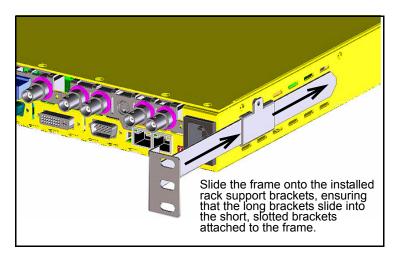
**Figure 4-5.** Installed Long and Short Rack Support Brackets

6. Attach the frame's front-mounting ears to the rack using the appropriate rack screws.

# Making Cable and System Connections

Some connections to the X75HD/X75SD are provided via supplied breakout cable(s), while others are made directly to the frame via single-link cabling. Figure 4-6 identifies the various connectors on the X75HD/X75SD back panel:
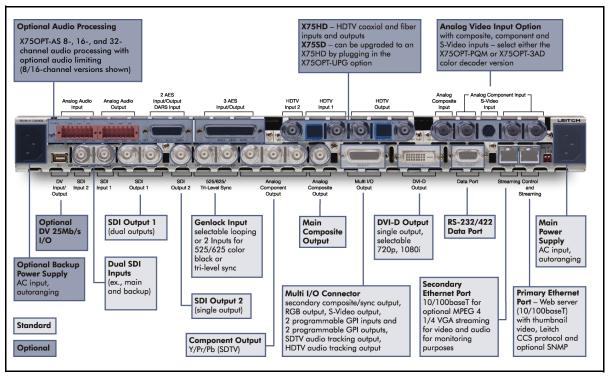


**Figure 4-6.** X75HD/X75SD Back Panel

When making cable connections, maintain approximately 10 in. (25 cm) of slack in the rear connecting cables (wrap or tie extra cable around the cable relief bar). This allows you to pull the frame out from the rack for servicing without needing to remove any cable connections.

# Multi-Purpose Breakout Cable and Connections

The optional X75OPTCAB-MULTI breakout cable connects to the high-density DB-26M connector on the back of the unit labelled Multi I/O. Input connections include GPI 1 and GPI 2. The cable provides the following output connections:

- S-video (Y/C)
- RGB (Blue, Green, Red)
- Aux Composite or Sync
- GPI 1 and GPI 2
- SDTV audio delay
- HDTV audio delay.

For pinout descriptions of this cable, see "Individual Cables" on page 221.

### S-Video (Y/C) Output

This four-pin mini-DIN connector on the Multi I/O breakout cable provides processed, synchronized/time base-corrected S-video (Y/C) output.

### RGB (Blue, Green, Red) Video Output

These Red, Green, Blue, and Sync BNC connectors provide processed, synchronized/time base-corrected RGB(S) (RGB with auxiliary sync) video output. You can turn all three RGB channels' sync signals on or off independently. If RGB without auxiliary sync is sufficient, reassign the Sync/Composite connection as an auxiliary composite output.

### Synchronized Composite Output

As described above, you can reassign the sync composite connection on the Multi I/O breakout cable. This capability is set by the **Aux Sync/Comp** option in the **Video Setup** menu.

### GPI 1 and GPI 2 Input/Output

To use a GPI-based external controller as a trigger for internal functions of the X75HD/X75SD unit, use the two RCA jack GPI inputs provided on the Multi I/O breakout cable. To configure the function triggered by each GPI input, navigate to **System Config** > **Setup** > **GPI Input**.

To trigger external devices, use the two RCA jack GPI outputs provided on the Multi I/O breakout cable. Configure the functionality of this output by navigating to **System Config** > **Setup** > **GPO Output**.

## SD Audio Delay Output

This BNC connector provides the varying width TTL pulse that is directly proportional to input-to-output propagation delay of the selected SDTV signal path. Some external audio synchronizer devices can use this pulse signal to auto-synchronize the audio signal to the video.

## HD Audio Delay Output

This BNC connector provides the varying width TTL pulse that is a direct output from the HDTV frame synchronizer output. The pulse width is directly proportional to the frame synchronizer's input-to-output propagation delay. Some external audio synchronizer devices can use this pulse signal to auto-synchronize the audio signal to the video.

# Video Connections

The following are direct single-link video connections (not via breakout cables) visible on the rear of the X75HD/X75SD.

### Digital Video Input

This six-pin IEEE-1394 connector, labelled **DV**, is reserved for future use.

### Serial Digital Input

These BNC connectors, labelled **SDI In 1** and **SDI In 2**, accept serial digital ITU-R BT.601 video and embedded audio data at a rate of 270 Mb/s. SDI In 1 has a relay bypass capability to SDI Out 1.

### Serial Digital Outputs

These BNC connectors, labelled **SDI Out 1** and **SDI Out 2**, provide the processed and synchronized serial digital ITU-R-BT.601 video and embedded audio at an output rate of 270 Mb/s.

### HDTV Serial Digital Inputs

There are three HDTV video input connectors on the X75HD frame that allow for three possible input choices. Choose from **HD-Fiber**, **HD In1**, or **HD In2**.

### HDTV Serial Digital Outputs

There are three available outputs on the X75HD frame: **HD Fiber**, **HD Out1**, and **HD Out2**. All three outputs will contain the same content.

### Genlock Input

X75HD/X75SD models accept NTSC, PAL-B and Tri-Level Sync as the reference sources to provide the stable clock-to-output signals. The two **Genlock** BNC ports can be set either to **Loop-Thru** or **Split** operation. You can select any feed for the **Tri-Level Sync**, but in **Split** mode operation, you must select the port at which the signal is connected. To select the port, follow **Reference Setup > GL Source Config**. All other genlock parameters are accessible in the **Reference Setup** menu.

There are three genlock connection modes: **Loop-thru**, **Split-525**, and **Split-625**.

- **Loop-thru** disconnects the internal terminations, connects the loop-through path and feeds the looped signal to the genlock subsystem

- **Split-525** disconnects the loop-through path and connects the terminations to both ports (the genlock source becomes the 525 Genlock BNC connector)

- **Split-625** disconnects the loop-through path and connects the terminations to both ports (the genlock source becomes the 625 Genlock BNC connector)

The genlock signal must be a stable, time base-corrected source, such as color bars or black burst. You can choose one of the following reference sources for the frame:

- **External** reference input (either color black or tri-level sync)

- **Freerun** (the internal clock generated by the X75HD/SD)

- Any video input, including **SD-SDI 1**, **SD-SDI 2**, **HD**, or **Analog Video**.

  When the input video is selected as the reference source, the unit runs in one clock system; therefore it is in the *delay* mode rather than the synchronization mode.

The **GL Standard Set** parameter selects the operational video standard mode for the genlock circuitry. You can manually force it to a specific standard to match the source being fed into the Genlock port, or set it to **Auto** to let X75 unit to automatically detect and configure its circuitry.

When a valid signal is connected to the genlock input, all video outputs from the X75HD/SD will be genlocked to this signal. When this occurs, the **Genlock** LED will be lit. When no external reference is supplied to the genlock input, the unit will operate using its own internal clock source.

## Component Analog Video Outputs

These three BNC connectors, labeled **B-Y**, **R-Y**, and **Y Out**, are used to output the signals to analog component devices, such as Betacam VTRs.

## Composite Video Output

This BNC connector, labeled **Composite Out**, provides processed, synchronized versions of any of the input signals.

**DVI Output**

>This connector, labelled **DVI-Out**, is a digital-only transmitter that provides up to 330 MHz bandwidth signal and supports 1080i/59.94, 1080i/50, and 720p/59.94, and 720p/50 outputs. From this output, connect the optional X75OPTCAB-DVI DVI-D to DVI-D (digital, single-link) cable to your DVI monitor.

**Composite Video Input**

>This BNC connector, labelled **Cmpst In**, is used to feed composite 1 V pk-to-pk 75Ω video to the X75HD/X75SD. The input video signal must be direct color or monochrome (such as from a satellite feed or live camera).

**S-Video Input**

>This four-pin mini-DIN connector, labelled **S-Video**, is used for S-video (Y/C) signals, such as from an S-VHS or Hi-8 device. The internal time base corrector automatically processes any signal received at this port.

**Component Analog Video Inputs**

>These three BNC connectors, labeled **Y In**, **R-Y In**, and **B-Y In**, are used to input the signals from analog component devices, such as Betacam VTRs.

>If component analog video input is not needed, the **CAV-Y In** connection can be reassigned as a second composite video input with the **CAV-Y Composite** option in the **Video Setup/Analog Input/Proc** menu (see "Chapter 8: Video Configuration" on page 155).

# Audio Connections

A variety of X75HD/X75SD audio packages are available, as shown in Table 4-1.

**Table 4-1.** Audio Connection Packages

| Model | Features |
|---|---|
| X75HD-AV models (including X75OPT-AS-16) | • 4 analog mono channels in and out<br>• 2 AES in and out<br>• SDTV embedded (4 groups)<br>• HDTV embedded (4 groups) |
| X75SD-AV models (including X75OPT-AS-8) | • 4 analog mono channels in and out<br>• 5 AES in and out<br>• SDTV embedded (4 groups)<br>• HDTV embedded (4 groups) |
| X75HD or X75SD with X75OPT-AS-32 | • 8 AES in and out<br>• SDTV embedded (4 groups)<br>• HDTV embedded (4 groups) |

## DARS Inputs

The DARS input is available on the DB-26 connector.

The **DARS Bal/UnBal Sel** parameter selects between the unbalanced (coax) and balanced (XLR) type of connection. Primarily, the DARS (Digital Audio Reference Signal) is used for the audio synchronization.

## AES/EBU Outputs

The **AES1** and **AES2** outputs are available on the DB-26 connector.

The **AES3**, **AES4,** and **AES5**; and **AES6**, **AES7**, and **AES8** outputs are available on the DB-44 connectors.

Both the unbalanced (coax) and balanced (XLR) AES audio signals are present at all time on both D-Sub connectors.

The **AES# Bal/UnBal Sel** parameters select between the unbalanced (coax) and balanced (XLR) type of connection. Only one input connection type is supported.

### Analog Audio Inputs and Outputs

Four channels (two stereo pairs) of analog audio inputs and outputs are supported on the 8- and 16-channel audio modules (no analog audio is supported on the 32-channel version). The analog audio input and analog audio output connectors are labelled **In CH1** to **In CH4**, and **Out CH1** to **Out CH4**, respectively. Each balanced analog audio input channel can be configured as 600Ω or high impedance.

Two analog audio receptacles (included with purchase of an X75OPT-AS-16 or X75OPT-AS-8 module) must be plugged into these connectors before configuration. See "X75OPT-AS-32, X75OPT-AS-16, or X75OPT-AS-8-L Audio Limiters" on page 67 for more information.

# Remote Control Ports

Supported remote control methods include the following:

- 10Base-T or 100/Base-T Ethernet (used for control through a TCP/IP-based network) using a CCS™ (Command and Control System) application such as Pilot or Navigator, or using a controller such as the X75-RCP remote control panel or an X75HD/X75SD local control panel

- Web browser program such as Internet Explorer™ or Netscape™

- SNMP (Simple Network Management Protocol) and third-party control software through Leitch CCS Protocol

- GPI (General Purpose Interface) input/output used for remote triggering of functions such as Freeze or triggering of external devices

### Ethernet Ports

The 10/100Base-T Ethernet connector, labelled **Ctrl/Strm**, connects X75HD/X75SD models to a TCP/IP-based network for remote control and status monitoring. Web-browsing software, an X75-RCP remote control panel, or a frame-mounted local control panel then control the unit. See "Configuring for HTTP Control via Web Browser" on page 110 for details about controlling the unit from your Web browser.

When using Ethernet, you must configure the IP Address, Subnet Mask, and Default Gateway settings of the unit for your network; your network administrator can provide you with these settings. The network settings are located in the **System Config > Setup** menu. When all the changes are made, the **Save IP** function must be performed to actually save the changes in non-volatile memory.

A second port, labelled **Streaming**, is activated when the optional X75OPT-STR module is installed. For more details, see "X75OPT-STR Module and Back Panel" on page 77.

# Initial Configuration

# Overview

This chapter describes the various configurations and settings that are required before you begin operating the X75HD/X75SD. Although you can modify all parameters and settings at any point during operation, there are certain control options and configurations that you need to set first, including those listed below:

Unless otherwise specified, instructions in this chapter are provided for making changes via a local or remote control panel.

For more details on using local and remote control panels, see the *Control Panels for X75 Systems Installation and Operation Manual*.

# Initial Power-Up and Control Steps

1. If you have an X75OPT-AS-8/16 audio option card, ensure all jumper settings have been made. (The X75OPT-AS-32 module does not require jumper settings.)

   See "X75OPT-AS-32 /X75OPT-AS-16 /X75OPT-AS-8 Modules and Back Panels" on page 62 for details about the jumper settings.

   The X75OPT-AS-8/16 audio module is shipped with the following jumper settings: 100 kΩ for input impedance, and 66Ω for output impedance. If 600Ω impedance is required, all input and output jumpers should be placed on pins 1 and 2.

2. Install the X75HD/X75SD in a rack and make the required system connections (see the instructions beginning on page 84).

3. Plug the unit into a grounded electrical source.

   The unit is factory configured with default settings, including the following network settings:

   - IP address: 192.168.100.250
   - Subnet mask: 255.255.255.0
   - Gateway: 192.168.100.250
   - Machine name: Leitch X75

   (Upon request, Leitch can preconfigure X75HD/X75SD systems with specific IP addresses and network settings. Please contact your Leitch customer service representative for more details.)

4. Using a frame-mounted local control panel, configure the network settings for each system by assigning a unique IP address to each unit, configuring the subnet mask to be the same for all units on a shared network, and changing the gateway if required (see "Configuring Network Settings" on page 100 for details).

5. If you are controlling the unit remotely via remote control panel, make the required Ethernet connections (see "Remotely Controlling X75HD/X75SD Systems" on page 107 for details).

6. If you are controlling the unit via a third-party Web browser, launch the Web browser (see "Configuring for HTTP Control via Web Browser" on page 110 for details).

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### 📝 Note

The current system IP address and network settings can be viewed on a local or remote panel VFD screen. If you do not have access to a control panel, and cannot remember the set IP address of your system, see "Forgotten IP address" on page 240 for more information.

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7. If you are controlling the unit via a third-party SNMP browser, make the appropriate connections and download/configure the appropriate MIB and SNMP agent files (see "Configuring SNMP Support" on page 331 for details).

8. Configure your video (and audio) input settings prior to operation (see "Configuring Video" on page 117 and "Configuring Audio" on page 119 for details).

# Configuring Network Settings

When shipped, the X75HD/X75SD is configured with a default IP address, subnet mask, and default gateway. If you intend to control the unit remotely, or connect it to a network hub/switch along with other X75HD/X75SD units, you will need to reconfigure the IP with unique network settings. Local control (with a direct Ethernet crossover connection to a PC) does not require any IP configuration.

## Supported Network Protocols

The X75HD/X75SD supports the following network protocols for remote/network control:

- Leitch CCS Protocol (for example, using an X75-RCP remote control panel).

  See "Remotely Controlling X75HD/X75SD Systems" on page 107 for details.

- HTTP (for example, using a Microsoft Internet Explorer 6.0).

  See "Configuring for HTTP Control via Web Browser" on page 110 for details.

- SNMP (for example, using NuDesign Visual MIBrowser Pro 3.1).

  See "Configuring SNMP Support" on page 331 for details.

## Making Required Hardware Connections

If you are connecting an X75HD/X75SD directly to a PC (no network connection), connect one end of a crossover Ethernet cable to the **Ctrl/Strm** RJ-45 port on the back of the X75HD/X75SD, and the other end to the PC **Ethernet** port.

If you are establishing a network connection, connect a straight-through 10/100Base-T Ethernet cable between the X75HD **Ctrl/Strm** port and the network hub/switch.

# Setting IP and Subnet Mask Addresses

To allow devices to communicate on a network, you need to set all devices to the same subnet (network location). When shipped, X75HD/X75SD units are configured with the same default IP (device identifier) and subnet addresses. These addresses need to be changed so that each unit is uniquely identified and the network location of all units is accurately reflected.

An IP address is made up of a four-item set of numbers (octet). The default (factory-configured) IP address for every X75HD/X75SD unit is **192.168.100.250**. For a class C network, you must change the first three items in the octet to identify the location (address) of the unit on your network, and also change the last item in the octet to uniquely identify the device from other X75HD/X75SD units.

The default subnet mask address for every X75HD/X75SD is 255.255.255.0.

## Setting the IP Address of a Single Unit with LCP or RCP

Follow these steps to configure the network addresses using a local or remote control panel:

1. Apply power to the RCP or the LCP-enabled X75HD/X75SD unit.

   When ready for configuration, the X75HD/X75SD main menu shows on the display screen.

2. Follow this path: **System Config** > **Setup** (in the RCP, select **Device Setup**).

3. Scroll to the **Device IP** parameter, and then press **Enter**.

   If this is a new unit being configured, the default IP displays. Otherwise, the current IP address of the unit displays.

4. Change the IP address by following these steps:

   a. Press **Enter** to navigate to one of the four number sets in the octet.

   b. Modify the address value by using the scroll knob to set a new number.

   c. Press **Enter** to move to the next item in the octet, and then repeat step (b) above.

   d. Press **Exit** when you are finished configuring the address.

5.  Scroll to the **Subnet Mask** parameter, and then press **Enter.**

    If this is a new unit being configured, the default subnet mask displays. Otherwise, the current subnet displays.

6.  Repeat the procedure described in step 4, this time for the subnet mask.

7.  Scroll to the **Gateway** parameter, and then press **Enter**.

    If this is a new unit being configured, the default gateway displays. Otherwise, the current gateway address displays.

8.  Repeat the procedure described in step 4, this time for the gateway parameter.

9.  Select **Save IP**, and then press **Enter**.

10. Select **Yes** option and then press **Enter**.

11. Press **Exit** to return to the **Setup** menu.

12. Navigate to the **Setup** menu, select **Reboot**, and then press **Enter**.

    To restart an X75HD/SD unit with a blank front panel, unplug it and then reapply power.

### Setting the IP Addresses of Multiple Units

If you have multiple X75HD/X75SD systems that require network configuration, you will need to set unique IP addresses and assign a subnet mask and gateway address for each of them one at a time. The following procedure summarizes the required steps:

1.  Apply power to the first X75HD/X75SD unit with a frame-mounted local control panel.

    When ready for configuration, the main X75HD/X75SD menu shows on the display screen.

2.  Configure the network settings for this unit, as described in the procedure on .

3.  Restart the X75HD/X75SD unit.

4.  Plug in the next X75HD/X75SD system, configure its network information, and then restart the unit.

    Follow this procedure for all remaining X75HD/X75SD units that require configuration.

5.  If you will be using a remote panel, configure the RCP's network settings in the same way as you would for an X75HD system (see ).

6. Connect all X75HD/X75SD systems and remote panels to a network hub or switch using a 10/100Base-T Ethernet cable.

7. Ensure that all configured X75HD/X75SD units are detected on the network.

   To do this, press **Remote** on the front panel of either an RCP or a frame-mounted local control panel. All units configured with the same subnet mask address will display (you will see a list of all detected IP addresses).

   If a unit or RCP is not detected, ensure that the subnet mask address is accurate. Alternatively, confirm that all units were restarted after configuring any network settings.

## Note

If configured to be on the same network, the following items will be detected: X75HD/X75SD systems, X75-RCP panels, and any DPS-575 systems.

# Changing the PC Network Settings

In unusual situations, such as correcting a failed software upgrade, you may need to change your PC network settings. Follow these steps to change the settings:

1. Change the IP Address of the PC to match that of the X75HD/X75SD, by following theses steps:

   a. Click **Start > Settings** and then click **Control Panel**.

      This opens the Control Panel window.

   b. Double-click **Network and Dial-up Connections,** and then double-click **Local Area Connection.**

   c. Click the **General** tab, and then click **Properties**.

      This opens a new **Local Area Connection Properties** window.

   d. On the **General** tab, select **Internet Protocol (TCP/IP)**, and then click **Properties**..., ensuring you are working on the correct Ethernet adapter for the CCS network.

      The IP Address of the **Internet Protocol TCP/IP Properties** box appears.

      Figure 5-1 shows the portion of the Internet Protocol TCP/IP Properties box where you enter the IP Address, Subnet Mask, and Default Gateway of your PC.
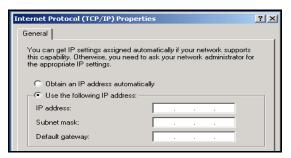


**Figure 5-1.** Portion of IP Address Box

   e. Note whether **Obtain an IP address automatically** is selected.

      You may need to re-select this option later when you revert back to the original PC IP Address.

f.   Select **Use the following IP address**, and in the **IP address** box, type a new computer IP Address to match the first three octets of the IP Address of the X75HD/X75SD, and then add a different fourth octet.

(For example, if the X75's IP Address is 192.168.100.50, you could type 192.168.100.181).

g.   In the **Subnet Mask** field, type: `255.255.255.0`

This value applies to Class C IP addresses; confirm the number with your network administrator.

h.   Enter the same **Default Gateway** number as the one on the X75HD/X75SD, or leave blank.

i.   Click **OK** to close the **TCP/IP Properties** box, and then close the two **Local Area Connection** boxes.

2.   Verify the network settings were accepted by following the ipconfig procedure, as described below:

a.   Click **Start**, point to **Programs** > **Accessories** and then click **Command Prompt** to open the **Command Prompt** window on the PC.

b.   Type the following at the MS-DOS command prompt, and then press ENTER:

`ipconfig`

The IP Address, Subnet Mask, and Default Gateway of the PC appear. (In some situations, the Default Gateway value is not shown. See Figure 5-2.)



**Figure 5-2.** IP Address, Subnet Mask and Default Gateway of PC

c.  Write down the IP Address, Subnet Mask, and Default Gateway numbers of your PC.

d.  Compare the network numbers of the X75HD/X75SD, with the numbers found in step 2c.

In general, the two Subnet Mask and Default Gateway numbers should be identical. The first three octets of the two IP Addresses also are generally identical. For example, if the X75HD/X75SD has an IP Address of 192.168.248.50, the PC could have an IP Address of 192.168.248.181.

3.  If the network settings match, click **Close**.

# Remotely Controlling X75HD/X75SD Systems

This section provides the following general configuration procedures:

- "Preparing for Remote Control via Control Panel" (below)
- "Selecting a Remote Unit to Control" on page 108

See your *Control Panels for X75 Systems Installation and Operation Manual* for more information about using an X75-RCP remote control panel.

## Preparing for Remote Control via Control Panel

### 📝 Note

A frame-mounted local control panel can also remotely control other networked X75HD/X75SD units. Procedures described in this section also apply to local panel control. See "Using a Frame-Mounted Local Control Panel for Remote Operation" on page 109 for more information.

Control panels remotely control X75HD/X75SD units via broadcast. Switchers and routers in the network need to be configured accordingly. Follow these steps to prepare your X75HD/X75SD models for remote control:

1. Using an LCP, reconfigure each X75HD/X75SD and X75-RCP unit with unique IP addresses and other appropriate network settings, including shared subnet mask addresses.

   See "Setting IP and Subnet Mask Addresses" on page 101 for details.

2. Restart each X75HD/X75SD and X75-RCP unit, and then wait 20 seconds to allow for network detection.

3. Connect all X75HD/X75SD systems and remote panels to a TCP/IP-based network hub or switch using 10/100Base-T Ethernet cable.

   On X75-RCP units, use the **Control** connector; on X75HD/X75SD units with frame-mounted local control panels, use the **Ctrl/Strm** port at the back of the X75HD/X75SD unit.

4. Discover all units found on the network, and then select the one you wish to control. See "Selecting a Remote Unit to Control" on page 108 below for details.

# Selecting a Remote Unit to Control

You can remotely control all X75HD/X75SD systems that share the same subnet, using an X75-RCP panel or a frame-mounted local control panel. Both examples of remote control are described in the sections that follow.

## Using an X75-RCP for Remote Operation

Follow these steps to select and control a detected X75HD/X75SD over the network:

1. Ensure all connections and network settings have been made.

2. On the X75-RCP, press the **Remote** button to bring up a list of available units for control (see Figure 5-3).



**Figure 5-3.** List of Systems Available for Remote Control

The **<local device >** option shown on-screen represents the unit you are using (the local unit that is in front of you), and is always available on this list. An asterisk (**\***) beside the name indicates that this is the remote system currently being controlled by the panel.

3. Use the control knob to scroll through the list of available X75HD/X75SD devices, highlight the unit you wish to control, and then press **Enter**.

The X75-RCP screen reads **Connecting...**

4. Wait a few moments.

   The menu of the selected X75HD/X75SD unit appears along with all of that unit's settings.

5. Operate the selected unit as required.

   Once a unit is selected for remote control, all front panel features operate as if you were actually at the front panel of the selected remote unit. This means that the VFD panel, status indicators, and buttons (with the exception of the **Remote** and **Option** button) all control and/or reflect the status of the remote unit, *not* the one you are physically operating.

6. To switch to another unit, or to control the local device you are physically operating, click **Remote**, and then select a new device to control.

7. Select **<local device >** to resume normal single-unit operation.

**Note**

The light on the **Remote** button flashes while the unit is remotely controlling a device.

### Using a Frame-Mounted Local Control Panel for Remote Operation

After ensuring that all connections and network settings have been made, you can also remotely control X75HD/X75SD units that are on the network using a frame-mounted local control panel. To do this, click **Remote** on the LCP to enter Remote mode, and to view the list of X75HD/X75SD units available for control on the same subnet. The procedure remains the same for selecting and operating devices remotely via the LCP, as it does for the X75-RCP.

# Configuring for HTTP Control via Web Browser

Once the networking parameters of the X75HD/X75SD have been configured appropriately, and it is connected to the Ethernet network, the built-in Web server allows a standard Web browser to control the X75HD/X75SD unit. Before controlling your unit in this way, note the following system and browser requirements:

- The X75HD/X75SD supports Web browsers that are compatible with HTML 4.0 (and later).

- Although most standard Web browsers can be used with the X75HD/X75SD for HTTP control, the following browsers have been tested and approved by Leitch: Microsoft® Internet Explorer 6.0, Netscape® Navigator™ 7.2, and Mozilla® Firefox™ 1.0.

### Procedure

To select a unit for control, follow these steps:

1. Ensure all required connections and network settings have been made locally on your X75HD/X75SD unit(s).

2. Open a supported Web browser, and then type the IP address of the unit you wish to control into the **Address**, **Location**, or **URL** field of your Web browser (the name of the field depends on the Web browser you are using). For example, type the following to control an X75HD/X75SD unit with this IP address:

   ```
   http://192.168.100.250
   ```

   The Web browser then displays the Home page of the X75HD/X75SD Control interface (Web server).

See for more information.

## ✎ Note

Web browser control is only available for X75HD/X75SD units, and not for X75-RCP panels.

# Configuring for CCS Software Control

The Windows-based CCS software applications, such as Pilot and Navigator, provide control of the X75HD/X75SD via a Windows-based PC and enables you to accomplish these tasks:

- Discover remote CCS devices dynamically on your CCS network without knowing their IP addresses
- Build custom hierarchical views of the distributed network for each network user, using icons, colored text, and other visual information
- Design, model, and test your CCS system
- Set up user accounts and groups with different access rights to CCS devices and their control parameters
- Centrally navigate, control, and monitor CCS devices over a local- or wide-area network
- Set alarms to signal visual, auditory, or e-mail alerts when CCS devices go off-line or malfunction
- Transfer software upgrades to CCS devices
- Diagnose and correct problems with the CCS network or devices
- Monitor the integrity of video signals throughout a facility
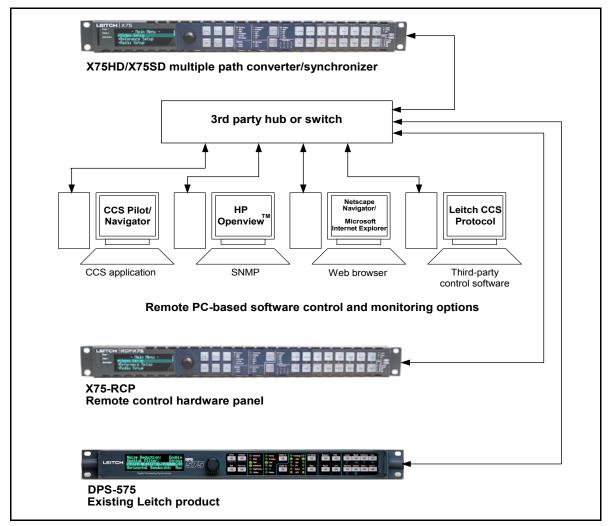
**Figure 5-4.** Network Configuration Diagram

# Configuring for SNMP and Third-Party Software Control

SNMP is an industry-standard protocol that allows other (non-Leitch) control software to remotely monitor and control X75HD/X75SD units. Leitch provides a MIB file that you can download off the Leitch Web site for this purpose. The file defines the parameters of the X75HD/X75SD, and is required for third-party software control.

See "Configuring SNMP Support" on page 331 for details.

# Processing Modes

## General Information

> **📝 Note**
>
> If you are missing certain option modules, the corresponding outputs will not be available.

Video M-Path configuration is performed on the following groups of video outputs:

- Analog (includes five analog output types: composite, CAV (Y, B-Y, R-Y), S-video, RGB, Aux-composite)

- HD (with various options, such as HD 1, HD 2, HD-Fiber, and DVI/HD)

- SD-SDI 1

- SD-SDI 2

- StrV (streaming video

These output groupings are used for configuration purposes. You can individually set each of these output groups to accept a specific input source. In addition, there are four special routable blocks in the SDTV video configuration path that may be included in the input path for any input signal.

Alternatively, you can use the **AllOutSelect** parameter to select an input source for all output groups simultaneously. Table 5-1 summarizes the video output groups and available input sources.

**Table 5-1.** Video Output Groups and Available Video Input Sources

| Output Groups | Physical Outputs Forming Part of this Output Group | Input Source to Assign to Each Output Group |
|---|---|---|
| • Analog<br>• HD<br>• SD 1<br>• SD 2<br>• StrV | • Composite, CAV, S-Video, Aux, RGB<br>• HD 1, HD 2, HD Fiber, DVI<br>• SDI 1<br>• SDI 2<br>• Streaming and future-use DV | • Composite<br>• S-Video<br>• CAV<br>• SD 1<br>• SD 2<br>• DV (future use)<br>• HD Fiber<br>• HD 1<br>• HD 2 |

# Input Video Modes

## ≡✎ Note

Precedence levels that can be assigned include **Highest**, **High**, **Normal**, **Low**, and **Lowest**. (For example, if the X75HD/X75SD unit detects two input signals, it will accept an HD signal tagged **Higher** over an SD-SDI signal that is tagged **Normal**.) See for more information.

The **Input Video Mode** for manual configuration is **M-Path (User)**. In this mode you assign input sources to each output group. However, if you set the **Input Video Mode** to **Auto Detect**, the X75HD/X75SD system will automatically detect the incoming input signal(s) and then send it to all output groups.

In the default **Auto Detect** mode, the X75HD/X75SD senses the presence of valid input signals, and then processes them to all outputs. This mode is a useful redundancy feature: If one input signal disappears, the X75HD/X75SD will automatically switch to **AllOutSelect** control, and will process whatever input is detected and send it to all outputs. If the X75HD/X75SD detects more than one valid input, it will refer to the precedence order set by you in the **Auto Detect Setup** submenu, or it will apply the default priority order.

A third input video mode is **Simulcast Enable**. In this mode you can assign two different input sources to selected output groups for the purpose of switching between the sources. In most instances, you would use a GPI control to switch between the selected input sources at the required time. When you change an input source, the **AllOutSelect** control also changes the output mappings accordingly.

# Configuration Exceptions and Further Information

There are a few exceptions to the input source/output group mapping process described in the previous sections, including the following:

- "Mutually Exclusive Inputs"
- "AllOutSelect Limitations"
- "SD-ARC Limitation"
- "Strobe or Film Mode and Closed Captioning"

## Mutually Exclusive Inputs

Several input settings are mutually exclusive. For example, the back of the X75HD/X75SD allows for up to three HD input sources; however, only one of these input sources can be accepted at a time. In this example, all output groups must be set to the same HD input type, *not* to three different input types. If you attempt to map different HD inputs to various output groups, only the last setting you make will apply. Previous HD input mappings will change to reflect the last setting.

This scenario of mutually exclusive HD inputs also applies to the following input types:

- SDI 2 and future-use DV
- Analog (Composite, CAV, and S-video)

These groupings are not independent inputs. Only one input type in each of these groups can be selected for each output group.

## AllOutSelect Limitations

The **AllOutSelect** control lists all available input sources. But in cases where you have manually assigned different input sources to various output groups, **AllOutSelect** will not able to reflect a single input type. Instead, **M-Path** control becomes selected.

As soon as you manually configure any of the **M-Path** menu output groups, **AllOutSelect** control will change over to the **M-Path** control.

Note that if you change **AllOutSelect** to a single input type, and you return to **AllOutSelect** control, all manual changes done previously during **M-Path** configuration will be overridden.

## SD-ARC Limitation

When SD-ARC selects one of the standard definition inputs, it uses the data path from the main board to the HD board for SD aspect ratio conversion. The same data path is also used for the up-conversion. Due to this limitation, when the HD output selects any one of the standard definition inputs, the software also changes the SD-ARC source selection.

## Strobe or Film Mode and Closed Captioning

The SDTV Strobe or Film mode does not support the passing of the closed captioning data to the outputs, as this process does not guarantee the continuation of the metadata.

# Configuring Video

## Selecting a Video Source

> ### 📝 Note
>
> If you press the **Video In** button and then manually select a video source, the X75HD/X75SD unit reverts to **User-Select** mode. Video modes are found under **Routing Setup** > **Input Video Mode**.

X75HD/X75SD units are shipped with **Auto Detect** video mode as the factory default setting. This mode sets the X75HD/X75SD to automatically detect composite, S-video, CAV, SD-SDI 1, SD-SDI 2, future-use DV, HD-SDI Fiber, HD-SDI 1, and/or HD-SDI 2 inputs. When video is connected to any of these inputs, the X75HD/X75SD automatically selects the applied input video and then sends out the converted video to all outputs. The **Video Input** LEDs on the front panel show the selected video source. For information on certain exceptions and limitations applied to video source selection, see "Mutually Exclusive Inputs" on page 115.

For analog video sources, only a single video source can be automatically detected. Therefore, you must pre-select the desired analog input video source first in order for auto-detection to work across the HD-SDI/SD-SDI/analog inputs.

To change the input signal type, follow these steps:

1. Press **Video In** on the control panel, or navigate to the **Video Setup > Routing Setup** menu and then select **AllOutSelect**).

   All available inputs will display on the control panel screen.

2. Using the control panel knob, scroll through the list of input types, and then press to **Enter** to select one.

When multiple video sources are connected, the **Auto Detect Setup** menu determines the selection of the input video. For example, if the X75HD/X75SD unit detects two input signals, it will accept the signal tagged as **Higher** over another lower-precedence signal. Found in the top-level **Video Setup > Routing Setup** menu, precedence levels include **Highest**, **High**, **Normal**, **Low**, and **Lowest**. When multiple input types are present and assigned the same precedence level, the X75HD/X75SD uses the following default ordering:

1. Analog video input
2. SD-SDI 1 input
3. SD-SDI 2/DV input
4. HD-SDI 1/HD-SDI Fiber input
5. HD-SDI 2 input

Using the **Video Switch Delay** parameter in the **Video Setup >
Routing Setup > Auto Detect Setup** menu, you can enter the delay
value in seconds to prevent inadvertent switching of the input video
sources. Figure 5-5 graphically illustrates a single-source signal
process, where one selected video input is fed to all outputs.
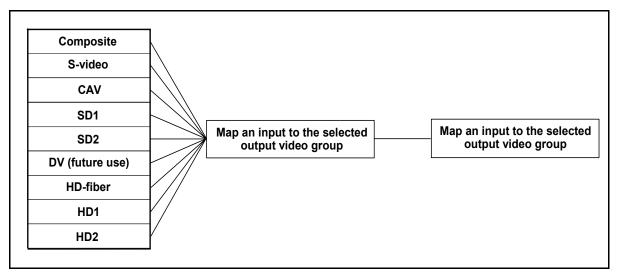


**Figure 5-5.** Single Source Processing

# Adjusting Video Levels

Various control panel buttons provide quick access to the video
processing parameters of a selected video source. Simply press a button
and use the control knob to change the selection. For more information
on configuring video, see "Video Configuration" on page 155.

For more information on using a local or remote control panel, see
"Chapter 6: Operation via Front Panel Controls" on page 127 or refer to
the *Control Panels for X75 Systems Installation and Operation Manual*.

# Configuring Audio

This section briefly describes how to select a single audio source and how to quickly adjust audio levels. For more information about audio configuration, see "Audio Configuration" on page 163.

For more information on using a local or remote control panel, see "Operation via Front Panel Controls" on page 127 or refer to the *Control Panels for X75 Systems Installation and Operation Manual*.

## Selecting an Audio Source

Directly press the **Audio In** button to select any *one* set of audio inputs to be sent out to *all* audio multiple output sets. The LEDs to the top, right side of this button indicate which input is currently selected.

## Adjusting Audio Levels

When a single audio source is selected and sent to all outputs, press the **Ctrl** and **A. Proc** buttons to quickly access the audio level controls of the selected audio input.

The selected audio input channels' gain controls are mapped to the numbered buttons on the control panel accordingly. The mapped buttons will illuminate during audio proc control. The **Audio Proc** LEDs on the lower, right corner of the front panel indicate which processing block is currently selected.

## Tracking and Delaying Audio

Each audio sample rate converter (SRC) can be configured to automatically track the processing delay of one of the video outputs. To apply the internal audio tracking feature, follow this path: **Audio Setup > Global Audio Config > I/O Delay Config**. Select one of the four or eight **I/O Delay SRC**s, and then select the accompanying video signal to track with that audio SRC.

# Configuring the GPI

The GPI inputs are internally pulled HIGH. External contact closure to ground will trigger the assigned function set by the user.

In the **System Config > Setup** menu, the two **GPI-1 Function** and **GPI-2 Function** parameters allow the selection of pre-defined or user assigned GPI functions:

- Disabled—No action will be taken
- Freeze—Will freeze all the internal frame synchronizers memory
- Simulcast A/B—Switches between simulcast video source A and video source B
- Voice-Over—Ramps down the program audio channels and mixes the voice-over channel to the program audio outputs.
- Fav1— Activates the GPI set parameter in the Favorite list 1.
- Fav2—Activates the GPI set parameter in the Favorite list 2.

For instructions on how to add a parameter and assign it as a GPI input in a Favorites list, see "Using the FAV1 and FAV2 Function" on page 188.

# Configuring an X75OPT-A3D-1 Module

## Note

The X75OPT-A3D-1 module requires version 1.4 or higher software installed on the X75HD/X75SD unit.

The X75OPT-A3D-1 module is similar to the X75OPT-A3D, but uses an alternate color decoder algorithm. Typically, these modules are factory installed. However, if you add a new X75OPT-A3D-1 to an existing X75HD/X75SD unit, or if the module is moved from one X75 unit to another, the module must be reconfigured.

Follow these steps to configure the X75OPT-A3D-1 module:

1. Simultaneously hold the SHIFT + CTRL + NR buttons.
2. When the Leitch logo appears on the display screen, release the buttons.

   The factory calibration mode is now enabled.
3. Follow this parameter path: **System Config > Factory > Calibration > Analog Input (A3D) > Ext Notch Filter > Enable.**
4. Press the **Exit** button twice.
5. Select **Save Cal**, and then select **Yes.**

   The X75OPT-A3D-1 module is now functional. To make the version change visible in the **Status/Version Info** menu, you must first reboot the X75HD/X75SD unit.

# Launching QuickTime Player for Streaming Video

Using the X75OPT-STR streaming option, you can play streaming video in a **Graphical Navigation** window of CCS Navigator.

You can also view the streaming video separately, without CCS Navigator. In either case, you must have QuickTime Player version 7.0 or later installed on your PC. See for more information.

## CCS Navigator Streaming Installation

To add a button to launch streaming video using CCS Navigator, follow these steps:

1.  With Navigator in Build mode, place a button on a **Graphical Navigator** page.

    For information on creating buttons, see your CCS Pilot/Navigator manual or online help.

2.  Right-click on the button and then select **Properties...** from the menu that appears.

    The **Object Properties** dialog box opens.

3.  Select the **Rules** tab, and then click the **New Rule** button.

    A new line appears in the **Rules** table.

4.  In the new rule's **Event** list, select **OnMouseClick**.

    The default **Condition** setting for this event is **Always**; you can leave that as it is, or you can change it by clicking the **Condition** button. See "Defining Conditions" in your CCS Pilot/Navigator manual or online help for information on completing the **Condition** dialog box.

5.  From the new rule's **Action** list, select **Launch Application**.

6.  Click the **Action Properties** button.

    The **Action Property** dialog box opens.

7.  Enter the following information in the **Action Property** dialog box:

    - **Command**: c:\program files\quicktime\quicktimeplayer.exe

    - **Arguments**: rtsp://172.25.101.101:554/x75streaming

    - **Initial Directory:** leave field blank

8. Click **OK** to close the **Action Properties** dialog box, and then close the **Object Properties** window.

   When you enter Control mode, the new button will open a QuickTime Player and play streaming video from the X75HD/X75SD.

# Section II—Operation

This section contains the following topics:

# Operation via Front Panel Controls

## Overview

This chapter describes the main areas of the front panel, and provides the following general descriptions:

This chapter does *not* give specific descriptions about available menus, submenus, parameters, or options. See the *X75HD Control Options* html file available from the Leitch Web site at www.leitch.com or on the accompanying X75HD/X75SD CD.

Detailed information on using front panel controls can be found in the *Control Panels for X75 Systems Installation and Operation Manual*. Some limited control information (such as information on video and audio proc amp status LEDs, and audio proc amp channel mappings) can be found in the following chapters:

# Front Panel Description

The front panel (Figure 6-1) is divided into several areas for control and monitoring, including the following:

*   VFD screen for viewing menu options, selections, feedback, and device information

    Changes to the display intensity and screen saver functionality can be made within the **Setup** submenu (press the **Option** button) in order to prolong the life of the VFD

*   Control knob and buttons for scrolling, selecting, and setting menu options

    The push and turn shaft encoder (knob) is used for menu navigation and selection, and for coarse and fine parameter adjustment; the knob direction can be changed to your preference from within the **Setup** submenu (press the **Option** button)

*   Programmable and device-dedicated control buttons

*   Status and alarm LEDs for monitoring the current mode and operating conditions of the unit

Information about each of these areas is available in this chapter.
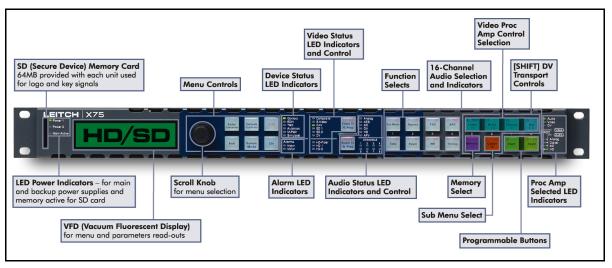


**Figure 6-1.** X75HD/X75SD Front Panel

# Using the Control Knob and Menu Control Buttons

All menus and device settings for the X75HD/X75SD can be selected and configured by using the control knob and menu control buttons. Figure 6-2 shows the location of the control knob and various menu control buttons on the device. Use these items to open and navigate menus, scroll through and select options, and adjust various parameters and settings.
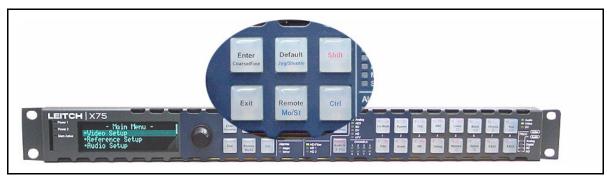


**Figure 6-2.** Control Knob and Menu Control Area

## Setting the Direction of the Control Knob

If desired, you can change the direction of the control knob. To do this, press the **Option** button, open the **Setup** menu, and then select the **Shaft Direction** parameter.

Set the direction of the knob to either **Clockwise = Up** or **Clockwise = Down**.

# Using Multi-Function Buttons

Many of the buttons on the X75HD/X75SD control panel are multi-functional, and can have up to three functions assigned to them. To select a certain function from a multi-function button, perform one of the following steps:

- Press the desired multi-function button. The assigned default function is written in *black* text on the button face, either near the top or in the middle of the button.

- Press **Shift** and the desired multi-function button simultaneously. The assigned function is written in *red* text on the button face near the top of the button.

- Press **Ctrl** and the desired multi-function button simultaneously. The assigned function is written in *blue* text on the button face near the bottom of the button.

For more information on front panel buttons, see the *Control Panels for X75 Systems Installation and Operation Manual*.

# Navigating Through the Menus

There are eight main menu items available. Each of them open up into several layers of submenus and parameter options that you can scroll through and edit as required. Table 6-1 briefly describes each of the eight main menu items.

**Table 6-1.** Main Menu Items

| Menu Name | Menu Description |
|---|---|
| Video Setup | Configures and controls the video settings |
| Audio Setup | Configures and controls the unit's audio settings |
| Reference Setup | Configures and controls the genlock and other reference settings |
| System Config | Configures settings of the initial setup parameters |
| Global Frame Rate | Sets the unit's frame rate per second |
| SD Operating Standard | Provides a read-only view of the selected or detected SD-SDI operating standard |
| HD Output Standard | Provides a read-only view of the selected HD-SDI operating standard |

**Procedure**

To navigate through the menus of an active X75HD/X75SD system, follow these steps:

1. With the X75HD/X75SD **Main** menu displayed, rotate the control knob to scroll through the menu items.

2. Press **Enter** to open a selected submenu.

3. Scroll through the options and parameters using the control knob, and then press **Enter** to make a selection.

   See "Changing Parameters" on page 132 for more information.

4. Press **Exit** to go back a step in the menu structure.

# Changing Parameters

Once you have selected an option from a particular menu or submenu, use the control knob on the front panel to set the new value for the parameter by following the methods described below.

Alternatively, you can use the X75-RCP to remotely control the X75HD/X75SD. See "Configuring Network Settings" on page 100 and "Remotely Controlling X75HD/X75SD Systems" on page 107 for more information on configuring the X75HD/X75SD for remote control.

### Setting Discrete Options

The control knob cycles through discrete parameter and value options (such as **Auto**, **On**, **Off**). Depending on the parameter type, it will either wrap or clip when the control knob reaches the end of the option list.

- A wrapping parameter returns to the beginning of its range/list of options after you have scrolled through all of them.

- A clipping parameter requires you to scroll back through the range/list of options to return to the beginning of the list.

#### Procedure

To set a discrete parameter option, follow these general steps:

1. Navigate to the required menu or submenu, and select a parameter.

2. Highlight a parameter with the control knob, and then press **Enter**.

3. Press **Exit** to accept your new value and return to the previous menu or submenu.

   Selected settings affect the output immediately.

## Setting a Numeric Value

For parameters that have a numerical range of values, the VFD panel shows both a numeric and a visual representation of the range. Figure 6-3 shows this representation.
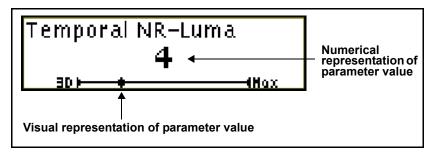


**Figure 6-3.** VFD Showing Numerical Range of Values

To set a parameter with a numerical value, follow these general steps:

1. Navigate to the required menu or submenu, and then select a parameter.

2. Change to **Coarse** adjustment mode if required (**Fine** mode is the default mode when you first enter a parameter adjustment screen).

   As an example, you can use the control knob to either adjust a value in increments of 0.02 (**Fine** mode) or 0.50 (**Coarse** mode).

   a. Press **Enter** to switch to **Coarse** mode where you can make large adjustments more quickly.

      When in Coarse mode, the **Enter** button lights up.

   b. Press **Enter** again to return to Fine mode.

3. Use the control knob to select a new value, and then press **Enter** to set it.

   Selected settings affect the output immediately.

4. To reset the parameter to its default value, press **Default** on the front panel.

   The **Default** LED lights up whenever the current value of the parameter is equivalent to the default value (whether you reached this value by pressing the **Default** button, or by scrolling to it with the control knob).

5. Press **Exit** to accept your new value and return to the previous menu or submenu.

# Getting Visual Feedback: Status and Alarm LEDs

The status and alarm LEDs provide visual feedback on the current mode and operating conditions of the unit. These LEDs are located together in the center of the panels, as shown in Figure 6-4.
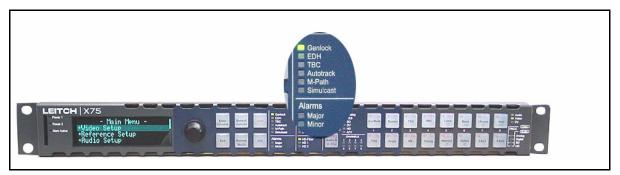


**Figure 6-4.** Status LED Area

## Genlock Status LED

The **Genlock** LED indicates the current status of the external genlock source.

**Table 6-2.** Genlock LED Status Definitions

| LED Status | Operating Condition |
|---|---|
| On | The control panel is configured to Auto Genlock and a stable genlock source is detected. |
| Off | Genlock is not selected. |
| Flashing | The genlock source is not stable or is missing. |

# EDH Status LED

The **EDH** LED indicates the current configuration and status of Error Detection Handling (EDH) in the input standard serial digital video stream. The EDH LED receives both SD-SDI 1 and HD-SDI 2 inputs for status reporting.

**Table 6-3.** EDH LED Status Definitions

| LED Status | Operating Condition |
| --- | --- |
| On | The EDH feature is monitoring incoming video from both SD-SDI inputs. |
| Off | The EDH feature is turned off. |
| Flashing | EDH detection is enabled and EDH errors have been detected, or the incoming SDI feed does not include EDH. For an EDH error count and other related information, follow this path: **Video Setup > SD1 or SD2 Input > EDH**. |

# TBC Status LED

The **TBC** LED indicates whether or not the composite input signal is timebase-corrected by the unit's TBC circuitry.

**Table 6-4.** TBC LED Definitions

| LED Status | Operating Condition |
| --- | --- |
| On | The internal time base corrector is operating and correcting the input signal, usually for heterodyned signals from sources such as a VTR. |
| Off | The internal time base corrector is not active (the unit may be in Sync mode). |

# Autotrack Status LED

The **Autotrack** LED indicates whether or not the audio Auto Track mode is enabled. You can independently set each audio synchronizer to track the selected output video channel to auto compensate the propagation delay introduced in the processed video path. Also, you can add the additional delay with the Audio Delay controls. Follow this path: **Audio Setup > Input Setup > Delay**

**Table 6-5.** Autotrack LED Definitions

| LED Status | Operating Condition |
|---|---|
| On | Any one of the **I/O Delay SRC#** parameters in **Audio Setup > Global Audio Config > I/O Delay Config** is set to an option that is other than **None**. |
| Off | The audio delay feature is turned off. |

# M-Path Status LED

The **M-Path** LED indicates whether or not the unit is in M-Path mode. If the **M-Path** LED is not lit, the Simulcast mode is in effect.

**Table 6-6.** Digi-Triplex LED Definitions

| LED Status | Operating Condition |
|---|---|
| On | The M-Path mode is enabled (one or more input signals are selected and routed to the outputs). |
| Off | The M-Path mode is not enabled. |

# Simulcast Status LED

The **Simulcast** LED indicates when the unit is in Simulcast mode. If the **Simulcast** LED is not lit, the M-Path mode is in effect.

**Table 6-7.** Simulcast LED Definitions

| LED Status | Operating Condition |
|---|---|
| On | The Simulcast mode is enabled. |
| Off | The Simulcast mode is not enabled. |

# Major and Minor Alarm LEDs

The **Major** and **Minor Alarm** LEDs are activated from the enabled list of alarms found in the selected frame's parameters. Local and remote control panels only detect alarms that are activated on X75HD/X75SD models that are currently being accessed.

Major alarms appear as red LEDs; minor alarms are amber. See page 343 for a detailed list of all possible alarms.

**Table 6-8.** Major and Minor Alarm LEDs

| LED Status | Operating Condition |
|------------|---------------------|
| On | Alarms are detected. |
| Off | No alarms are detected. |

# Mem Active LED

This LED indicates there is activity on the SD card.

# Video Input LEDs

Directly press the **Video In** button to select a video source manually and to send out to all outputs. The LEDs to the left side of this button indicate which input is currently selected. The M-Path selection allows any output group to be assigned with the video input sources. When more than one video source is selected and mapped to multiple output groups, the M-Path and corresponding video input source LEDs will light. When the selected input signal is absent, the LED flashes.

See "Video Configuration" on page 155 for more information.
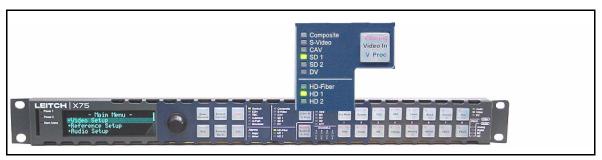


**Figure 6-5.** Video Input LED Area

# Audio Input LEDs

Directly press the **Audio In** button to select any *one* set of audio inputs to be sent out to all multiple audio output sets. The LEDs to the top, right side of this button indicate which input is currently selected. When the selected input signal is absent, the LED flashes.

See "Audio Configuration" on page 163 for more information.



**Figure 6-6.** Audio Input LED Area

# Control Mode Status LEDs

The **Audio**, **Video**, and **DV** LEDs indicate the current focus of control.

- The **Audio** LED lights when an audio parameter adjustment is made.

- The **Video** LED lights when a video parameter adjustment is made.

- The **DV** LED lights when the DV control is enabled.
  (The DV function is reserved for future use.)



**Figure 6-7.** Control Mode Status LED Area

# Web Server Software Control

## Overview

> ### 📝 Note
>
> Web browsers do not automatically update when server information changes. As a result, your Web page may contain stale information. Using the **Back** and **Forward** buttons on your browser may also present you with stale data. Before monitoring a device, be sure to click **Refresh** on your browser to get the latest information from the X75HD/X75SD server.

Once the networking parameters of the X75HD/X75SD have been configured appropriately, and it is connected to the Ethernet network, you can control the unit through standard Web browsing software (for example, Microsoft® Internet Explorer 6.0, Netscape® Navigator™ 7.2, or Mozilla® Firefox™ 1.0). See "Configuring for HTTP Control via Web Browser" on page 110 for more information.

Controlling the X75HD/X75SD remotely from your PC through a standard Web browser gives you the same options for control and alarm monitoring as other local and remote control methods, without the additional costs of purchasing control panels or specialized software applications. Using a Web browser to control the X75HD/X75SD does not require any special hardware or software.

The following topics are discussed in this chapter:

# Launching the Web Server Software

To access the X75HD/X75SD, open a supported Web browser on your computer (supported browsers include Microsoft Internet Explorer 6.0, Netscape Navigator 7.2, and Mozilla Firefox 1.0, among others).

In the **Address**, **Location**, or **URL** field of your Web browser (the name depends on the browser), type `http://` followed by the **IP Address** of the X75HD/X75SD you want to control. For example, if the X75HD/X75SD is configured with the IP Address 10.0.0.1, enter the following location into your Web browser:

```
http://10.0.0.1
```

The Web browser then displays the Home page of the X75HD/X75SD Control interface (hereafter referred to as the "Web server"), as shown in Figure 7-1.
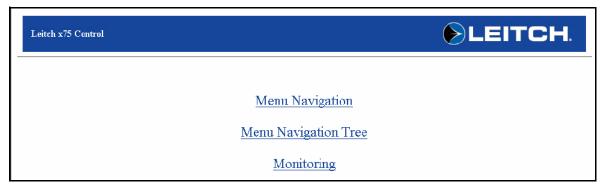


**Figure 7-1.** X75HD/X75SD Control Home Page for Web Server

The Home page provides three options:

- **Menu Navigation Tree** (see page 143)
- **Menu Navigation** (see page 149)
- **Monitoring** (see page 150)

Click an option to open the desired control page.

# Controlling Devices

Click **Menu Navigation** from the Home page to open the **Main** menu page. The **Main** menu page provides access to all available X75HD/ X75SD menus and options. These menus mirror those menus that are accessible through the local and remote control panels.

## Navigating from the Main Menu Page

The **Main** menu page lists several major submenus through which you can navigate to a required parameter/setting. Click a menu to open the corresponding configuration page. Continue to navigate through the resulting submenus until you reach the desired parameter.

The **Main** menu also has a number of individual parameters that can be set directly from this page. Click a parameter name from the **Main** menu table to change the value; a separate parameter configuration page will open.

describes the **Main** menu page interface. illustrates the sequence of pages that results during navigation.

**Current location
in menu structure**

**Available submenus**
Click a menu name to open the
corresponding configuration page.

Leitch X75 Control : Menu Navigation

⬥LEITCH.

Main Menu

Video Setup : Audio Setup : Reference Setup : System Config

## Main Menu

| Name | Description | Value |
|------|-------------|-------|
| Global Frame Rate | Allows the selection of the operational standard. | Auto |
| SD Operating Std | Current SD video standard | 525 |
| HD Output Std | Current HD output video standard | 720p, 59.94 |

**Main menu parameter options**
Click a parameter name to change
the corresponding value.

**General parameter
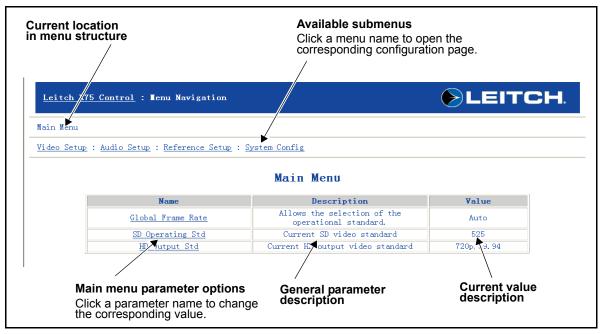description**

**Current value
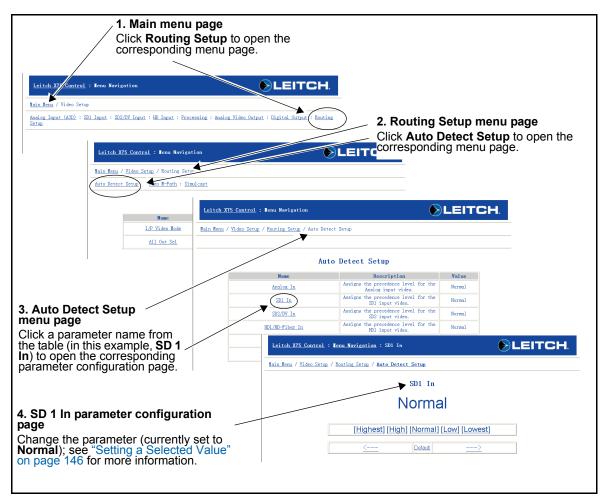description**

**Figure 7-2.** Main Menu Page

**Figure 7-3.** Sequence of Pages that Result During Navigation (Example)

# Setting a Selected Value

To set a parameter value, navigate through the required menu and submenu structure until you reach the desired option. Click the parameter name from the table to open the corresponding parameter page and to modify its value.

Individual parameter pages show a minimum, maximum, and default value for the selected option. Click a minimum or maximum value, or enter a specific value in the provided text field, to change the parameter setting. Alternatively, you can click the --- > or <--- arrows to increase or decrease the values incrementally, or click **Default** to return the parameter to its factory setting. (See Figure 7-4.)
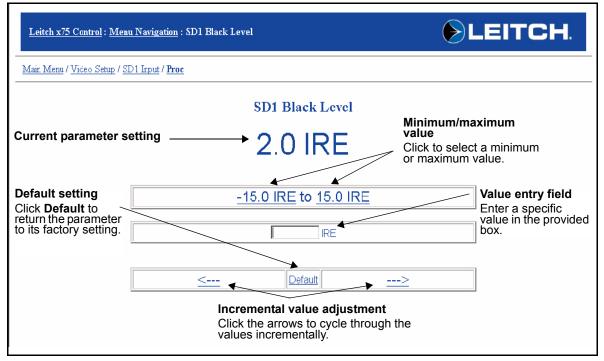


**Figure 7-4.** Setting a Parameter Value (Range)

For parameter options with discrete values, all of the available values are displayed. Click one of the values to set the option for that value. Alternatively, you can click the --- > or <--- arrows to cycle through the values, or click **Default** to return the parameter to its factory setting. (See Figure 7-5).
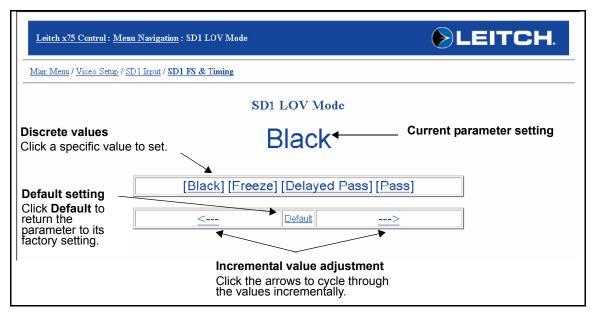


**Figure 7-5.** Setting a Parameter Value (Discrete)

Some parameters show read-only options that cannot be changed. Others may be disabled and unavailable for configuration. (See Figure 7-6 on page 148.) If you require more information about the read-only function, click **Read Only** to open a Help page. The Help page provides general information about read-only and disabled parameters. See "Getting Help" on page 153 for more information.
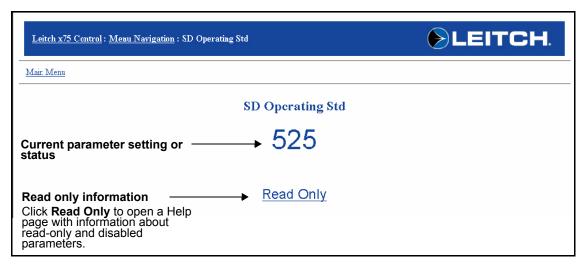
**Figure 7-6.** Viewing a Read Only Parameter

# Navigating Menus and Options via the Menu Navigation Tree

Click **Menu Navigation Tree** from the Home page to present the X75HD/X75SD menu structure for selecting and setting options. These menus mirror the menus that are accessible through the local and remote control panels of the unit.

The menu listings display available menus and submenus. Click any of these to open the corresponding configuration page. Figure 7-7 shows a sample of the **Menu Navigation Tree** page and a resulting configuration page that opens when you click a submenu.



**Figure 7-7.** Menu Navigation Tree Control Page

# Monitoring Alarms

Click **Monitoring** from the Home page to open the **Leitch X75 Alarms** page. On this page, you can view or change the status of the active and disabled alarms (see Figure 7-9 on page 151). For a complete list of all of the possible alarms, see page 343.

# Thumbnail Streaming

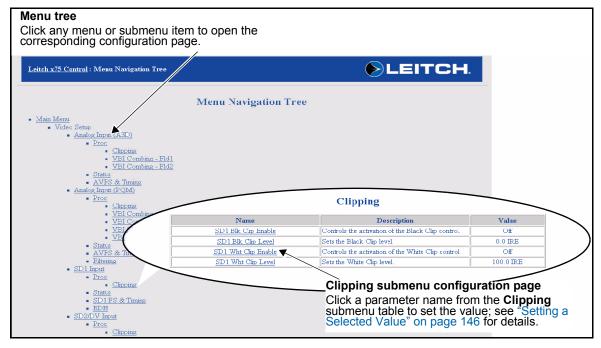All X75HD/X75SD units provide a "thumbnail" streaming video output that originates from the **Ctrl/Strm** Ethernet port and is displayed both in the Alarms page of the X75 Web Server and in the Control window of CCS Pilot and Navigator. To activate the streaming in the Web Server, click **Enable Streaming** at the top left corner of the Alarms page (see Figure 7-8).

The frame size of the thumbnail image is 128 x 96 pixels. On the X75HD/X75SD Web server, the default refresh rate is once every 10 seconds, but you can adjust it to a rate of between 5 and 300 seconds. (It can also be turned off entirely.) The control for the refresh rate is located at the bottom of the **Alarms** page.
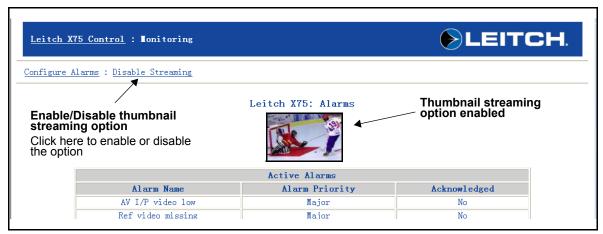


**Figure 7-8.** *Monitoring Page with Streaming Enabled*

**Figure 7-9.** Alarm Monitoring Page

Click **Configure Alarms** from the Monitoring page to open up the alarm configuration page (see Figure 7-10 on page 152). The Configure Alarms page allows enabling of the disabled alarms and also can change each alarm's reporting properties.

Click the **Edit** in the **Action** column to change the selected alarm's properties (see Figure 7-11 on page 152).
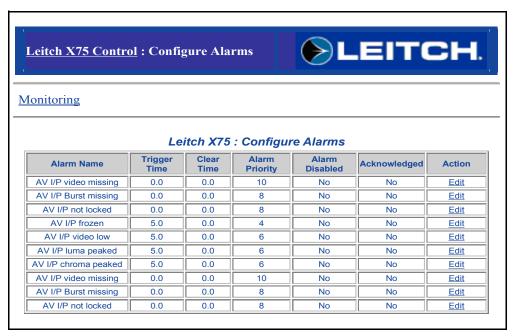
**Figure 7-10.** Configure Alarms Page
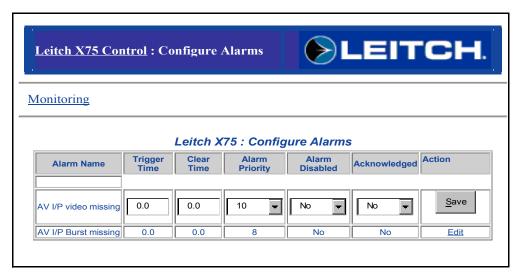


**Figure 7-11.** Editing Alarms Page

# Getting Help

For certain parameters, help text is provided to answer why a parameter may be disabled or is available only as a "read-only" item. On parameter setting pages where you cannot change the value, click **Read Only** to open the provided Help page. The Help page provides general information about read-only and disabled parameters. See Figure 7-12.
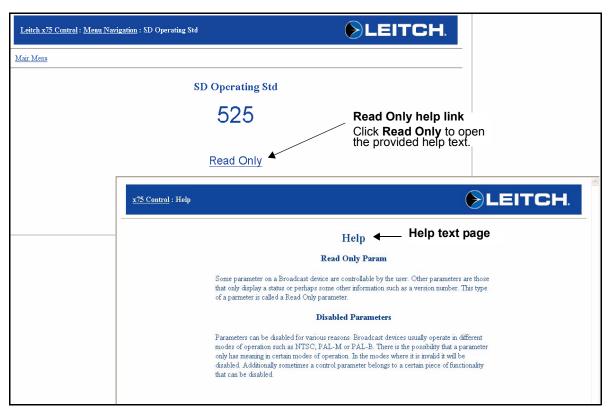


**Figure 7-12.** Read Only Parameter Sample

Chapter 8

# Video Configuration

# Overview

This chapter briefly describes the major video configuration options that can be changed in the course of normal operation.

The following topics are found in this chapter:

- "Selecting a Video Source" on page 156
- "Adjusting Video Levels" on page 158
- "Video/Audio Timing Tool" on page 159

See the following for more detailed information:

- *Control Panels for X75 Systems Installation and Operation Manual* for control panel shortcuts to video settings

- *X75HD/X75SD Control Parameter List* HTML document (available for download from either the Leitch Web site at www.leitch.com or from the included *Documentation for X75 Systems and Control Panels* CD) for lists of all available menus and parameter options

# Selecting a Video Source

## General Information

With control panel video shortcuts, you can select an input (or multiple inputs) and immediately send it to all video outputs by pressing the **Video In** button. The LEDs on the left side of this button indicate which input is currently selected. The M-Path (multiple inputs) selection allows any output group to be assigned with the video input sources. When two or more video sources are selected and mapped to multiple output groups, the M-Path and corresponding video input source LEDs will be lit. When the selected input signal is absent, the LED flashes. Available inputs include the following:

- M-Path
- Composite
- S-Video
- CAV
- SD 1
- SD 2
- DV (future use)
- HD Fiber
- HD 1
- HD 2

If the **Auto Detect** feature is enabled when a selected input option is not installed or detected, the panel accepts the next available input. If the selected video signal is absent, the corresponding video input LED flashes.

# Procedure

X75HD/X75SD units are shipped with **Auto Detect** video mode as the factory default setting. This mode sets the X75HD/X75SD to automatically detect analog, SD-SDI 1, SD-SDI 2, future-use DV, HD-SDI Fiber, HD-SDI 1, HD-SDI 2, composite, and S-video inputs. When video is connected to any of these inputs, the X75HD/X75SD automatically selects the applied input video and then sends out the converted video to all outputs. The **Video Input** LEDs on the front panel show the selected video source.

For analog video sources, only a single video source can be automatically detected. Therefore, you must pre-select the desired analog input video source first in order for auto-detection to work across the HD/SD/analog inputs.

Similarly, you must select HD input sources (HD-SDI 1, HD-SDI 2, and HD-SDI Fiber) and SD-SDI 2 or future-use DV inputs first, for the auto-detection to function.

To change the input signal type, follow these steps:

1. Press **Video In** on the control panel, (or navigate to the **Video Setup > Routing Setup** menu and then select **AllOutSelect**).

   All available inputs will display on the control panel screen.

2. Use the control panel knob to scroll through the list of input types, and then press to **Enter** to select one.

When multiple video sources are connected, the **Auto Detect Setup** setting determines the selection of the input video. For example, if the X75HD/X75SD unit detects two input signals, it will accept the signal tagged as **Higher** over another signal that has been given a lower-precedence. Found in the top-level **Video Setup > Routing Setup** menu, precedence levels include **Highest**, **High**, **Normal**, **Low**, or **Lowest**. When multiple input types are present and assigned the same precedence level, the X75HD/X75SD uses the following default ordering:

1. Analog video input
2. SD1 input
3. SD2/DV input
4. HD1/HD-Fiber input
5. HD2 input

Figure 8-1 graphically illustrates a single-source signal process, where one selected video input is fed to all outputs.
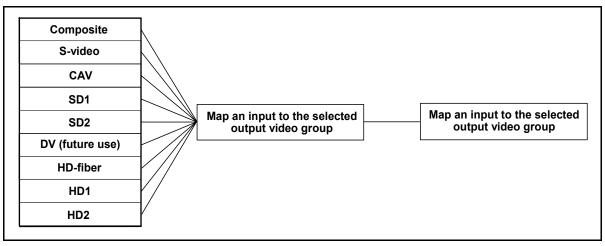


**Figure 8-1.** Single-Source Processing

# Adjusting Video Levels

Various control panel buttons provide quick access to the video processing parameters of a selected video source. Simply press a button and use the control knob to change the selection.

For more details, see "Video Proc Amp" on page 178.

# Video/Audio Timing Tool

The X75OPT-V2A video/audio timing tool is a software upgrade that makes it possible to correct lip sync problems that occur during conversions. (The video/audio timing tool consists of a receiver and transmitter; the transmitter is free; the receiver is an optional upgrade requiring a software key.) The V2A feature enables a receiving X75HD/X75SD to analyze video and audio test signals and then detect any time propagation differences that may occur during the following processes:

- Up-, cross-, and down conversion
- Analog to digital conversion
- Digital to analog conversion
- MPEG coding and decoding

V2A can operate manually or automatically. The automatic mode aligns received video and audio signals that are up to 1.3 seconds apart.

A user menu (**Video/Audio Timing**) includes the timing tool's parameters. The menu's parameters perform the following functions:

- Display the time by which each audio channel is leading or lagging the video (either SD1, SD2, HD, and/or analog)
- Enable you to load the currently measured video delays to the audio delay parameters, effectively performing audio/video synchronization

The X75OPT-V2A video/audio timing tool will only insert audio delays, and thus will not account for situations in which the measured audio processing paths (shown in the middle box of Figure 8-2 on page 159) are longer than the video processing paths—even though the tool will be able to display it. If audio is lagging behind the video, the V2A feature can measure the difference, but the user must add the video delay; it cannot be automatically corrected.

## Note

CCS versions 3.1.2 and earlier do not reliably distinguish between disabled audio parameters and read-only audio parameters.
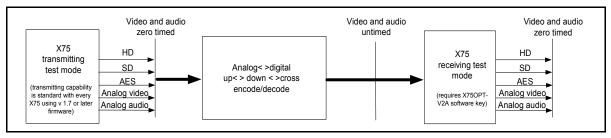


**Figure 8-2.** X75OPT-V2A Video/Audio Timing Feature

# Transmitter

Firmware versions 1.7 or later are capable of transmitting a special V2A video/audio test pattern. This pattern may be used directly to measure a system's relative video/audio timing delays, or you can record the pattern for later use. To manually configure an X75HD/X75SD unit to output this test pattern, follow these steps:

1. If an X75HD sub-module is present, perform the following steps to enable the HD TSG:

    i. Navigate to the **Video Setup > Processing > HD TSG & Slide** menu.

    ii. Set the **HD-TSG Select** parameter to **Color Bars 100%**.

    iii. Back up one level and set the **HD-TSG Enable** parameter to **On**.

2. Enable the SD TSG by performing the following steps:

    i. Enter the **Video Setup > Processing > SD TSG & Slide** menu.

    ii. Select the Keyer/TSG Insert parameter and ensure it is configured to the correct video path.

    iii. Back up one level and then set the SD-TSG Select parameter to Bars 100%.

    iv. Back up one level and then set the SD-TSG Enable parameter to On.

3. Set all audio left-channel outputs to Tone3/V2A-L and all audio right-channel outputs to Tone4/V2A-R by following this path: Audio Setup > Routing > Output > (select your audio output).

4. Navigate to Video/Audio Timing in the main menu and then set the V2A Tx Enable parameter to Enable.

To disable the V2A blank insertion, set the **V2A Tx Enable** parameter to **Disable**.

# Receiver

The V2A receiver simultaneously monitors the inputs to the X75's audio sources and compares them against one of the unit's video inputs. To configure an X75 unit for V2A reception, follow these steps:

1. Route the audio inputs containing V2A signals to the SRCs to be used in the unit's final processing (see "Selecting an Audio Source" on page 165 and "Advanced Audio Inputs and Outputs Selection" on page 172 for details).

2. Select a video input under the **Video/Audio Timing > V2A Rx Video Src** parameter.

   For analog and HD inputs, the source will be that which is currently selected in the X75A3D/X75PQM and X75HD submodules respectively.

Parameters under **Video/Audio Timing > V2A Signal Status** indicate whether or not a valid V2A test signal is detected on the unit's inputs. If a valid V2A test signal is detected, the relative video delay will be indicated by a series of parameters under the **Video/Audio Timing > Video Delay** sub-menu. A series of parameters under the **Video/Audio Timing > Channel Swap** sub-menu report whether or not the unit detects a left/right channel swap for stereo pairs.

You can automatically set the measured video delays to the unit's audio delay parameters using the **Video/Audio Timing > Align Leading Audio** parameter. Setting this parameter to **Yes** updates the unit's audio delay parameters with the currently displayed V2A video delays, effectively compensating for measured video/audio timing differences.

# Typical Applications

Figure 8-3 illustrates three typical applications for the timing tool.
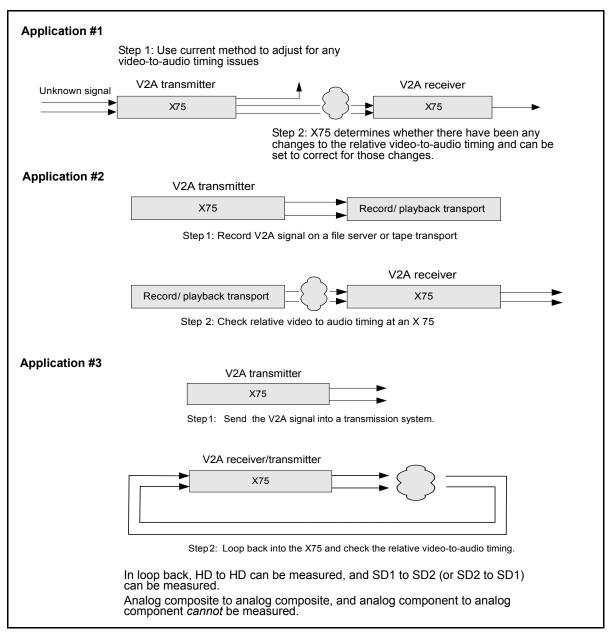


**Figure 8-3.** X75OPT-V2A Applications

Chapter 9

# Audio Configuration

# Overview

This chapter describes the audio configuration options that can be changed in the course of normal operation.

The following topics are found in this chapter:

- "General Information" on page 164
- "Selecting an Audio Source" on page 165
- "Adjusting Audio Levels" on page 167
- "Audio LED and Buttons Map" on page 168

See the following for more detailed information:

- *Control Panels for X75 Systems Installation and Operation Manual* for control panel shortcuts to audio settings
- *X75HD/X75SD Control Parameter List* HTML document (available for download from either the Leitch Web site at www.leitch.com or from the included *Documentation for X75 Systems and Control Panels* CD) for lists of all available menus and parameter options

# General Information

With control panel shortcuts, you can select an input (or multiple inputs) and immediately send it to all audio outputs. Directly press the **Audio In** button to select any one set of audio inputs to be sent out to all audio multiple output sets. The LEDs to the top, right side of this button indicate which input is currently selected. When the selected input signal is absent, the LED flashes.

Available audio input groups include the following:

- User
- Analog—4 mono channels of analog audio input
- AES—8 channels
- DV (future use)
- SD—8 or 16 channels from the SD-SDI de-embedder
- HD—8 or 16 channels from the HD-SDI de-embedder
- Dolby—10 channels from the internal Dolby encoder

![Note icon] **Note**

The optional X75OPT-AS-8/16/32 module is required for synchronizing, delaying and processing mono audio for SD-SDI and HD-SDI inputs.

Depending upon which input you have selected, the X75 unit automatically and logically maps all output channels. When you select two or more audio input groups, the **Audio In Src Select** parameter is automatically set to the **User** setting, and this control is available from the **Audio Setup > Routing** submenu.

To switch between mono and stereo audio processing control, press the **Ctrl** and **Mo/St** buttons simultaneously. When mono control is active, each button controls an individual gain. When stereo control is active, the top and bottom front panel buttons work together (are "married") so that either button will adjust the gain in stereo pairs.

# Selecting an Audio Source

Press the **Audio In** button to select any *one* set of audio inputs to be sent out to *all* audio multiple output sets. The LEDs to the top, right side of this button indicate which input is currently selected. This table shows how the signals are routed internally and mapped to audio outputs.

**Table 9-1.** Audio Source Groupings

| Default Output Mapping | Input Audio Source Groups | | | | | |
|---|---|---|---|---|---|---|
| | Analog | AES | DV (future use) | SD-SDI X | HD-SDI X | Dolby |
| AA_Out1 | AA1 | AES1a | DV_a | SDX1 | HDX1 | Dolby1 |
| AA_Out2 | AA2 | AES1b | DV_b | SDX2 | HDX2 | Dolby2 |
| AA_Out3 | AA3 | AES2a | | SDX3 | HDX1 | Dolby3 |
| AA_Out4 | AA4 | AES2b | | SDX4 | HDX2 | Dolby4 |
| AES1_OutA | AA1 | AES1a | DV_a | SDX1 | HDX1 | Dolby1 |
| AES1_OutB | AA2 | AES1b | DV_b | SDX2 | HDX2 | Dolby2 |
| AES2_OutA | AA3 | AES2a | | SDX3 | HDX3 | Dolby3 |
| AES2_OutB | AA4 | AES2b | | SDX4 | HDX4 | Dolby4 |
| AES3_OutA | | AES3a | | SDX5 | HDX5 | Dolby5 |
| AES3_OutB | | AES3b | | SDX6 | HDX6 | Dolby6 |
| AES4_OutA | | AES4a | | SDX7 | HDX7 | Dolby7 |
| AES4_OutB | | AES4b | | SDX8 | HDX8 | Dolby8 |
| AES5_OutA | | AES5a | | SDX9 | HDX9 | DolbyAuxL |
| AES5_OutB | | AES5b | | SDX10 | HDX10 | DolbyAuxR |
| SD1/HD1_OutA | AA1 | AES1a | DV_a | SDX1 | HDX1 | Dolby1 |
| SD1/HD1_OutB | AA2 | AES1b | DV_b | SDX2 | HDX2 | Dolby2 |
| SD2/HD2_OutA | AA3 | AES2a | | SDX3 | HDX3 | Dolby3 |
| SD2/HD2_OutB | AA4 | AES2b | | SDX4 | HDX4 | Dolby4 |
| SD3/HD3_OutA | | AES3a | | SDX5 | HDX5 | Dolby5 |

**Table 9-1.** Audio Source Groupings *(Continued)*

| Default Output Mapping | Input Audio Source Groups | | | | | |
|---|---|---|---|---|---|---|
| SD3/HD3_OutB | | AES3b | | SDX6 | HDX6 | Dolby6 |
| SD4/HD4_OutA | | AES4a | | SDX7 | HDX7 | Dolby7 |
| SD4/HD4_OutB | | AES4b | | SDX8 | HDX8 | Dolby8 |
| SD5/HD5_OutA | | AES5a | | SDX9 | HDX9 | |
| SD5/HD5_OutB | | AES5b | | SDX10 | HDX10 | |
| SD6/HD6_OutA | | | | SDX11 | HDX11 | |
| SD6/HD6_OutB | | | | SDX12 | HDX12 | |
| SD7/HD7_OutA | | | | SDX13 | HDX13 | |
| SD7/HD7_OutB | | | | SDX14 | HDX14 | |
| SD8/HD8_OutA | | | | SDX15 | HDX15 | |
| SD8/HD8_OutB | | | | SDX16 | HDX16 | |

# Adjusting Audio Levels

When an audio source group is selected and sent to all outputs, press the **Ctrl** and **A. Proc** buttons to quickly access the audio level controls of the selected audio input.The selected audio input channels' gain controls are mapped to the numbered buttons on the control panel accordingly. The mapped buttons illuminate during audio proc control. The **Audio Proc** LEDs on the lower, right corner of the front panel indicate which processing block is currently selected.
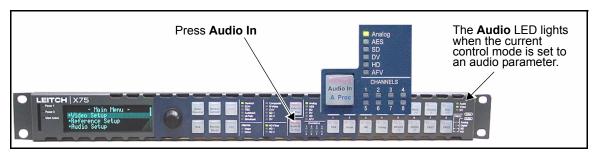


**Figure 9-1.** Audio Input Control Area

# Audio LED and Buttons Map

> ## 📝 Note
>
> For audio input configuration, an optional X75OPT-AS-8/16/32 module must be installed.

When you press the **Audio In** or **Ctrl + A Proc** button on a local or remote control panel, or if you make audio input selections via your Web browser software or other control application, certain parameters and audio proc amp buttons get mapped, and various **Channel** LEDs and **Audio I/P** LEDs will light according to the selected input configuration. The following tables describe the LEDs and buttons that are assigned to selected input sources.

Tables 10-1 through 10-6 in "Chapter 10: Special Function Buttons" describe the various channels, LEDS, gain controls, and control panel buttons that are affected/activated by the selection of certain analog, AES, SD-SDI, and/or HD-SDI demuxed audio inputs. Use the **Ctrl** + **A Proc** buttons to switch between the audio input types.

## Selecting an Audio Input

Directly press **Audio In** to select any one input group to be sent out to all audio outputs. Alternatively, open the **Audio Setup** menu and navigate to the **Routing** submenu. From here you can select and configure your audio inputs.

After configuring your audio inputs, the following LEDs will light (see Figure 9-2 on page 169 for their locations):

- The **Audio Mode** LEDs on the far right side of the front panel (top) indicate the current mode of operation.

- The **Audio Proc** LED on the far right side of the front panel indicates the current processing audio group.

- The **Audio Input** LEDs to the top, right of the button indicate which input group is currently selected.

- The **Audio Channel** LEDs immediately to the right of the button indicate which audio channels are mapped and internally routed to the SRC channels.

  See "Audio Proc Amp" on page 179 for information on LED and channel mappings on a frame-mounted local control panel or X75-RCP remote control panel.

**Figure 9-2.** Location of Audio LEDs

# Accessing Audio Level Controls

Press the **Ctrl** and **A Proc** buttons together to quickly access the audio level controls of a selected audio input. Along with LEDs, the selected audio input channel's gain controls will be mapped to specific numbered buttons on the right side of the front panel. These buttons will light during audio processing and configuration.

See "Audio Proc Amp" on page 179 for information on LED and channel mappings on a frame-mounted local control panel or X75-RCP remote control panel.
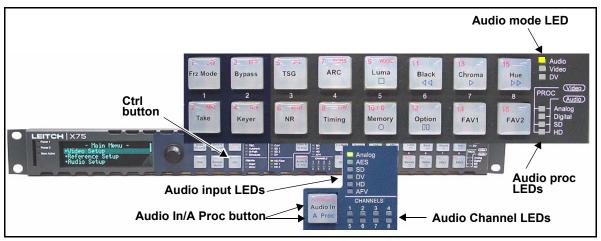
# Tracking and Delaying Audio

Each audio sample rate converter (SRC) can be configured to automatically track the processing delay of one of the video outputs. To apply the internal audio tracking feature, follow this path: **Audio Setup > Global Audio Config > I/O Delay Config**. Select one of the four or eight **I/O Delay SRC**s, and then select the accompanying video signal to track with that audio SRC.

# AFV (Audio Follows Video) Mode

In AFV mode, each of the selectable video inputs has an audio input selection linked to it. With this feature enabled, the audio input selection for the channel automatically changes when the video input is changed.

You can enable or disable AFV mode through the **Audio** menu. The **<channel > -AFV- <input >** parameters specify the audio input channel ("**<channel >**") to be automatically switched when the **SD Out Sel** parameter is switched to a specified input ("**<input >**"). For example, the **Ch1-AFV-SD1** parameter specifies the audio input for **SRC Channel 1** will be automatically switched when the **SD Out Sel** parameter changes to **SD1**.

When AFV mode is enabled for any single SRC channel, the AFV LED on the front panel of the unit will be lit.

You can override AFV mode by manually selecting a different audio input. This will not, however, turn AFV mode off—the next time the video input selection is changed, the audio will again follow it. AFV mode can only be disabled through the audio menus.

Figure 9-3 on page 171 shows the default AFV audio and video assignments. It illustrates the linked audio channels in AFV mode when the video is switched from the composite input to SD-SDI 1 video. When the AFV is enabled for all SRC channels, the composite input video selection also routes analog input channels 1 and 2 to SRC channel 1, and analog input channels 3 and 4 to SRC channel 2. When SD-SDI 1 input video is selected, all four groups of de-multiplexed audio channels are routed through eight SRC channels.

You can assign different audio inputs to each SRC channel, as well as enable and disable the AFV function for each video input to create a complex routing.
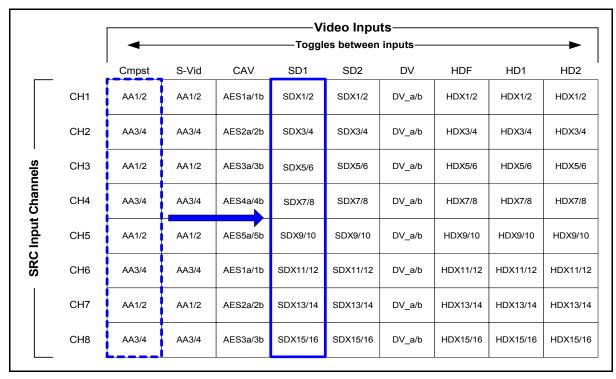
| | | Cmpst | S-Vid | CAV | SD1 | SD2 | DV | HDF | HD1 | HD2 |
|---|---|---|---|---|---|---|---|---|---|---|
| | CH1 | AA1/2 | AA1/2 | AES1a/1b | SDX1/2 | SDX1/2 | DV_a/b | HDX1/2 | HDX1/2 | HDX1/2 |
| | CH2 | AA3/4 | AA3/4 | AES2a/2b | SDX3/4 | SDX3/4 | DV_a/b | HDX3/4 | HDX3/4 | HDX3/4 |
| | CH3 | AA1/2 | AA1/2 | AES3a/3b | SDX5/6 | SDX5/6 | DV_a/b | HDX5/6 | HDX5/6 | HDX5/6 |
| | CH4 | AA3/4 | AA3/4 | AES4a/4b | SDX7/8 | SDX7/8 | DV_a/b | HDX7/8 | HDX7/8 | HDX7/8 |
| | CH5 | AA1/2 | AA1/2 | AES5a/5b | SDX9/10 | SDX9/10 | DV_a/b | HDX9/10 | HDX9/10 | HDX9/10 |
| | CH6 | AA3/4 | AA3/4 | AES1a/1b | SDX11/12 | SDX11/12 | DV_a/b | HDX11/12 | HDX11/12 | HDX11/12 |
| | CH7 | AA1/2 | AA1/2 | AES2a/2b | SDX13/14 | SDX13/14 | DV_a/b | HDX13/14 | HDX13/14 | HDX13/14 |
| | CH8 | AA3/4 | AA3/4 | AES3a/3b | SDX15/16 | SDX15/16 | DV_a/b | HDX15/16 | HDX15/16 | HDX15/16 |

Video Inputs — Toggles between inputs

SRC Input Channels

**Figure 9-3.** Default AFV Channel Assignment

# Advanced Audio Inputs and Outputs Selection

For custom applications, the X75 unit provides full input and output routing control. You can select multiple audio input sources simultaneously and route them internally to meet your application requirements (see Figure 9-4 on page 173). Each SRC can be assigned to any stereo input sources. Mono-based audio outputs can select any SRC outputs, including the summation, tones, and mutes. More than one audio input LED will light when multiple audio input sources are selected (for example, **Analog** and **AES**).

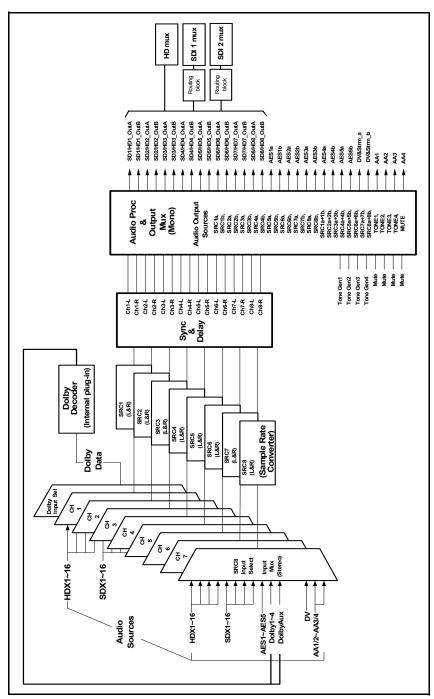To make changes to these audio input and outputs, follow this path: **Audio Setup > Routing > Input** or **Output.**

**Figure 9-4.** Advanced Audio Signal Routing

# Audio Delays in Dolby E

When using Dolby E audio embedding on the X75, audio content delay will vary, depending upon the alignment of the incoming Dolby E-encoded AES audio. When the Dolby E packet header leads the video switching line by *less than* 10 ms, it is delayed by one video frame *plus* the delay required to place the packet header at the appropriate location in the video. However, when the Dolby E packet header leads the video switching line by *more than* 10 ms, it is delayed only by the amount required to place the packet header at the appropriate location in the video (in other words, no video frame delay is added).

Therefore, when the Dolby E signal comes from an external source, the embedded audio content delay can vary from a minimum of one-third of a frame, to one and two-thirds of a frame.
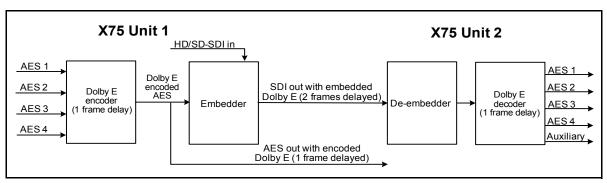


**Figure 9-5.** Audio Delay in Dolby E

Using the X75OPT-DOLBY-2 internal encoder, a two-frame audio content delay is added to the HD- or SD-SDI signal (one frame for the encoding process and one frame for the embedding process). If you use the X75's Dolby E-encoded AES output instead of the Dolby E-encoded SDI output, there is a one frame delay.

# Special Function Buttons

## Overview

This chapter describes various special function buttons found on the frame-mounted local control panel or X75-RCP remote control panel, including the following:

See the following for more detailed information:

- *Control Panels for X75 Systems Installation and Operation Manual* for control panel shortcuts to various audio and video settings

- *X75HD/X75SD Control Parameter List* HTML document (available for download from either the Leitch Web site at www.leitch.com or from the included *Documentation for X75 Systems and Control Panels* CD) for lists of all available menus and parameter options

# Using the Freeze Control

The freeze control freezes individual frames or fields of the incoming video source. The Freeze mode only affects the currently active video proc amp block.

To use the freeze shortcut, follow these steps:

1. Press **Frz Mode** to open a menu in the VFD panel where you can select a mode to apply to the incoming video.

2. Press **Frz Mode** multiple times to cycle through the different modes.

   Available modes include the following:

   • Field 1

   • Field 2

   • Frame

3. Press **Take** to activate the selected Freeze mode and apply it to the incoming video.

   The **Take** button flashes while the Freeze mode is active.

4. Press the **Take** button repeatedly to toggle between live and freeze modes.

## Note

The **Mute In Freeze** option (**Audio** menu) specifies whether or not audio output will be muted while the video is frozen in Frame or Field mode.

# Using Proc Amp Controls

## Video Proc Amp

There are four internal input video proc amps: HD-SDI, SD-SDI 1, SD-SDI 2, and Analog.

- HD-SDI 1, HD-SDI 2, and HD-SDI Fiber inputs share the HD video proc amp.
- SD-SDI 1 input has its own dedicated SD-SDI 1 video proc amp.
- SD-SDI 2 and future-use DV inputs share the SD-SDI 2 video proc amp.
- Composite, S-video and CAV inputs share the analog video proc amp.

The four most commonly used video processing controls are available from the control panel as the hot buttons, and include the following:

- **Luma**: Can be mapped to Analog Luma Gain, SD-SDI 1 Luma Gain, SD-SDI 2 Luma Gain, HD-SDI Luma Gain
- **Black**: Can be mapped to Analog Black Level, SD-SDI 1 Black Level, SD-SDI 2 Black Level, HD-SDI Black Level
- **Chroma**: Can be mapped to Analog Chroma Gain, SD-SDI 1 Chroma Gain, SD-SDI 2 Chroma Gain, HD-SDI Chroma Gain
- **Hue**: Can be mapped to Analog Hue Phase, SD-SDI 1 Hue Phase, SD-SDI 2 Hue Phase

The VFD briefly displays the selected video proc amp block when the **Ctrl** and **V Proc** buttons are pressed simultaneously.

### Video Proc Amp Status LEDs

The three **Video Proc** LEDs (Analog, SD-SDI, HD-SDI) on the far right side of the front panel become active whenever the control panel is set to adjust the video parameters. They indicate which input video processing block is currently selected for the adjustments.

- **Analog**: Lights when the analog video proc amp is selected
- **SD**: Lights when the SD-SDI 1 or SD-SDI 2 video proc amp is selected. When a shortcut (front panel) button is pressed, the parameter prefix on the VFD display indicates which video processing block is currently active
- **HD**: Lights when the HD-SDI video proc amp is selected

# Audio Proc Amp

When an X75OPT-AS-8, X75OPT-AS-16, or X75OPT-AS-32 module is installed, you can synchronize, delay, and process up to 8, 16, or 32 mono channels respectively. Depending on the selected audio source group type, the numbered buttons 1 through 8/16 are mapped accordingly to allow quick access to its audio gain controls.

The audio source group types include the following:

- 4 mono channels of analog audio
- 2 AES channels for X75SD-AV modules (including X75OPT-AS-8); 5 AES channels for X75HD-AV modules (including X75OPT-AS-16); 8 AES channels for X75HD/X75SD modules with X75OPT-AS-32
- DV audio (future use)
- 16 channels from the SD-SDI demultiplexer
- 16 channels from the HD-SDI demultiplexer

Tables 10-1 through 10-6 in the following pages describe the button mappings for single and multiple audio source configurations.

### Single Source Configuration

Tables 10-1, 10-2, 10-3, and 10-4 show the mapped buttons on the control panels and the parameters affected when you use a single source of analog, AES, SD-SDI demuxed, or HD-SDI demuxed audio, respectively.

For more information about the items in these tables (for example, what each of the column headings refers to), see "Appendix to Tables" on page 182.

**Table 10-1.** Analog Audio Inputs Selected

| Selected Inputs | Lit Channel LEDs | Lit Audio Input LEDs | Mapped Parameters | Mapped Buttons on Control Panel | Lit Audio Proc LEDs |
|---|---|---|---|---|---|
| AA1/2 | 1 | Analog | Gain1, Gain2 | 1, 2 | Analog |
| AA3/4 | 2 | | Gain3, Gain4 | 3, 4 | |

**Table 10-2.** AES Audio Inputs Selected

| Selected Inputs | Lit Channel LEDs | Lit Audio Input LEDs | Mapped Parameters | Mapped Buttons on Control Panel | Lit Audio Proc LEDs |
|---|---|---|---|---|---|
| AES1 | 1 | AES | Gain1, Gain2 | 1, 2 | Digital |
| AES2 | 2 | | Gain3, Gain4 | 3, 4 | |
| AES3 | 3 | | Gain5, Gain6 | 5, 6 | |
| AES4 | 4 | | Gain7, Gain8 | 7, 8 | |
| AES5 | 5 | | Gain9, Gain10 | 9, 10 | |

**Table 10-3.** SD-SDI Demuxed Audio Selected (SDX)

| Selected Inputs | Lit Channel LEDs | Lit Audio Input LEDs | Mapped Parameters | Mapped Buttons on Control Panel | Lit Audio Proc LEDs |
|---|---|---|---|---|---|
| SD1/2 | 1 | SD | Gain1, Gain2 | 1, 2 | SD |
| SD3/4 | 2 | | Gain3, Gain4 | 3, 4 | |
| SD5/6 | 3 | | Gain5, Gain6 | 5, 6 | |
| SD7/8 | 4 | | Gain7, Gain8 | 7, 8 | |
| SD9/10 | 5 | | Gain9, Gain10 | 9, 10 | |
| SD11/12 | 6 | | Gain11, Gain12 | 11, 12 | |
| SD13/14 | 7 | | Gain13, Gain14 | 13, 14 | |
| SD15/16 | 8 | | Gain15, Gain16 | 15, 16 | |

**Table 10-4.** HD-SDI Demuxed Audio Selected (HDX)

| Selected Inputs | Lit Channel LEDs | Lit Audio Input LEDs | Mapped Parameters | Mapped Buttons on Control Panel | Lit Audio Proc LEDs |
|---|---|---|---|---|---|
| HD1/2 | 1 | HD | Gain1, Gain2 | 1, 2 | HD |
| HD3/4 | 2 | | Gain3, Gain4 | 3, 4 | |
| HD5/6 | 3 | | Gain5, Gain6 | 5, 6 | |
| HD7/8 | 4 | | Gain7, Gain8 | 7, 8 | |
| HD9/10 | 5 | | Gain9, Gain10 | 9, 10 | |
| HD11/12 | 6 | | Gain11, Gain12 | 11, 12 | |
| HD13/14 | 7 | | Gain13, Gain14 | 13, 14 | |
| HD15/16 | 8 | | Gain15, Gain16 | 15, 16 | |

### Multiple Audio Input Source Configurations

Tables 10-5 and 10-6 show the mapped buttons on the control panels and the parameters affected when you use multiple sources of analog, AES, SD-SDI and SD-SDI audio. Use the **Ctrl** + **A Proc** buttons to switch between the audio input types.

**Table 10-5.** Multiple Audio Inputs Selected

| Selected Inputs | Lit LED Channels | Lit Audio Input LEDs | Mapped Parameters |
|---|---|---|---|
| AA1/2 | 1 | Analog | Gain1, Gain2 |
| AA3/4 | 2 | | Gain3, Gain4 |
| AES1 | 3 | AES | Gain5, Gain6 |
| AES2 | 4 | | Gain7, Gain8 |
| SD1/2 | 5 | SD | Gain9, Gain10 |
| SD3/4 | 6 | | Gain11, Gain12 |
| HD1/2 | 7 | HD | Gain13, Gain14 |
| HD3/4 | 8 | | Gain15, Gain16 |

**Table 10-6.** Ctrl + A Proc Buttons Pressed

| Lit LED Channels | Mapped Buttons on Control Panel | Lit Audio Proc LEDs |
|---|---|---|
| 1 | 1, 2 | Analog |
| 2 | 3, 4 | |
| 3 | 5, 6 | AES |
| 4 | 7, 8 | |
| 5 | 9, 10 | SD |
| 6 | 11, 12 | |
| 7 | 13, 14 | HD |
| 8 | 15, 16 | |

## Appendix to Tables

Tables 10-1 through 10-6 describe the various channels, LEDS, gain controls, and control panel buttons that are affected/activated by the selection of certain inputs. Table 10-7, below, provides some general information and definitions about each of these items.

**Table 10-7.** Table Definitions

| Item | Description |
|---|---|
| **Items Applied/Enabled when you Press the "Audio In" Button** | |
| Selected Inputs | This identifies the selected input source. Select an input using the X75 Web server software (via a Web browser), or by pressing Audio In Src on a control panel. |
| Lit Channel LEDs | This identifies the audio channels (and their LEDs) that correspond with your selected audio input source. Find these eight LEDs directly to the right of the Audio In/A Proc button on a control panel. |

**Table 10-7.** Table Definitions *(Continued)*

| Item | Description |
|---|---|
| Lit Audio Input LEDs | This identifies the audio input LED that lights when an input source is selected.<br>Find these LEDs above, and to the right, of the Audio In/A Proc button on a control panel.<br>Options include Analog, AES, SD-SDI, HD-SDI, and AFV (Audio Follow Video). |
| Mapped Parameters | This identifies the selected audio input channel's gain controls/parameters that are now enabled and available once a certain audio input source is selected. |
| **Items Applied/Enabled when you Press the "Ctrl" + "A Proc" Buttons** | |
| Mapped Buttons on Control Panel | This identifies the audio proc amp buttons on the right side of the control panel (labelled 1 through 16) that become mapped to/correspond with the selected audio input channel's gain controls.<br>Mapped buttons are backlit; unmapped buttons remain dimmed. Once mapped, press a numbered button to enable the gain controls assigned to it. |
| Lit Audio Proc LEDs | This identifies the audio proc LED that lights when an audio input source type is selected.<br>Find these four LEDs on the far right side of the control panel. Options include Analog, Digital, SD-SDI, and HD-SDI. |

### Audio Proc Amp Status LEDs

The four Audio Proc LEDs (**Analog**, **Digital**, **SD-SDI**, **HD-SDI)** on the far right side of the front panel indicate the selected audio input group that is being adjusted for the audio gain.

• Analog: Lit during analog audio channels gain adjustments

• Digital: Lit for AES and future-use DV channel audio gain adjustments

• SD-SDI: Lit during SD1 or SD2 (SD-SDI demuxed) channel audio gain adjustments

• HD-SDI: Lit during HD1 or HD2 (HD-SDI demuxed) channel audio gain adjustments.

# Using the Memory Function

Using the **Memory** button, you can store and recall user settings for up to 100 presets on an SD card, or up to 10 presets in the X75 itself.

When storing each "package" of parameter settings, the memory will automatically save to a default file naming structure (**X75Save00** in an SD card, or **Preset Slot 1** in an X75). Files on the SD card can be renamed later, using Windows Explorer in a PC.

Once all of the available default filenames are "used up" you must delete the existing files, overwrite the existing files, or rename these files to make room for new default names.

Table 10-8 compares the process of saving in the X75 memory to that of saving in an SD card.

**Table 10-8.** Comparison of SD Card and X75 Memory Saving

| Item | SD Card | X75 Memory |
|------|---------|------------|
| Default naming convention | X75Save00, X75Save01, etc. | Preset Slot 1, Preset Slot2, etc. |
| Limit to number of saved presets | 100 using default naming convention (up to 1000 can be visible when at least 900 have been renamed) | 10 slots |
| Number of characters allowable in the filenames | 24 | 63 |

### File Naming Conventions

When using SD card presets, filenames have a limit of 24 characters (before the extension), must have the extension of ".psf", and must reside in the x75preset directory.

The following are some examples of usable and unusable file naming conventions (files are assumed to be in the /x75preset directory):

**Example 1**

"*my preset that has a long name.psf*"
(30 characters)

Result: Will not work (will not display)

### Example 2

"*my preset w24 characters.psf*"
(24 characters)

Result: Will work

### Example 3

"*non-proper ext.txt*"
(Extension is.txt)

Result: Will not work (will not display)

### Example 4

"*test.txt.psf*"
(the last four characters are is ".psf", making the filename valid)

Result: Will work.

The various procedures for formatting, saving, recalling, renaming, and deleting presets are outlined below.

## Formatting an SD Card

New SD cards must be formatted in an X75 before use. Follow this path to format a card:

1. Insert the card into the slot
2. Press the **Memory** button.
3. Select **SD Card Format**, and then press **Enter**.
4. Click **Yes** when prompted.

A confirmation message will appear briefly.

## Saving a Preset

To save a preset, follow these steps:

1. Press **Memory**.

   A menu pops up with the following options:

   - List Preset
   - Save Presets
   - SD Card List Presets
   - SD Card Save Presets

2. Select **Save Presets** to save the settings to the X75, or press **SD Card Save Presets** to save the settings to the SD card.

   A list of ten slots appears in the X75 memory, or up to 1000 filenames appear in the SD card.

   When saving to the X75, the slots are named **Preset Slot 1**, **Preset Slot 2**, etc., or simply **Empty**. When saving to an SD card, the default filenames are **X75Save00**, **X75Save01**, **X75Save02**, etc., in addition to an option to create a new **Preset**.

3. Overwrite an old file, or, in the X75, scroll to the slot where you wish to save the entry, and then press the **Enter** button.

4. To save a new preset, scroll to a slot that is empty in the X75, or scroll to the **New Preset** option for the SD card, and then press the **Enter** button.

## Recalling a Preset

To recall a preset, follow these steps:

1. Press **Memory**.

2. Select **List Presets** (to recall a setting stored in theX75) or **SD Card List Presets** (to recall a setting stored in the SD card).

3. Scroll to the preset you would like to recall.

4. Press **Memory** again, or press **Enter**.

   A menu opens with the following options:

   • Restore Preset

   • Delete Preset

   • Rename Preset

5. Scroll through the list, select **Recall Preset**, and then press **Enter**.

   Your preset is recalled.

## Renaming a Preset

To rename a preset, follow these steps:

1. Press **Memory**.

2. Select **List Presets** for items stored in the X75, or **SD Card List Presets** for items in the SD card.

3. Scroll to the preset you would like to rename, and then press **Enter**.

4. In the new list, select **Rename Preset**, and then press **Enter**.

   You will be prompted to enter a new name.

5. Enter a new name.

## Deleting a Preset

To delete preset, follow these steps:

1. Press **Memory**.

2. Select **List Presets** for items stored in the X75, or **SD Card List Presets** for items in the SD card.

3. Scroll to the preset you would like to delete, and then press Enter.

4. Select **Delete Preset**, and then press **Enter**.

   The item is deleted from the list.

# Using the FAV1 and FAV2 Function

The **Fav1** and **Fav2** buttons store lists of favorite menu locations or controllable parameters. Using these buttons, you can "go to" a Favorite, delete a Favorite, or set a Favorite to be activated by GPI.

The procedures described below apply when the **1 Click Fav** capability is *not* enabled. If the **1 Click Fav** capability is enabled (see page 189), you can still access the full list of favorites by following this path: **Option** button > **Favorite 1** or **Favorite 2**.

### Reaching a Favorite

To go to a favorite, follow these steps:

1. Press **Fav1** or **Fav2**.

   A menu opens with the following options:

   • List Favorites

   • Add Favorite

2. Select **List Favorites**.

3. Scroll to the desired favorite, and then press **Enter**.

### Deleting a Favorite

To delete a favorite, follow these steps:

1. Press **Fav1** or **Fav2**.

   A menu pops up with the following options:

   • List Favorites

   • Add Favorite

2. Select **List Favorites**.

3. Scroll to the favorite you want to delete.

4. Press **Fav1** or **Fav2** again.

   A menu opens with the following options:

   • Delete Favorite

   • Move Up

   • Move Down

   • Set as GPI Parameter

5. Scroll to **Delete Favorite**, and then press **Enter**.

   A confirmation box appears stating that the favorite was deleted.

## Setting a GPI Activation

To set a parameter to be activated by a GPI input signal, follow these steps:

1. Press **Fav1** or **Fav2**.

    A menu pops up with the following options:

    - List Favorites
    - Add Favorite

2. Select **List Favorites**.

3. Scroll to the favorite you wish activated by a GPI input signal.

4. Press **Fav1** or **Fav2** again to store the parameter.

    A menu opens with the following options:

    - Delete Favorite
    - Move Up
    - Move Down
    - Set as GPI Parameter

5. Scroll to **Set as GPI Parameter**, and then press **Enter**.

    An arrow (>) is placed just before the parameter name, indicating that the favorite is now set as a GPI-triggered parameter.

> **Note**
>
> The **Move Up** and **Move Down** options are used to change the order of the presets.

## 1 Click Capability

The Favorites feature has an additional **1 Click Fav** capability that makes it possible for you to directly access the first item in your favorites list, saving several steps. In this mode, the first item in the Favorites list appears on the screen directly, and you can execute it by pressing **Enter**.

To enable this feature, follow these steps:

1. Press the **Option** button.

2. Rotate the control knob and then select **Setup**.

3. Press the **Enter** button.

4. Scroll to **1 Click Fav**, select **Yes**, and then press the **Enter** button.

When **1 Click Fav** is enabled, the normal functionality of the **Fav 1** and **Fav 2** shortcut buttons (as described on page 188) is locked out. In this instance, access the Favorites by following this path: **Option** button > **Favorites 1** or **Favorite 2**.

# Using the Bypass Function

In Bypass mode, no processing is applied to the **SDI 1 In** video signal; the signal is instead passed directly to the **SDI 1 Out** connector that is closest to the **SDI 1 In** connector. (Only one of the two **SDI 1 Out** connectors provides a bypass output.)

To activate Bypass mode, press the **Bypass** button. From the resulting **Bypass Menu**, select **On** or **Off**, and then press **Enter**. When the unit is powered off, or forced by the user, this relay is not energized to pass the signal straight through the output without any processing. The **Bypass** button flashes when the Bypass mode is active.

# Using the Mo/St Button Function

The **Mo**no**/St**ereo button located just left of the **Ctrl** button changes the audio channels control style. Pressing the **Ctrl** and **Mo/St** buttons toggles between the mono or stereo level and delay adjustments. This button is also mapped to the **Audio Control Style** parameter in the **Audio Setup > Global Audio Config** menu.

In mono control style, when adjusting the audio processing parameters such as the level, each numbered button is mapped directly to the individual gain controls. In stereo control style, even though a single button is pressed, both L/R channels are adjusted at the same time.

# Using the Noise Reduction

### Note

If you are working in either the SD-SDI or HD-SDI noise reducer menu, the **NR** button will light up. If either of the noise reducers is enabled, the **NR** button will stay lit even if you exit the menu. In SD-SDI, the enabling parameter is **Noise Reduction**; in HD-SDI the enabling parameter is **HD NR Enable**.

When the X75HD/SD unit is equipped with the X75OPT-NR option, it provides superior noise handling and image enhancement features on SDTV video processing paths. Press the **NR** button for quick access to the noise reduction menu.

The **SDNR Insert** parameter under the **Video Setup > Processing > SD NR/Enhancement** menu selects a video input source to be processed by this block. All video output groups using the video input source selected by the **SDNR Insert** parameter will automatically have the SD noise reducer inserted into their video processing paths.

# SD NR/Enhancement

The optional video noise and artifact reducer is based on Leitch's AVARI (Advanced Video Artifact Reducer I) technology. This feature is capable of impulse noise reduction, Gaussian random noise reduction, compression blockiness and mosquito artifact reduction and the sharpening and softening of images.

The impulse noise reducer is particularly effective in reducing satellite noise. It automatically detects impulse noise and applies a median filter when necessary. To achieve the ideal setting, adjust the **Impulse Noise Level** control to reduce more impulse noise, but not to the extent that excessive motion artifacts are generated.

AVARI technology uses a recursive 3D directional filter that reduces Gaussian noise and compression artifacts, which includes the ability to block artifacts and mosquito noise. For ideal effectiveness, adjust the **Noise/Artifact Level** control up to see more effect on filtering, but not to a level where excessive blurring is visible.

The directional softening/sharpening filter can be used in various applications. For example, the softening filter can be used as a compression pre-filter to reduce mosquito noise, and the sharpening filter can be used to enhance picture appearance. The **Soften/Sharpen** control provides this function; a negative value achieves a softening effect, and a positive value results in a sharpening effect. While adjusting these controls, the **Split Screen** feature may be used to compare the filtered video against unfiltered video.

The overall filter delay is approximately 1 line when the **Minimum Delay** parameter is set to **Yes**, and approximately 1 field when set to **No**. The overall performance is slightly better when **Minimum Delay** is set to **No**.

# HD NR/Enhancement

The HD digital noise reduction and enhancement controls are included as a standard feature with the HD submodule and may be applied to the X75HD's HD outputs.

When equipped with the X75OPT-NR option, for the up-converted HD output signal, you can use either (or both) of the SD or HD noise reduction functions. To use the **SD NR/Enhancement** feature in this case, set the **SDNR Insert** parameter to the appropriate SD video input as described in the previous section.

# Using the Test Signal Generator

An X75HD/X75SD unit provides HDTV(8-bits) and SDTV(10-bits) internal test signals. Table 10-9 on page 193 and Table 10-10 on page 194 respectively show the list of test signals for each standard, and these options are directly accesible through the **TSG** button.The SD Keyer and the test signals function share the same processing block. Using the **Keyer/TSGInsert** parameter in **Video Setup > Processing > SD TSG & Slide**, you can select a video source to be processed by this block. All video output groups using the video input source selected at the **Keyer/TSG Insert** parameter will automatically have the Keyer/TSG inserted into their video processing paths.

**Table 10-9.** HDTV Test Signals

| HD-SDI 1080 | HD-SDI 720 |
| --- | --- |
| Black | Black |
| Color Bars 100% | Color Bars 100% |
| Color Bars 75% | Color Bars 75% |
| Color Bars 100% 4:3 | Color Bars 100% 4:3 |
| Horizontal Sweep Y-only | Horizontal Sweep Y-only |
| Horizontal Sweep | Horizontal Sweep |
| White | White |
| 10-Step | 10-Step |
| 5-Step | 5-Step |
| Ramp Y-only | Ramp Y-only |
| Ramp | Ramp |
| Multiburst Y-only | Multiburst Y-only |
| Multiburst | Multiburst |
| Pluge | Pluge |
| Aspect 4:3 | Aspect 4:3 |
| RP219-1 | RP219-1 |
| RP219-2 | RP219-2 |
| RP219-3 | RP219-3 |
| RP219-4 | RP219-4 |

**Table 10-10.** SDTV Test Signals

| SD-SDI 525 | SD-SDI 625 |
|---|---|
| SMPTE Bars | Bars 100% |
| EIA Bars | Black |
| Full Field Bars | Gray |
| Bars/Reverse | White |
| Bars/Red | Luma Ramp |
| Bars 100% | Modulated Ramp |
| Black | Luma 5-Step |
| Gray | Modulated 5-Step |
| White | Shallow Ramp |
| Luma Ramp | Luma Sweep 5.5MHz |
| Modulated Ramp | Chroma Sweep |
| Luma 5-Step | VIRS |
| Modulated 5-Step | Cross Hatch |
| Shallow Ramp | Pluge |
| Multiburst-60IRE | SIN(X)/X |
| Luma Sweep 5.5MHz | Timing Bowtie |
| Chroma Sweep | Matrix 1 |
| Pulse and Bar | FF Bounce |
| NTC7 Composite | SDI EQ Test |
| NTC7 Combination | SDI PLL Test |
| FCC Composite | Zone Plate |
| VIRS | Bars/Red 100% |
| Cross Hatch | EBU Bars |
| Pluge | EBU Bars/Red |
| SIN(X)/X | Multiburst 5.0MHz |
| Red Field | Multiburst 5.8MHz |
| Timing Bowtie | Multiburst 420mV |

**Table 10-10.** SDTV Test Signals *(Continued)*

| SD-SDI 525 | SD-SDI 625 |
|---|---|
| Matrix 1 | Pulse & Bar 2410t |
| Matrix 2 | Pulse & Bar 248t |
| FF Bounce | Pulse & Bar 2t |
| SDI EQ Test | Luma 10-Step |
| SDI PLL Test | Valid Ramp |
| Zone Plate | Multipulse 5.8MHz |
| SDI Pathological | Shallow Ramps |
| 30 Hz | VITS 17 |
| | VITS 18 |
| | VITS 19 |
| | VITS 20 |
| | VITS 330 |
| | VITS 331 |
| | Red Field 75% |
| | Red Field 100% |
| | Ramp 100 |
| | Ramp 120 |
| | UBM Ramps |
| | SDI Pathological |
| | 25 Hz |

# Using the ARC Function

The **SD-ARC Insert** parameter under the **Video Setup > Processing > ARC (SD-SDI Out)** menu selects a video input source to be processed by the SD aspect ratio converter. All video output groups using the video input source selected by the **SD-ARC Insert** parameter will automatically have the SD-ARC inserted into their video processing path. The HD-ARC is always available for HD outputs.

The **ARC** button provides quick access to the ARC (SD-SDI Out) and ARC (HD-SDI Out) controls. When the HD video processing block is currently selected, pressing the **ARC** button takes you straight to the ARC (SD-SDI Out) variable controls. When the SD 1, SD 2 or Analog video proc amp block is currently selected, pressing the **ARC** button takes you straight to the ARC (HD-SDI Out) variable controls.

Depending on the video configuration, you must manually select the appropriate ARC controls to apply the settings to outputs. The following options are available when the **ARC** button is pressed:

- Aspect Ratio Lock
- H. Size
- H Position
- V Size
- V Position

The manually adjusted User settings can be saved or recalled from the four ARC Presets that are available from each ARC (HD-SDI Out) and ARC (SD-SDI Out) menus.

The X75HD/X75SD also provides viewing modes to allow the quick selection of predefined input and output aspect ratios.

# HD Aspect Ratio Conversion

illustrates the options in the HD ARC (HD-SDI Out) preset. The following viewing modes are available:

- Anamorphic
- Pillar Box
- Middle Cut
- 14:9 Pillar Box
- 21:9 Letter Box

# SD Aspect Ratio Conversion

illustrates the options in the SD ARC (SD-SDI Out) preset. The following viewing modes are available:

- Anamorphic
- Letter Box
- Center Cut
- 14:9 Letter Box
- 21:9 Letter Box

| 4:3 Input | 16:9 Display Output Viewing Options |
|---|---|
| 4:3 Source — 4:3 Display — Input Signal | 4:3 Source — 16:9 Display — Anamorphic Stretch |
| | 4:3 Source — 16:9 Display — Middle Cut |
| | 4:3 Source — 16:9 Display — Pillar Box |
| | 4:3 Source — 16:9 Display — 14:9 Pillar Box |
| | 4:3 Source — 16:9 Display — 21:9 Letter Box |
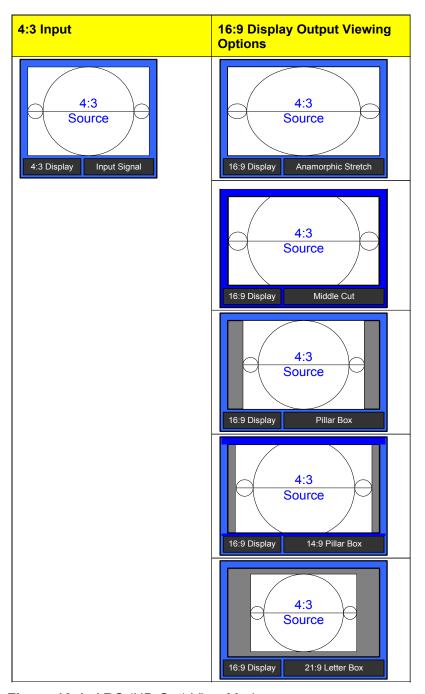
**Figure 10-1.** ARC (HD Out) View Modes

| 16:9 Input | 4:3 Display Output Viewing Options |
|---|---|
| 16:9 Source — 16:9 Display / Input Signal | 16:9 Source — 4:3 Display / Anamorphic Squeeze |
| | 16:9 Source — 4:3 Display / Center Cut |
| | 16:9 Source — 4:3 Display / 16:9 Letter Box |
| | 16:9 Source — 4:3 Display / 14:9 Letter Box |
| | 16:9 Source — 4:3 Display / 21:9 Letter Box |
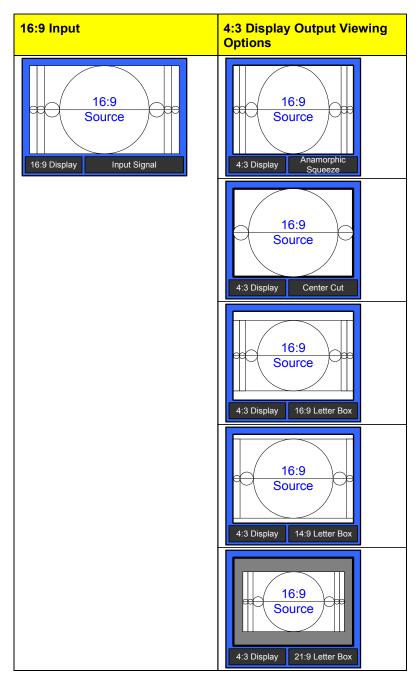
**Figure 10-2.** ARC (SD-SDI Out) Viewing Modes

# Using the Timing Control

Using the **Timing** button, you can quickly access the currently selected video processing block's phase controls. When multiple input video sources are selected and processed, pressing the **Ctrl** and **V Proc** buttons allows you to switch between the processing blocks and leads you directly to the selected timing controls.

The **Proc** LEDs on the right side of the front panel and the display show the currently selected and active block.

- When the Analog processing block is selected, press the **Timing** button to access the **AVFS & Timing** submenu.

- When an SD processing block is selected, press the **Timing** button to access the **SD1 FS & Timing** or **SD2 FS & Timing** submenus.

- When the HD processing block is selected, press the **Timing** button to access the **HD Out V-Phase** parameter under the **Processing** menu, and press the **Exit** button to access the HD Out H-Phase control.

The timing controls for the down-converted signal can be adjusted with the **SD-ARC/HD Dn V-Ph** and **SD-ARC/HD Dn H-Ph** controls from the **Video Setup > Processing** menu.

# Using Option Controls

The **Option** control panel shortcut allows quick access to certain parameters, some of which become enabled with the purchase and installation of various optional modules and upgrades.

To access the list of **Option** parameters, press the **Option** button, and then select one of the following items:

- **History**: The last ten parameters that you have viewed or modified appear chronologically in the **History** list. The most recent event appears at the bottom of the list. This list is deleted if the control panel loses its power.

- **Active Alarms**: Using this parameter, you can set the parameters for alarms on your network of X75-RCP-enabled devices. For each alarm, you can make the following settings:
  - Trigger Time
  - Clear Time

- Priority
- Alarm Mute
- Acknowledged

- **Alarms Log**: The last 20 alarms (minor and major) are listed in the Alarms Log. This is a read-only list; it can only be cleared by disconnecting power to the control panel.

- **Configure Alarms**: Use this parameter to set the parameters for alarms on your network of X75-RC- enabled devices. For each alarm, you can access the following options:
  - Trigger Time
  - Clear Time
  - Priority
  - Alarm Mute
  - Acknowledged

For a complete list of all the possible alarms, see .

- **Favorite 1** and **Favorite 2**: Use these two lists to retain the ten most-needed parameters. With each parameter listing that you wish to save, press **Favorite 1** or **Favorite 2** from the **Options List**, and then select **Add**. The message "Item added" appears. See for more information.

- **Preset**: This shortcut leads you directly to the **Memory** menu (see ).

- **MuteKeepAlive:** The X75HD/X75SD unit sends out a "keep alive" message at approximately every 15 seconds. The keep alive checks to determine if the device is still active and resides on the control network. The following options are available:
  - **No**: The keep alive message is broadcast every 15 seconds by the X75 unit to be discovered by the client control systems.
  - **Yes**: Suppresses the keep alive message unless it is requested by any client control system.

    If the X75 is repowered with the **Mute KeepAlive** option set to **Yes**, a client device such as a remote control panel will not be able to discover the unit until the control panel is repowered.

- **Home**: This option returns you to the **Main** menu.

- **Path**: Using this feature, you can establish the path of the parameter that you are currently viewing or adjusting. To obtain the path, select **Path** from the options list, and then press **Enter**. Rotate the control knob to view the entire path.

- **Lock Panel**: By selecting and entering this parameter, all card-edge controls are locked out, preventing accidental changes. To remove the Lock Panel function, press **Ctrl** + **Exit**. If you are using a DPS-575 or RC-575 to control the X75, press the **Default** + **Exit** buttons on the DPS-575 or RC-575 to remove the locked panel function.

- **Setup**: The **Setup** menu contains a number of parameters that affect how your display screen operates (see "Display Screen Setup Parameters" on page 203).

More information on each of these control options can be found in the *Control Panels for X75 Systems Installation and Operation Manual*.

# Rebooting Shortcut

To reboot the X75HD/X75SD unit without using the power switch, press the SHIFT + CTL + NR buttons simultaneously.

# Display Screen Setup Parameters

The display screen Setup parameters affect the way in which the display screen functions on your panel. These settings do not affect how parameters are seen on other panels.

To access the display screen Setup Menu, follow these steps:

1. Press the **Option** button.

2. Rotate the control knob and select **Setup**.

3. Press the **Enter** button.

The display screen Setup parameters are described in the following pages.

## Scroll Mode

In *Wrap* mode, when you scroll through menus and non-numeric parameters, the module considers the list as a circular set of data. When the last parameter in the list is reached, the first parameter in the list immediately follows it. In *Don't Wrap* mode, the module stops when the last parameter in the list is displayed. To return to the first parameter, you must scroll through the entire list in the opposite direction. The **Scroll Mode** options globally affect all non-numeric parameters as they appear on the control panel where you have made this setting. Numeric values are not affected by Scroll Mode options.

## Display Intensity

To accommodate different equipment room lighting conditions, you can set the panel to five levels of display intensity: 100%, 75%, 50%, and 25%.

## Screen Saver Timeout

To extend the life of the display device, the screen saver automatically shuts off the display after a preset period of inactivity. Using the **Screen Saver Timeout** parameter, you can set the duration of inactivity after which the control panel display turns off, or you can disable the screen saver. The available time options are 5, 10, 20, and 30 minutes.

To exit the screen saver mode, press the control knob or any button. No parameters will be changed when you exit the screen saver mode.

# Screen Saver Select

The screen saver can be set to either **Blank** or **Default**. The **Default** screen saver consists of a line of scrolling text.

# Shaft Direction

Using this parameter, you can determine whether the clockwise rotation of the control knob moves a parameter list up or down. The setting of this parameter only applies to navigation, and does not effect the adjustment of numeric values. To make numeric values increase, the control knob must always be turned the knob clockwise. To make values decrease, you must always turn the knob counter-clockwise.

# 1 Click Favorite

The Favorites feature has an additional **1 Click Fav** capability that makes it possible for you to directly access the first item in your favorites list, saving several steps. In this mode, the first item in the Favorites list appears on the screen directly, and you can execute it by pressing **Enter**. To enable the **1 Click Fav** capability, select **Yes.** See page 189 for details.

# Backlite

This feature illuminates the X75's buttons in dark locations; buttons that have been activated when the **Backlite** is enabled will now flash.

To enable this feature, follow this path:

**Option** button > **Setup** > **Backlite** > **On**.

# Section III—Appendixes

This section contains the following topics:

These appendixes contain extra information useful for configuring, operating, and servicing your X75HD/X75SD system.

# Cables and Pinouts

## Overview

This appendix describes various cable options and I/O, video, and audio cable pinouts (both standard and optional) available for use with the X75HD/X75SD. The following topics are covered in this chapter:

# Summary of Cables and Cable Sets

Table A-1 lists all of the standard and optional cables and cable sets used in different X75HD/X75SD packages. Details begin on page 221.
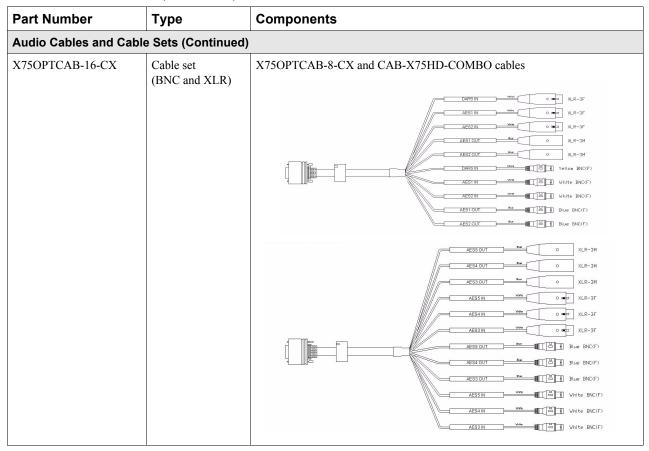
**Table A-1.** Cables and Cable Sets

| Part Number | Type | Components |
|---|---|---|
| **Multiple Input/Output (Non-Audio) Set** | | |
| X75OPTCAB-MULTI | Single cable | X75OPTCAB-MULTI  |
| **DVI-D Output** | | |
| X75OPTCAB-DVI | Single cable | X75OPTCAB-DVI  |
| **Audio Cables and Cable Sets** | | |
| X75OPTCAB-8-C | Single cable (BNC) | X75OPTCAB-8-C  |
| X75OPTCAB-8-X | Single cable (XLR) | X75OPTCAB-8-X  |

| Standard/Optional | Description | Major Features |
|---|---|---|
| | | |
| Optional | One cable for multi input/output connectors<br>• Sync/comp out<br>• Blue, Green, and Red out<br>• Y/C out<br>• SDTV and HDTV audio delay<br>• GPI1 and GPI2 in<br>• GPI1 and GPI2 out | 1 ft (30 cm) multi I/O breakout cable with the following connector types:<br>• DB26(M) to 6 x BNC(F), 1 x XLR(F), 1 x MiniDin4(F), and 4 x RCA(F) |
| | | |
| Optional | One cable for DVI-D single-link output | DVI-D to DVI-D (digital-single link) cable |
| | | |
| Standard (X75SD) | One cable for 8-channel audio synchronizer, with the following unbalanced coax AES connectors:<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out | 1 ft (30 cm) breakout cable with the following connector types:<br>• DB26(M) to 5 x BNC(F) |
| Optional | One cable for 8-channel audio synchronizer, with the following balanced XLR AES connectors:<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out | 1 ft (30 cm) breakout cable with the following connector types:<br>• DB26(M) to 3 x XLR(F)<br>• 2 x XLR(M) |
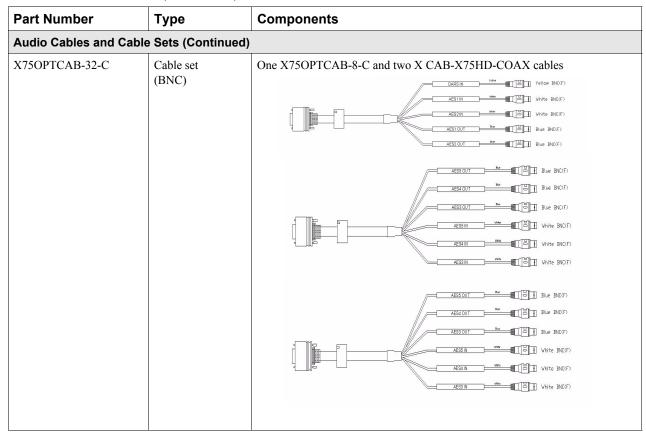
## Cables and Cable Sets (Continued)

| Part Number | Type | Components |
|---|---|---|
| **Audio Cables and Cable Sets (Continued)** | | |
| X75OPTCAB-8-CX | Single cable (BNC and XLR) | X75OPTCAB-8-CX<br> |
| X75OPTCAB-16-C | Cable set (BNC) | X75OPTCAB-8-C and CAB-X75HD-COAX cables<br> |
| X75OPTCAB-16-X | Cable set (XLR) | X75OPTCAB-8-X and CAB-X75HD-XLR cables<br> |

| Standard/Optional | Description | Major Features |
|---|---|---|
| | | |
| Optional | One cable for 8-channel audio synchronizer, with the following unbalanced coax AES and XLR connectors:<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out | 1 ft (30 cm) breakout cable with the following connector types:<br>• DB26(M) to 5 x BNC(F)<br>• 3 x XLR(F)<br>• 2 x XLR(M) |
| Standard (HD) | Two cable sets for 16-channel audio synchronizer, with unbalanced coax AES connectors<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out<br>• AES3, AES4, and AES5 in<br>• AES3, AES 4, and AES 5 out | 2 X 1 ft. (30 cm) breakout cables with the following connector types:<br>• DB26(M) to 5 x BNC(F)<br>• DB44(M) to 6 x BNC(F) |
| Optional | Two cable sets for 16-channel audio synchronizer, with balanced XLR AES connectors<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out<br>• AES3, AES4, and AES5 in<br>• AES3, AES 4, and AES 5 out | 2 X 1 ft (30 cm) breakout cables with the following connector types:<br>• DB26(M) to 3 x XLR(F) and 2 x XLR(M)<br>• DB44(M) to 3 x XLR(F) and 3 x XLR(M) |
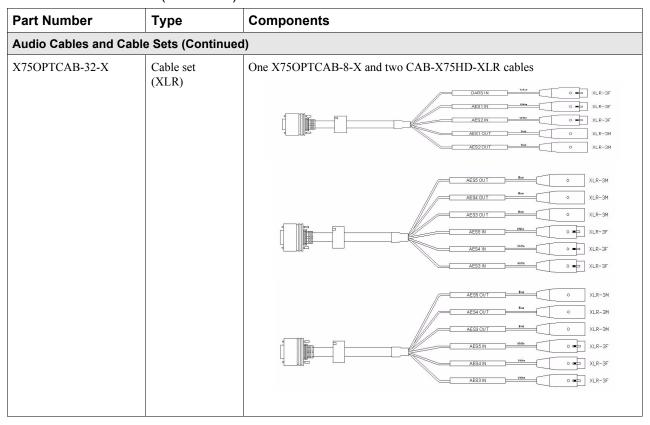
## Cables and Cable Sets (Continued)
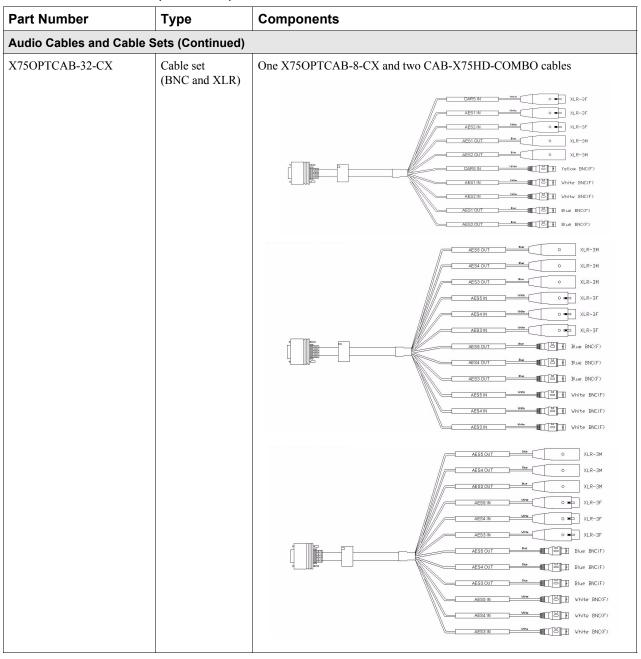
| Part Number | Type | Components |
|---|---|---|
| **Audio Cables and Cable Sets (Continued)** | | |
| X75OPTCAB-16-CX | Cable set (BNC and XLR) | X75OPTCAB-8-CX and CAB-X75HD-COMBO cables  |

| Standard/Optional | Description | Major Features |
|---|---|---|
| | | |
| Optional | Two cables for 16-channel audio synchronizer, unbalanced coax AES and balanced XLR AES<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out<br>• AES3, AES4, and AES5 in<br>• AES3, AES 4, and AES 5 out | 2 X 1 ft (30 cm) breakout cables with the following connector types:<br>• DB26(M) to 5 x BNC(F), 3 x XLR(F), and 2 x XLR(M)<br>• DB44(M) to 6 x BNC(F), 3 x XLR(F), and 3 x XLR(M) |

## Cables and Cable Sets (Continued)

| Part Number | Type | Components |
|---|---|---|
| **Audio Cables and Cable Sets (Continued)** | | |
| X75OPTCAB-32-C | Cable set (BNC) | One X75OPTCAB-8-C and two X CAB-X75HD-COAX cables |

| Standard/Optional | Description | Major Features |
|---|---|---|
| | | |
| Included with X75OPT-AS-32 (-L) | Three cable sets for 32-channel audio synchronizer, with unbalanced coax AES connectors<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out<br>• AES3, AES4, and AES5 in and out<br>• AES6, AES7, and AES8 in and out | 3 X 1 ft (30 cm) breakout cables with the following connector types:<br>• DB26(M) to 5 x BNC(F)<br>• 2 X DB44(M) to 6 x BNC(F) |

## Cables and Cable Sets (Continued)

| Part Number | Type | Components |
|---|---|---|
| **Audio Cables and Cable Sets (Continued)** | | |
| X75OPTCAB-32-X | Cable set (XLR) | One X75OPTCAB-8-X and two CAB-X75HD-XLR cables<br> |

| Standard/Optional | Description | Major Features |
|---|---|---|
| | | |
| Optional | Three cable sets for 32-channel audio synchronizer, with balanced XLR AES connectors<br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out<br>• AES3, AES4, and AES5 in and out<br>• AES6, AES7, and AES8 in and out | 3 X 1 ft (30 cm) breakout cables with the following connector types:<br>• DB26(M) to 3 x XLR(F) and 2 x XLR(M)<br>• 2 X DB44(M) to 3 x XLR(F) and 3 x XLR(M) |

## Cables and Cable Sets (Continued)

| Part Number | Type | Components |
|---|---|---|
| **Audio Cables and Cable Sets (Continued)** | | |
| X75OPTCAB-32-CX | Cable set (BNC and XLR) | One X75OPTCAB-8-CX and two CAB-X75HD-COMBO cables  |

| Standard/Optional | Description | Major Features |
|---|---|---|
| | | |
| Optional | Three cable sets for 32-channel audio synchronizer, unbalanced coax AES and balanced XLR AES<br><br>• AES1, AES2, and DARS in<br>• AES1 and AES2 out<br>• AES3, AES4, and AES5 in and out<br>• AES6, AES7, and AES8 in and out | 3 X 1 ft (30 cm) breakout cables with the following connector types:<br><br>• DB26(M) to 5 x BNC(F), 3 x XLR(F), and 2 x XLR(M)<br>• 2 X DB44(M) to 6 x BNC(F), 3 x XLR(F), and 3 x XLR(M) |

# Analog Audio Connections

Figure A-1 shows the analog audio input and output terminal blocks.
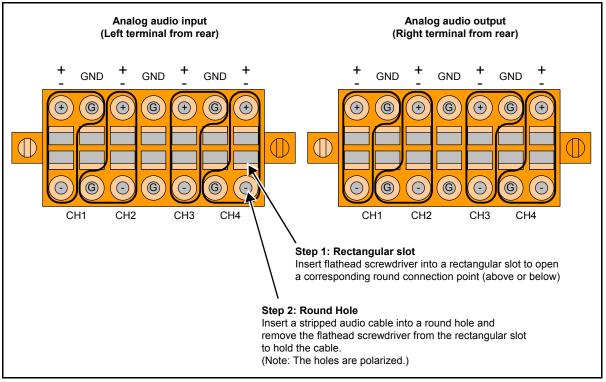


**Figure A-1.** Analog Audio Input and Output Terminal Blocks

# Individual Cables

## Multi I/O Cable (X75OPTCAB-MULTI)

Figure A-2 identifies the cable connectors available on the optional multiple input/output X75OPTCAB-MULTI cable.
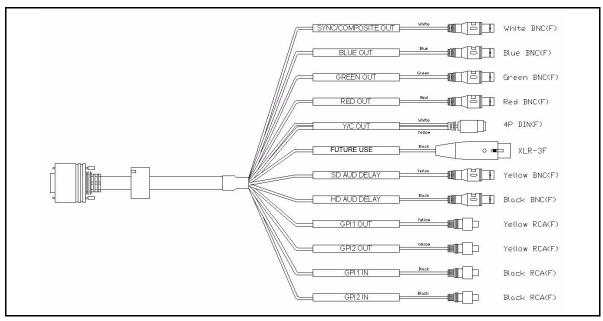


**Figure A-2.** X75OPTCAB-MULTI Cable Connectors

Figure A-3 shows the pinouts for the X75OPTCAB-MULTI DB-26M connector.
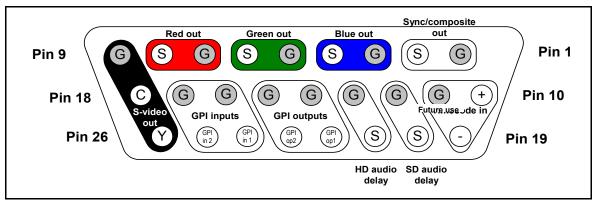


**Figure A-3.** X75OPTCAB-MULTI I/O Connector Pinout

Table A-2 describes each pin on the X75OPTCAB-MULTI DB-26M connector and its connection type.

**Table A-2.** X75OPTCAB-MULTI Pinout Descriptions

| Pin Number | Connection Type | Description |
|---|---|---|
| 1 | BNC-Gnd | Sync/composite out ground |
| 2 | BNC | Sync/composite out signal |
| 3 | BNC-Gnd | Blue out ground |
| 4 | BNC | Blue out signal |
| 5 | BNC-Gnd | Green out ground |
| 6 | BNC | Green out signal |
| 7 | BNC-Gnd | Red out ground |
| 8 | BNC | Red out signal |
| 9 | 4-Pin DIN-1-Gnd<br>4-Pin DIN-2-Gnd | S-video (Y) ground<br>S-video (C) ground |
| 10 | XLR-2 | Future use |
| 11 | XLR-1-Gnd | Future use |
| 12 | BNC-Gnd | SDTV audio delay ground |
| 13 | BNC-Gnd | HDTV audio delay ground |
| 14 | RCA-Gnd | GPI out 1 ground |

**Table A-2.** X75OPTCAB-MULTI Pinout Descriptions *(Continued)*

| Pin Number | Connection Type | Description |
|---|---|---|
| 15 | RCA Gnd | GPI out 2 ground |
| 16 | RCA Gnd | GPI in 1 ground |
| 17 | RCA Gnd | GPI in 2 ground |
| 18 | 4-Pin DIN-4 | S-video (C) out |
| 19 | XLR-3 | Future use |
| 20 | BNC | SDTV audio delay out |
| 21 | BNC | HDTV audio delay out |
| 22 | RCA | GPI out 1 |
| 23 | RCA | GPI out 2 |
| 24 | RCA | GPI in 1 |
| 25 | RCA | GPI in 2 |
| 26 | 4-Pin DIN-3 | S-video (Y) out |

# DVI-D Output Cable (X75OPTCAB-DVI)

The optional DVI-D to DVI-D digital single-link cable connects a monitor to the DVI Out port on the back of the X75HD/X75SD unit. This is a straight connection cable with no breakouts, and a single DVI-D connector for digital video output.
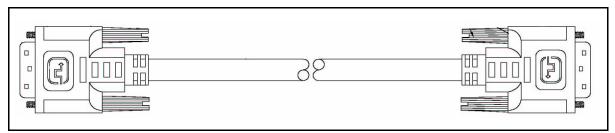


**Figure A-4.** DVI-D to DVI-D Cable

# Audio Coax Cable (X75OPTCAB-8-C)

Figure A-5 identifies the cable connectors available on the AES/EBU audio X75OPTCAB-8-C coax cable, supplied standard with each X75SD unit.
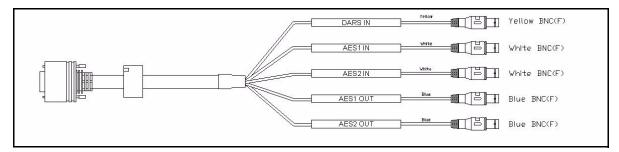


**Figure A-5.** X75OPTCAB-8-C Cable Connectors

Figure A-6 shows the pinouts for the X75OPTCAB-8-C DB-26M connector.
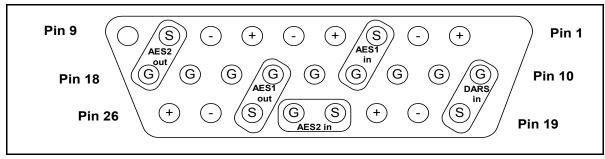


**Figure A-6.** X75OPTCAB-8-C Connector Pinout

Table A-3 describes each pin on the X75OPTCAB-8-C DB-26M connector and its connection type.

**Table A-3.** X75OPTCAB-8-C Pinout Description

| Pin Number | Connection Type | Description |
|---|---|---|
| 1 | NC | N/A |
| 2 | NC | N/A |
| 3 | BNC | Unbalanced AES1 in |
| 4 | NC | N/A |

**Table A-3.** X75OPTCAB-8-C Pinout Description *(Continued)*

| Pin Number | Connection Type | Description |
| --- | --- | --- |
| 5 | NC | N/A |
| 6 | NC | N/A |
| 7 | NC | N/A |
| 8 | BNC | Unbalanced AES2 out |
| 9 | NC | N/A |
| 10 | BNC-GND | Unbalanced DARS in ground |
| 11 | NC | N/A |
| 12 | NC | N/A |
| 13 | BNC-GND | Unbalanced AES1 in ground |
| 14 | NC | N/A |
| 15 | BNC-GND | Unbalanced AES1 out ground |
| 16 | NC | N/A |
| 17 | NC | N/A |
| 18 | BNC-GND | Unbalanced AES2 out ground |
| 19 | BNC | Unbalanced DARS in |
| 20 | NC | N/A |
| 21 | NC | N/A |
| 22 | BNC | Unbalanced AES2 in |
| 23 | BNC-GND | Unbalanced AES2 in ground |
| 24 | BNC | Unbalanced AES1 out |
| 25 | NC | N/A |
| 26 | NC | N/A |

# Audio Coax Cable (CAB-X75HD-COAX)

The CAB-X75HD-COAX cable is included in the X75OPTCAB-16-C package (1 per) and the X75OPTCAB-32-C package (2 per). When the second CAB-X75HD-COAX cable is used in the X75OPTCAB-32-C package, the pinout numbering changes from the diagram below. For the second cable, AES3 becomes AES6, AES4 becomes AES7, and AES5 becomes AES8.
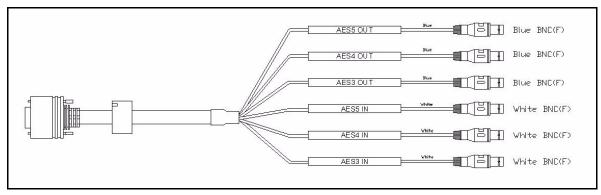


**Figure A-7.** CAB-X75HD-COAX Cable Connectors

Figure A-8 shows the pinouts for the X75OPTCAB-16-C DB-44M connector.
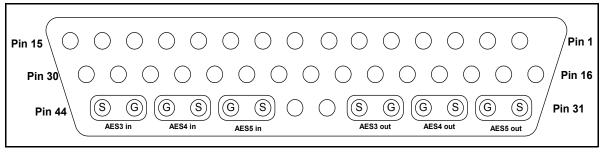


**Figure A-8.** CAB-X75HD-COAX Connector Pinout

Table A-4 describes each pin on the CAB-X75HD-COAX DB-44M connector and its connection type.

**Table A-4.** CAB-X75HD-COAX Pinout Description

| Pin Number | Connection Type | Description |
|---|---|---|
| 1 through 30 | NC | N/A |
| 31 | BNC | Unbalanced AES5 out |
| 32 | BNC-Gnd | Unbalanced AES5 out Ground |
| 33 | BNC | Unbalanced AES4 out |
| 34 | BNC-Gnd | Unbalanced AES4 out ground |
| 35 | BNC-Gnd | Unbalanced AES3 out ground |
| 36 | BNC | Unbalanced AES3 out |
| 37 | NC | N/A |
| 38 | NC | N/A |
| 39 | BNC | Unbalanced AES5 in |
| 40 | BNC-Gnd | Unbalanced AES5 in ground |
| 41 | BNC | Unbalanced AES4 in |
| 42 | BNC-Gnd | Unbalanced AES4 in ground |
| 43 | BNC-Gnd | Unbalanced AES3 in ground |
| 44 | BNC | Unbalanced AES3 in |

# Audio BNC/XLR Cable (X75OPTCAB-8-XC)

Figure A-9 identifies the cable connectors available on the optional AES/EBU X75OPT-CAB-8-XC combination BNC/XLR audio cable, supporting both unbalanced and balanced audio signals.
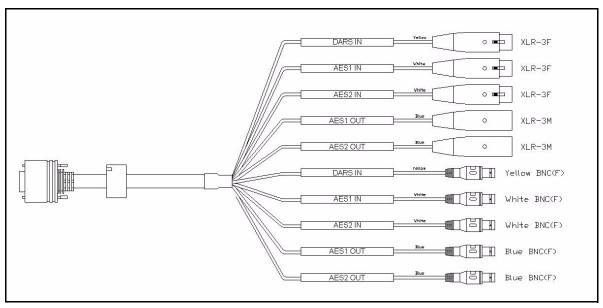


**Figure A-9.** X75OPTCAB-8-XC Cable Connectors

Figure A-10 shows the pinouts for the X75OPTCAB-8-XC DB-26M connector.
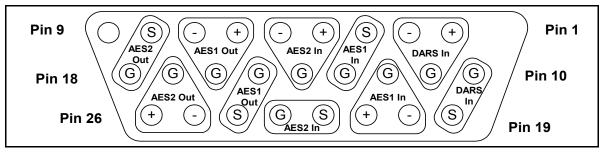


**Figure A-10.** X75OPTCAB-8-XC Connector Pinout

Table A-5 describes each pin on the X75OPTCAB-8-XC DB-26M connector and its connection type.

**Table A-5.** X75OPTCAB-8-XC Pinout Description

| Pin Number | Connection Type | Description |
|---|---|---|
| 1 | XLR-2 | Balanced DARS in (+) |
| 2 | XLR-3 | Balanced DARS in (-) |
| 3 | BNC | Unbalanced AES1 in |
| 4 | XLR-2 | Balanced AES2 in (+) |
| 5 | XLR-3 | Balanced AES2 in (-) |
| 6 | XLR-2 | Balanced AES1 out (+) |
| 7 | XLR-3 | Balanced AES1 out (-) |
| 8 | BNC | Unbalanced AES2 out |
| 9 | NC | N/A |
| 10 | BNC-GND | Unbalanced DARS in ground |
| 11 | XLR-1-GND | Balanced DARS in ground |
| 12 | XLR-1-GND | Balanced AES1 in ground |
| 13 | BNC-GND | Unbalanced AES1 in ground |
| 14 | XLR-1-GND | Balanced AES2 in ground |
| 15 | BNC-GND | Unbalanced AES1 out ground |
| 16 | XLR-1-GND | Balanced AES1 out ground |
| 17 | XLR-1-GND | Balanced AES2 out ground |
| 18 | BNC-GND | Unbalanced AES2 out ground |
| 19 | BNC | Unbalanced DARS in |
| 20 | XLR-3 | Balanced AES1 in (-) |
| 21 | XLR-2 | Balanced AES1 in (+) |
| 22 | BNC | Unbalanced AES 2 in |
| 23 | BNC-GND | Unbalanced AES2 in ground |
| 24 | BNC | Unbalanced AES1 out |
| 25 | XLR-3 | Balanced AES2 out (-) |
| 26 | XLR-2 | Balanced AES2 out (+) |

# Audio BNC/XLR Cable (CAB-X75HD-COMBO)

Figure A-11 identifies the cable connectors available on the optional AES/EBU CAB-X75HD-COMBO combination BNC/XLR audio cable, which supports both unbalanced and balanced audio signals. When the second CAB-X75HD-COMBO cable is used in the X75OPTCAB-32-C set, the pinout numbering changes from the diagram below. For the second cable, AES3 becomes AES5, AES4 becomes AES6, and AES5 becomes AES8.
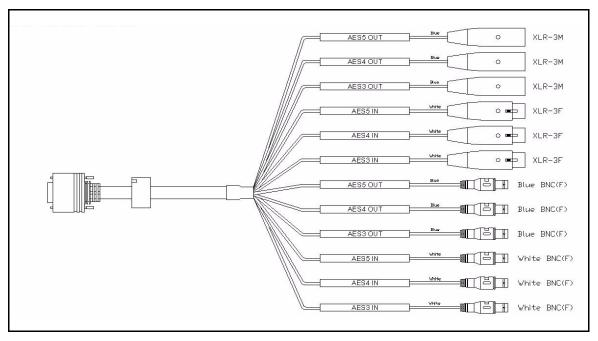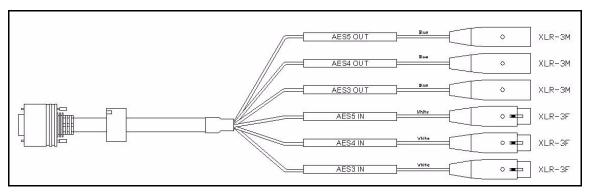


**Figure A-11.** CAB-X75HD-COMBO Cable Connectors

Figure A-12 shows the pinouts for the X75OPTCAB-16-CX DB-44M connector.
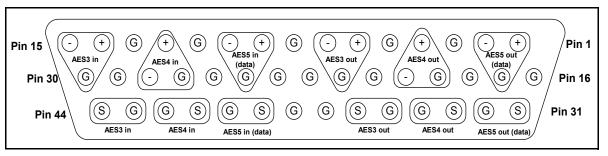


**Figure A-12.** CAB-X75HD-COMBO Connector Pinout

Table A-6 describes each pin on the CAB-X75HD-COMBO DB-44M connector and its connection type.

**Table A-6.** CAB-X75HD-COMBO Pinout Description

| Pin Number | Connection Type | Description |
| --- | --- | --- |
| 1 | XLR-2 | Balanced AES5 out (+) |
| 2 | XLR-3 | Balanced AES5 out (-) |
| 3 | NC | N/A |
| 4 | XLR-2 | Balanced AES4 out (+) |
| 5 | NC | N/A |
| 6 | XLR-2 | Balanced AES3 out (+) |
| 7 | XLR-3 | Balanced AES3 out (-) |
| 8 | NC | N/A |
| 9 | XLR-2 | Balanced AES5 in (+) |
| 10 | XLR-3 | Balanced AES5 in (-) |
| 11 | NC | N/A |
| 12 | XLR-2 | Balanced AES4 in (+) |
| 13 | NC | N/A |
| 14 | XLR-2 | Balanced AES3 in (+) |
| 15 | XLR-3 | Balanced AES3 in (-) |
| 16 | NC | N/A |

**Table A-6.** CAB-X75HD-COMBO Pinout Description *(Continued)*

| Pin Number | Connection Type | Description |
|---|---|---|
| 17 | XLR-1-Gnd | Balanced AES5 out ground |
| 18 | NC | N/A |
| 19 | XLR-1-Gnd | Balanced AES4 out ground |
| 20 | XLR-3 | Balanced AES4 out (-) |
| 21 | NC | N/A |
| 22 | XLR-1-Gnd | Balanced AES3 out ground |
| 23 | NC | N/A |
| 24 | NC | N/A |
| 25 | XLR-1-Gnd | Balanced AES5 in ground |
| 26 | NC | N/A |
| 27 | XLR-1-Gnd | Balanced AES4 in ground |
| 28 | XLR-3 | Balanced AES4 in (-) |
| 29 | NC | N/A |
| 30 | XLR-1-Gnd | Balanced AES3 in ground |
| 31 | BNC | Unbalanced AES5 out |
| 32 | BNC-Gnd | Unbalanced AES5 out ground |
| 33 | BNC | Unbalanced AES4 out |
| 34 | BNC-Gnd | Unbalanced AES4 out ground |
| 35 | BNC-Gnd | Unbalanced AES3 out ground |
| 36 | BNC | Unbalanced AES3 out |
| 37 | NC | N/A |
| 38 | NC | N/A |
| 39 | BNC | Unbalanced AES5 in |
| 40 | BNC-Gnd | Unbalanced AES5 in ground |
| 41 | BNC | Unbalanced AES4 in |
| 42 | BNC-Gnd | Unbalanced AES4 in ground |
| 43 | BNC-Gnd | Unbalanced AES3 in ground |
| 44 | BNC | Unbalanced AES3 in |

# Optional Audio XLR Cable (X75OPTCAB-8-X)

Figure A-13 identifies the cable connectors available on the optional AES/EBU X75OPTCAB-8-X XLR audio cable, which supports balanced audio signals.
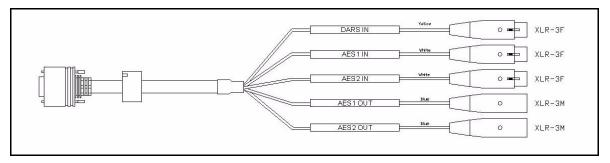


**Figure A-13.** X75OPTCAB-8-X Cable Connectors

Figure A-14 shows the pinouts for the X75OPTCAB-8-X DB-26M connector.
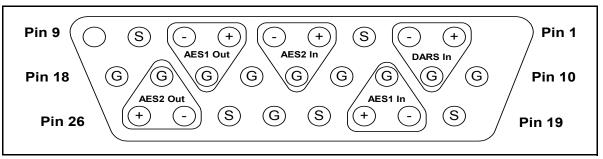


**Figure A-14.** X75OPTCAB-8-X Connector Pinout

Table A-7 on page 235 describes each pin on the X75OPTCAB-8-X DB-26M connector and its connection type.

**Table A-7.** X75OPTCAB-8-X Pinout Description

| Pin Number | Connection Type | Description |
| --- | --- | --- |
| 1 | XLR-2 | Balanced DARS in (+) |
| 2 | XLR-3 | Balanced DARS in (-) |
| 3 | NC | N/A |
| 4 | XLR-2 | Balanced AES2 in (+) |
| 5 | XLR-3 | Balanced AES2 in (-) |
| 6 | XLR-2 | Balanced AES1 out (+) |
| 7 | XLR-3 | Balanced AES1 out (-) |
| 8 | NC | N/A |
| 9 | NC | N/A |
| 10 | NC | N/A |
| 11 | XLR-1-GND | Balanced DARS in ground |
| 12 | XLR-1-GND | Balanced AES1 in ground |
| 13 | NC | N/A |
| 14 | XLR-1-GND | Balanced AES2 in ground |
| 15 | NC | N/A |
| 16 | XLR-1-GND | Balanced AES1 out ground |
| 17 | XLR-1-GND | Balanced AES2 out ground |
| 18 | NC | N/A |
| 19 | NC | N/A |
| 20 | XLR-3 | Balanced AES1 in (-) |
| 21 | XLR-2 | Balanced AES1 in (+) |
| 22 | NC | N/A |
| 23 | NC | N/A |
| 24 | NC | N/A |
| 25 | XLR-3 | Balanced AES2 out (-) |
| 26 | XLR-2 | Balanced AES2 out (+) |

# Optional Audio XLR Cable (X75OPTCAB-XLR)

Figure A-15 identifies the cable connectors available on the optional AES/EBU X75OPTCAB-XLR audio cable, which is one of the cables in the X75OPTCAB-16-X and X75OPTCAB-32-X sets. This cable supports balanced audio signals. When the second X75OPTCAB-XLR cable is used in the X75OPTCAB-32-X set, the pinout numbering changes from the diagram below. AES3 becomes AES6, AES4 becomes AES7, and AES5 becomes AES8.



**Figure A-15.** X75OPTCAB-XLR Cable Connectors

Figure A-16 shows the pinouts for the X75OPTCAB-16-X DB-44M connector.
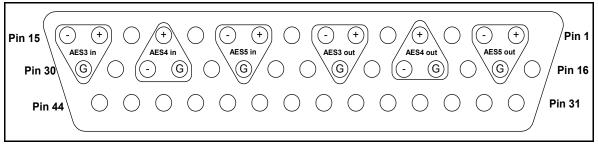


**Figure A-16.** X75OPTCAB-XLR Connector Pinout

Table A-8 describes each pin on the X75OPTCAB-XLR DB-44M connector and its connection type.

**Table A-8.** X75OPTCAB-XLR Pinout Description

| Pin Number | Connection Type | Description |
|------------|-----------------|-------------|
| 1 | XLR-2 | Balanced AES5 out (+) |
| 2 | XLR-3 | Balanced AES5 out (-) |
| 3 | NC | N/A |
| 4 | XLR-2 | Balanced AES4 out (+) |
| 5 | NC | N/A |
| 6 | XLR-2 | Balanced AES3 out (+) |
| 7 | XLR-3 | Balanced AES3 out (-) |
| 8 | NC | N/A |
| 9 | XLR-2 | Balanced AES5 in (+) |
| 10 | XLR-3 | Balanced AES5 in (-) |
| 11 | NC | N/A |
| 12 | XLR-2 | Balanced AES4 in (+) |
| 13 | NC | N/A |
| 14 | XLR-2 | Balanced AES3 in (+) |
| 15 | XLR-3 | Balanced AES3 in (-) |
| 16 | NC | N/A |
| 17 | XLR-1-Gnd | Balanced AES5 out ground |
| 18 | NC | N/A |
| 19 | XLR-1-Gnd | Balanced AES4 out ground |
| 20 | XLR-3 | Balanced AES4 out (-) |
| 21 | NC | N/A |
| 22 | XLR-1-Gnd | Balanced AES3 out ground |
| 23 | NC | N/A |
| 24 | NC | N/A |
| 25 | XLR-1-Gnd | Balanced AES5 in ground |
| 26 | NC | N/A |

**Table A-8.** X75OPTCAB-XLR Pinout Description *(Continued)*

| Pin Number | Connection Type | Description |
|---|---|---|
| 27 | XLR-1-Gnd | Balanced AES4 in ground |
| 28 | XLR-3 | Balanced AES4 in (-) |
| 29 | NC | N/A |
| 30 | XLR-1-Gnd | Balanced AES3 in ground |
| 31 through 44 | NC | N/A |

# Troubleshooting

# Overview

The following appendix describes some of the more common problems you might encounter while using the X75HD/X75SD, and it offers tips on how to correct these problems.

The following problems areas are covered:

- "Network Connectivity" on page 240
- "Front Panel Display" on page 243
- "Video Conversion" on page 249
- "Audio" on page 253
- "Alarms" on page 258
- "Softkey Installation" on page 260
- "Flash Memory" on page 262
- "Upgrading Firmware" on page 265

# Network Connectivity

## Forgotten IP address

### Problem

You can't remember the set IP address for a specific X75HD/SD unit and are having a problem communicating with it on the network.

### Solution

Temporarily set the unit into the factory default IP Address. Follow these steps to set the default IP address:

1. Push the **Def IP** DIP switch on the back of the unit to the *down* position (see Figure B-1).

   This resets the unit to the following default network addresses:

   • Device IP: 192.168.100.250

   • Subnet mask: 255.255.255.0

   • Gateway: 192.168.100.250
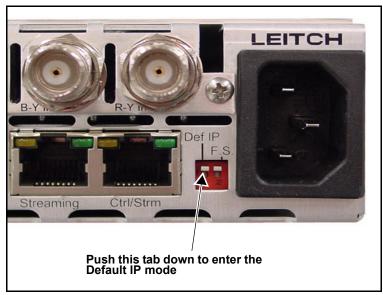


**Figure B-1.** Location of DEF IP DIP Switch

2.  Launch the X75 Web browser software, and then navigate to the **System Config > Setup** menu.

3.  Select the **Device IP** parameter to view the currently set IP address and then use this IP address to access the unit again.

4.  Return the **Def IP DIP** switch to the up position.

5.  Reboot the system.

# No response to SNMP Walk command

### Problem

After writing the SNMP configuration settings back to the X75HD/ X75SD using the CCS CoPilot/Pilot/Navigator application, the unit does not respond to the **SNMPWalk** command.

### Solution

Obtain and reinstall the latest version CCS application from Leitch and then rewrite the SNMP configuration back into the X75HD/X75SD unit. (CCS CoPilot/Pilot 2.99 and Navigator 2.1 do not write back the proper community strings within the x75agent.xnv file.)

To install the X75 agent configuration file work-around manually, follow these steps:

1. Start up a DOS box from the Windows application and then go to the C:\ directory.
2. Use the following ftp commands to read out the x75agent.xnv file from the X75:
   - ftp <**ip address of x75 frame** >
   - User: **leitch**
   - Password: **LeitchAdmin** (case sensitive)
   - Get **x75agent.xnv**
3. Edit the **x75agent.xnv** file with a Notepad application.
4. Go to the [**v1v2cCommunityTbl**] section and then edit the lines as shown below:

   (The public and private community names can be anything.)
   - 1=**public readOnly(2)**
   - 2=**private readCreate(4)**
5. Write the edited file back to X75 by issuing the command: **put x75agent.xnv**
6. Type **bye** to exit ftp session.
7. Reboot the X75 frame.

# Front Panel Display

## Control panel display is blank

### Problem

Even though the unit has been powered up, no information appears on the VFD screen. However, the LEDs on the control panel seem to be functioning.

### Solution 1

The **F.S.** (fail-safe) switch at the back of the X75 is in the down position (see Figure B-2); this is preventing the unit from booting up properly. When the switch is down, the runtime code is suspended, and only the FTP port is opened for the file transfer.

Restore the switch to the up position, and then re-power the unit to see if it reboots correctly.



**Ensure the F.S. switch is in the up position**
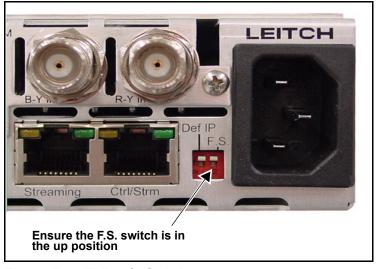
**Figure B-2.** Fail-safe Switch

**Solution 2**

Some of the early X75 and X75-RCP units have experienced premature failure of capacitor C38 (part # 101-000067-00; see Figure B-3 on page 245) made by Vishay (part # VJ1210Y334J(K)XBAT). This results in a blank VFD (Vacuum Florescent Display).

Obtain the serial number of the X75HD/X75SD unit and the original PO number. Then contact Leitch customer support. The front control panel assembly (part number 170-000483-00) will be exchanged free of charge. No special programming or configuration is required.

The failure nature of this C38 capacitor is that it slowly builds up the resistance in an inverse way that eventually shorts out the power line supplying the power to the VFD. The resistance across this capacitor should be more than several thousand ohms, but failed capacitors are measured below several hundred ohms.

The VFD will function without this DC filtering capacitor. If your situation is urgent, carefully remove or replace this capacitor. Follow these steps to remove and replace the capacitor:

1. Pull the frame 2 inches from the rack and then remove a total of 14 screws from the top and bottom of the front panel assembly.

2. Detach the front panel from the chassis by gently pulling the panel forward.

   (There is a mating connector on the left side of the chassis.)

3. Remove and replace the defective capacitor.

See "Installing a Frame-Mounted Local Control Panel" on page 281 for more details.
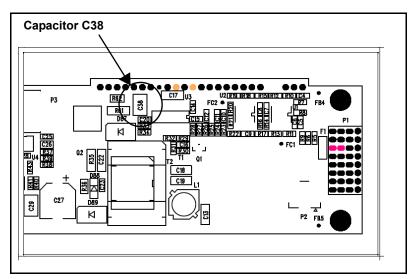
**Figure B-3.** Location of Failed Capacitor Behind VFD

### Solution 3

If you have verified that capacitor C38 is good, but there is still no display on the VFD, it is most likely that the VFD (part number 123-000003-00) has failed.

Contact Leitch customer service for a Returned Merchandise Authorization (RMA) number. Then return or exchange the control panel assembly (part number 170-000483-00).

# Analog input video control menu is not showing up

### Problem

The menus on the VFD appear to be functioning normally, but the **Analog Input Video** control menu does *not* appear, or it seems to appear randomly.

### Solution 1

If the appearance of the **Analog Input Video** menu is random, the software version of the unit is 1.4 and therefore, an upgrade to version 1.5 or greater is required.

Visit http://www.leitch.com/custserv/WebDL.nsf/ FF?OpenForm&X75HD/X75SD and then download the latest version of the software. Open up the **Release Notes** file for the update instructions, and then proceed with the firmware upgrade.

### Solution 2

The X75OPT-PQM or X75OPT-A3D module, or its interconnecting stacker pins are not installed correctly. To remove and reinstall the module, follow these steps:

1. Remove the X75HD/X75SD from the rack, and then open the lid.
2. Remove the X75OPT-A3D or X75OPT-PQM submodule from the mainboard.
3. Inspect the stacker pins for proper installation and connection.

   (See "Installing and Removing X75OPT-A3D or X75OPT-PQM Modules" on page 292 for more information.)
4. Re-install the submodule and lid.
5. Install the frame back into the rack and verify the presence of the **Analog Input Video** menu upon power up.

### Solution 3

The X75OPT-A3D or X75OPT-PQM submodule may be defective. If another A3D or PQM submodule is available, swap the submodule to determine if the original is defective.

If the submodule is proven defective, contact Leitch customer service for an RMA number, and then return the module to Leitch.

# Power LEDs are off and there is no display on the LCP

### Problem

The local control panel appears to be "dead." There are no functioning LEDs, no buttons are lit, and the VFD is blank.

### Solution 1

The unit is not receiving power. The AC cord(s) have become loose. Ensure the power cords are firmly pressed into the unit.

### Solution 2

The internal power supply is defective. Open the lid of the X75HD/X75SD, and using a voltage meter, determine if the power supply is producing +24VDC on the main DC cable(s). See Figure B-4 for the location of the power supply and Table B-1 on page 248 for pinout information.
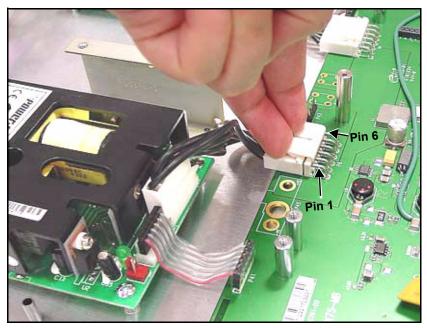


**Figure B-4.** Location of Power Supplies DC Cables

**Table B-1.** Main DC Cable Pinouts

| Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 | Pin 6 |
|-------|-------|-------|--------|--------|--------|
| +24V  | +24V  | +24V  | Ground | Ground | Ground |

### Solution 3

The internal flash memory is corrupted or locked up. See page 262 for details on restarting the flash memory.

# Video Conversion

## Performing an HD cross-conversion but can't see the down-converted signal

### Problem

The X75HD is taking 1080i input and forcing the output HD standard to 720p for cross-conversion, but the down-converted signal is not present at the SDTV outputs. There is no visible SDTV content.

1080i/59.94 ➡ HD1 input // ==== Internal processing ==== // HD output ➡ 720p/59.94

+ ==== // SD output ➡ No visible HD content

### Solution:

The unit does not have the softkey option that makes it possible to perform simultaneous crossconversion and downconversion. Purchase and install the X75OPT-HDDUOCON software key option.

Follow these steps to purchase and install the HDDUOCON option:

1. Confirm the option is *not* installed by following this path:
   **System Config > Status/Version Info > S/W Options**

   The word HDDUOCON will display if the option is installed.

2. If the option is not installed, follow this path to find and record the unit's serial number:
   **System Config > Status/Version Info > Serial Number**

3. Contact Leitch's sales department and then purchase the option.

Enter the softkey using either an X75HD/X75SD control panel, the X75HD/X75SD Web Browser, or a CCS software application. (The valid key character sets are numbers 2~9 and letters A~Z.)

To enter a softkey number using the control panel, follow these steps:

1. Select **System Config > Setup > License Key**.

2. Use the control knob and the **Enter** button to enter the characters.

3. Press the **Exit** button when completed.

To enter the softkey number using the Web Browser, follow these steps:

1. Type the IP address of the X75HD/X75SD unit you are upgrading into the **Address** field of your browser (Figure B-5).



**Figure B-5.** IP Address Insertion to Add X75OPT-HDDUOCON Option

2. Navigate to **System Config > Setup > License Key**.
3. Type in the supplied softkey codes.

   The option should now function.

To enter the softkey number using a CCS software application, follow these steps:

1. With your X75HD/X75SD unit selected in CoPilot, click the **Device** tab in the **Configuration** window.
2. Type your license key in the **License Key** field.
3. Click the **Write and Reboot** button.

   The writing process includes a validation step to prevent you from writing an invalid license key.

# Won't perform up and down conversions simultaneously

**Problem:**

The unit performs upconversions and it performs downconversions, but not both at the same time.

**Solution:**

The unit does not have the softkey option that makes it possible to perform simultaneous crossconversion and downconversion. Purchase and install the X75OPT-HDDUOCON software key option.

Follow these steps to purchase and install the HDDUOCON option:

1. Confirm the option is *not* installed by following this path:
   **System Config > Status/Version Info > S/W Options**

   The word HDDUOCON will display if the option is installed.

2. If the option is not installed, follow this path to find the unit's serial number:
   **System Config > Status/Version Info > Serial Number**

3. Contact Leitch's sales department and then purchase the option.

Enter the softkey using either an X75HD/X75SD control panel, the X75HD/X75SD Web Browser, or a CCS software application. (The valid key character sets are numbers 2~9 and letters A~Z.)

To enter a softkey number using the control panel, follow these steps:

1. Select **System Config > Setup > License Key**.

2. Use the control knob and the **Enter** button to enter the characters.

3. Press the **Exit** button when completed.

To enter the softkey number using the Web Browser, follow these steps:

1. Type the IP address of the X75HD/X75SD unit you are upgrading into the **Address** field of your browser (see Figure B-6 on page 252).

**Figure B-6.** IP Address Insertion to Add X75OPT-HDDUOCON Option

2. Navigate to **System Config > Setup > License Key**.

3. Type in the supplied softkey codes.

   The option should now function.

   To enter the softkey number using a CCS software application, follow these steps:

1. With your X75HD/X75SD unit selected in CoPilot, click the **Device** tab in the **Configuration** window.

2. Type your license key in the **License Key** field.

3. Click the **Write and Reboot** button.

   The writing process includes a validation step to prevent you from writing an invalid license key.

# Audio

## Lip sync problems

### Problem 1

During normal audio processing, the audio and video are out of sync.

### Solution

Each audio sample rate converter (SRC) can be configured to automatically track the processing delay of one of the video outputs. To apply the internal audio tracking feature, follow this path: **Audio Setup > Global Audio Config > I/O Delay Config** and then select one of the four or eight **I/O Delay SRCx** parameters.

To synchronize the audio, assign the output video type to the associated audio SRC(s).

The **I/O Delay SRCx** parameters are responsible for compensating the internal video propagation delay such that the audio channels are delayed in correct amount with respect to the chosen video output. Depending on the enabled internal processing options and signal path, the processed video's delay may vary from a few microseconds to several frames. Therefore, the aggregation of video delay is derived at the output as the I/O delay signal to be passed to the audio synchronizer to match the audio-to-video delay automatically.

illustrates how the **I/O Delay** signal is derived in SDI-to-SDI signal processing when some of the processing block(s) are activated. Some of the processing blocks that can be applied to the signal include SD ARC, Noise Reduction, User Fixed Delay.

Due to the flexibility of the M-Path mode, the default setting for this parameter is **None** and this selection sets the X75 in **Delay Only** mode. When any one of the **I/O Delay SRCx** parameters is set to track certain output video, the **Autotrack LED** on the control panel is lit.
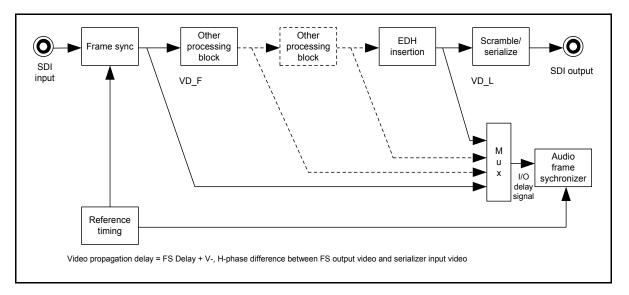
**Figure B-7.** I/O Delay Signal

### Problem 2

When passing the compressed audio via the AES input or embedded paths, the audio and video are out of sync.

### Solution

A proper system configuration must be created. If the X75HD/X75SD is set to run in **External Reference** lock mode and the reference signal is applied, the source signal (including the audio) also must be locked to the same reference. Otherwise, the X75's internal frame sync will repeat or drop the video frame as the input and output clocks drift from each other. This will affect the lip sync over periods of time. Also, if the source device driving the X75HD/X75SD has an internal frame sync, it may cause pops or clicks on the downstream device as it drops or repeat frames.

If the source cannot be locked, the X75 must run in delay mode. This is done by selecting **Genlock Lock Source** as the current video input.

## Application Example

The application example below describes how to set the X75 for **Delay** mode operation.

The X75HD takes a 1080i or 720p HD signal with embedded audio that is compressed, and at the output, provides fixed 720p with embedded audio. It is assumed that the Dolby embedded audio is present in one of the AES channels in group1's audio space. The X75HD is set up in delay mode, locking to HD video input. Thus, the synchronization of video and audio is not possible. However, you *can* activate the video **ProcAmp** function, making it possible to adjust video levels, video delay, audio delay, and other parameters.

Make the following settings to the X75 unit:

**Video Parameters**

• **Video Setup > HD Input > HD Input Std Select = Auto**

• **Video Setup > Routing Setup > All Out Sel = HD1**

• **Video Setup > Digital Output > HD Out Std Select = 720p/59.94**


**Reference Parameters**

• **Reference Setup > Genlock Lock Source = HD**


**Audio Parameters**

• **Audio Setup > Routing > Audio In Src Select = HD**

• **Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC1 = HD Out**

• **Audio Setup > Global Audio Config > I/O Delay Config > I/O Delay SRC2 = HD Out**

If the lip sync problem still occurs, decode the compressed audio to the baseband using the internal plug-in Dolby decoder module in the X75 and then re-encode again.

# Not passing the embedded audio

Without the optional audio submodule, the SD-SDI with embedded audio will pass through the SD-SDI output. The HD-SDI signal with the embedded audio will not pass through the HD-SDI output.

When the video frame sync repeats or drops a frame, or if there is a hot-switch, there will be a disturbance in the embedded audio data stream. This occurs with any video frame sync that passes embedded audio with no embedded audio processing.

When the X75SD unit has no audio submodule installed, the default factory setting will not allow the audio to pass. To change this setting, follow this path:

**Video Setup > Processing > SD TSG & Slide > Keyer TSG Insert = None**

Additionally, there is an implementation issue with X75 version 1.6.100 and below.

When the frame is rebooted or the **Video Input** source is switched, the **Keyer TSG Insert** parameter follows the selected input video source. In order to pass the embedded audio again, this parameter must be set to **None** again.

This issue will be addressed in the subsequent software release.

# Analog input audio control menu not showing up

### Problem

The menus on the VFD appear to be functioning normally, but the **Analog Input Audio** control menu does *not* appear, or it seems to appear randomly.

### Solution 1

If the appearance of the **Analog Input Audio** menu is random, the software version of the unit is 1.4 and therefore, an upgrade to version 1.5 or greater is required.

Visit http://www.leitch.com/custserv/WebDL.nsf/ FF?OpenForm&X75HD/X75SD and then download the latest version of the software. Open up the **Release Notes** file for the update instructions, and then proceed with the firmware upgrade.

### Solution 2

The X75OPT-AS-8, -16, or -32 audio submodules, and their interconnecting stacker pins, are not installed correctly. Follow these steps to remove and reinstall the module:

1.  Remove the X75HD/X75SD from the rack, and then open the lid.
2.  Remove the X75OPT-AS-8, X75OPT-AS-16, or X75OPT-AS-32 submodule from the mainboard.
3.  Inspect the stacker pins for proper installation and connection.

    (See "Installing and Removing an Audio Synchronizer Module" on page 282 for more information.)
4.  Re-install the submodule and lid.
5.  Install the frame back into the rack and verify the presence of the **Analog Input Audio** menu upon power up.

### Solution 3

The X75OPT-AS-8, X75OPT-AS-16, or X75OPT-AS-32 submodule may be defective. If another module of the same type is available, swap the module. If the submodule is proven defective, contact Leitch customer service for an RMA number, and then return the module to Leitch.

# Alarms

## Major and Minor Alarms are on

### Problem

When the unit is powered up, all or many of the **Alarm** LEDs and network alarms are activated.

### Solution 1

The X75 monitors all video and audio inputs, fans, and power supplies. When it detects failure conditions, it activates alarms because the factory default is set to monitor *all* alarms. You can globally disable all of the alarms, or manually enable only those that you want to monitor.

To globally disable all of the alarms in the X75HD/X75SD control panel and in the Web browser, follow this path:

**System Config > Alarm Assert Setup > Enable All Alarms** and then select **Disable**.

### Solution 2

You can choose to disable specific alarms, while leaving others activated.

To configure and activate only the alarms that you wish to monitor, using the X75HD/X75SD control panel, follow these steps:

1. Press the **Option** button and then select the **Configure Alarm** menu.
2. Select the desired alarm parameter by pressing the **Enter** button.
3. Within this parameter menu, configure the alarm appropriately.

To configure and activate only the alarms that you wish to monitor, using the Web Browser, follow these steps:

1. Open up your Internet browser.
2. Type the IP Address of the X75 frame on the Address field (see Figure B-8).

**Figure B-8.** IP Address Insertion to Access X75HD/X75SD Alarms

3. From the Main web page, select the **Monitoring** hyperlink.

4. Select the **Configure Alarms** hyperlink.

5. Press the **Edit** button corresponding to the alarm that you wish to enable and configure it.

# Softkey Installation

## Can't activate softkeys

To activate software options that you have purchased (including Dolby decoding) you must enter a softkey code into the License Key menu. The code, consisting of fourteen hexadecimal digits, will be provided when you purchase the option. Enter the softkey using either an X75HD/X75SD control panel, the X75HD/X75SD Web Browser, or a CCS software application. (The valid key character sets are numbers 2~9 and letters A~Z.)

To enter a softkey number using the control panel, follow these steps:

1. Select **System Config > Setup > License Key**.
2. Use the control knob and the **Enter** button to enter the characters.
3. Press the **Exit** button when completed.

To enter the softkey number using the Web Browser, follow these steps:

1. Type the IP address of the X75HD/X75SD unit you are upgrading into the **Address** field of your browser (Figure B-9).



**Figure B-9.** IP Address Insertion to Add X75OPT-HDDUOCON Option

2. Navigate to **System Config > Setup > License Key**.
3. Type in the supplied softkey codes.

   The upgrade will now take effect.

To enter the softkey number using a CCS software application, follow these steps:

1. With your X75HD/X75SD unit selected in CoPilot, click the **Device** tab in the **Configuration** window.
2. Type your license key in the **License Key** field.

3.  Click the **Write and Reboot** button.

    The writing process includes a validation step to prevent you from writing an invalid license key.

There is a different procedure for installing free firmware upgrades that appear on the Leitch Web site. See for details.

# Flash Memory

## Flash memory is locked

### Problem

The firmware update process was interrupted either by turning off the unit or breaking from the PC during the file transfer. The flash memory is now locked up.

### Solution

A manual unlock procedure is required. Follow these steps to unlock the flash memory:

1.  Push both **Def IP** and **F.S.** (Fail-safe) DIP switches at the back of the X75 unit to the down position, and then re-power the unit (see Figure B-10).

    (This action sets the unit with the default IP of 192.168.100.250 and opens the FTP port for the file transfer.)



**Push this tab down to enter the Default IP mode**

**Push this tab down to enter the Fail-safe mode**
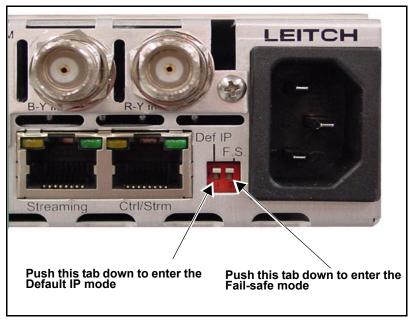
**Figure B-10.** Location of Def IP and FS DIP Switches

2. Configure your PC's network setting to be on the same static network, using the network addresses shown in Table B-2.

**Table B-2.** Network Addresses for Default IP and Fail-safe Modes

| Network Settings | X75HD/X75SD Unit | PC |
|---|---|---|
| IP Address | 192.168.100.250 | 192.168.100.2 |
| Subnet | 255.255.255.0 | 255.255.255.0 |
| Gateway | 192.168.100.1 | 192.168.100.1 |

3. Connect a cross-over Ethernet cable between the X75HD/X75SD and the PC directly, or a straight Ethernet cable when the PC and X75HD/X75SD are on a network hub or a switch.

4. Ping 192.168.100.250, and then press the ENTER button on your keyboard.

   If the network connection is valid, the reply messages should be returned.

5. Type the following text: TELNET 192.168.100.250, and then press ENTER.

6. Type the following case sensitive login information into the Telnet session:

   a. login: leitch and then press ENTER

   b. Password: LeitchAdmin and then press ENTER

7. In the Telnet session, follow these steps:

   a. In the .vxWorks shell, type: m 0x4000000,2
   and then press ENTER (there is a single space after the letter m).

      You will be prompted with:    0x4000000: xxxx

   b. Type in:   6060
   and then press ENTER

      You will be prompted with: 0x4000002: xxxx -

   c. Press ENTER.

      You will be prompted with: 0x4000004: xxxx -

      d.   Type in:   `d0d0`
           and then press ENTER (Note: These are numeric zeroes)

           You will be prompted with:   0x4000006: xxxx -

      e.   Type in:   q
           and then press ENTER.

8.   Close the **Command Prompt DOS Box** to quit the Telnet session.

9.   Obtain the latest version of the release software from the Leitch Web site and then follow the instruction to upload the files.

10.  When completed, put both the **Def IP** and **F.S.** DIP switches at the back of the X75 unit to the up position.

11.  Reboot the X75HD/X75SD unit.

# Upgrading Firmware

## Software can't upload

**Problem:**

Many attempts were made to update the X75HD/X75SD software, but there are network problems interfering with the procedure.

**Solution:**

It's likely that the file system became corrupted. In this case, the frame can be updated by using both the Fail-safe and Default IP switches. Follow these steps to correct the problem:

1. Push both **Def IP** and **F.S.** (Fail-safe) DIP switches at the back of the X75 unit to the down position, and then re-power the unit (see Figure B-11).

   (This action sets the unit with the default IP of 192.168.100.250 and opens the FTP port for the file transfer.)
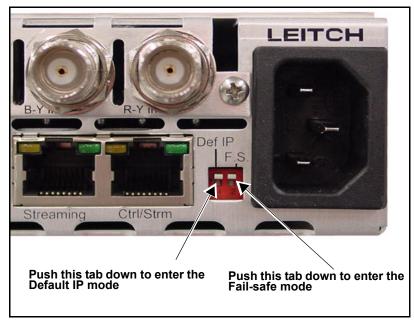


**Figure B-11.** Location of Def IP and FS DIP Switches

2. Configure your PC's network setting to be on the same static network, using the network addresses shown in Table B-3.

**Table B-3.** Network Addresses for Default IP and Fail-safe Modes

| Network Settings | X75HD/X75SD Unit | PC |
|---|---|---|
| IP Address | 192.168.100.250 | 192.168.100.2 |
| Subnet | 255.255.255.0 | 255.255.255.0 |
| Gateway | 192.168.100.1 | 192.168.100.1 |

3. Connect a cross-over Ethernet cable between the X75HD/X75SD and the PC directly, or a straight Ethernet cable when the PC and X75HD/X75SD are on a network hub or a switch.

4. Ping `192.168.100.250,` and then press the ENTER button on your keyboard.

    If the network connection is valid, the reply messages should be returned.

5. Type the following text: `TELNET 192.168.100.250,` and then press ENTER.

6. Type the following case sensitive login information into the Telnet session:

    a. login: `leitch` and then press ENTER

    b. Password: `LeitchAdmin` and then press ENTER

7. In the Telnet session, follow these steps:

    a. In the vxWorks shell, type: `m 0x4000000,2` and then press ENTER (there is a single space after the letter m).

    You will be prompted with:    0x4000000: xxxx

    b. Type in:  `6060` and then press ENTER

    You will be prompted with: 0x4000002: xxxx -

    c. Press ENTER.

    You will be prompted with: 0x4000004: xxxx -

    d.    Type in:   `d0d0`
         and then press ENTER (Note: These are numeric zeroes)

         You will be prompted with:   0x4000006: xxxx -

    e.    Type in:   q
         and then press ENTER.

8.    Close the **Command Prompt DOS Box** to quit the Telnet session.

9.    Obtain the latest version of the release software from the Leitch Web site and then follow the instruction to upload the files.

10.  When completed, put both the **Def IP** and **F.S.** DIP switches at the back of the X75 unit to the up position.

11.  Reboot the X75HD/X75SD unit.

# RCP is not booting up properly after upgrade

**Problem:**

An X75HD/X75SD batch file was accidently uploaded to an X75-RCP. Now the Remote Control Panel is not booting up properly. The VFD screen appears "dead" and none of the buttons and LEDs are lit.

**Solution:**

It is likely that the remote control panel is in fail-safe mode, with the factory default IP Address of 192.168.100.251. (Holding down the **Bypass** button for 3 seconds on power reboot forces the RCP into the manual fail-safe mode.)

Follow the instructions below to restart the RCP:

1. Configure your PC's network setting to be on the same static network, using the network addresses shown in Table B-4.

**Table B-4.** Network Addresses for Default IP and Fail-safe Modes

| Network Settings | X75HD/X75SD Unit | PC |
|---|---|---|
| IP Address | 192.168.100.250 | 192.168.100.2 |
| Subnet | 255.255.255.0 | 255.255.255.0 |
| Gateway | 192.168.100.1 | 192.168.100.1 |

2. Connect a cross-over Ethernet cable between the X75HD/X75SD and the PC directly, or a straight Ethernet cable when the PC and X75HD/X75SD are on a network hub or a switch.

3. Ping `192.169.100.250,` and then press the ENTER button on your keyboard.

   If the network connection is valid, the reply messages should be returned.

4. If you receive successful replies, continue with step 4; otherwise, troubleshoot the networking connectivity.

5. Download and unzip the latest X75-RCP files to a directory such as C:\X75RCP.

6. Go to the directory where the RCP files are extracted.

    Note: This assumes you had downloaded and unzipped the latest X75-RCP files to C:\X75RCP directory. For example:

    `CD \X75RCP <ENTER >`

7. Within this directory, type the following:

    `x75rcp 192.168.100.251`, and then press ENTER.

8. Reboot the panel.

(Note: When the RCP files are restored properly, the RCP's IP Address will go back to its original address.)

# Software file updated incorrectly or became corrupted

During a firmware upgrade, if your files become corrupted, you can put the system into a fail-safe mode. To enter the fail-safe mode and upgrade your firmware, follow these steps:

1. Ensure your X75HD/X75SD is either connected to the network using a 10/100Base-T straight-through Ethernet cable or is directly connected to a PC using a cross-over cable.

1. Push down the **F.S.** DIP switch on the back of the X75HD/X75SD unit (see Figure B-12).

   All programs and current activity will cease, except for the capability to upload new software via FTP.

> **Note**
>
> CCS CoPilot is a Windows-based software application provided with your X75HD/X75SD system that discovers devices on your network, and allows you to configure all system IP address settings (such as IP Address, Default Gateway, Subnet Mask, etc.). The current release of your X75HD/X75SD system only provides limited support for CoPilot. Contact your Leitch customer support representative for more information.



**Push this tab down to enter the Fail-safe mode**

**Figure B-12.** Location of the F.S. (Fail-safe) DIP Switch

2. Push down the **F.S**. DIP switch on the back of the unit to put the X75HD/X75SD system into Fail-Safe mode.

3. Launch CoPilot on the remotely or directly connected PC.

4. Follow the procedure in your CoPilot User Manual or online help system for "Updating the Software on a CCS Device."

5. Return the **F.S.** DIP switch to the up position, and then reboot your system.

> **Note**
>
> After rebooting, the network address settings of the X75HD/X75SD should have been retained. If not, navigate to **System Config > Setup**, and then change or validate the settings. Ensure that you select **Save IP**.

# Troubleshooting the Software Installation

If you are not able to ping the X75HD/X75SD from your PC, the cause may be one of the following:

- The X75HD/X75SD is not powered up.
- The Ethernet cabling between your PC, the X75HD/X75SD, and any other network devices—such as hubs, switches, or routers—is not set up properly.
- You connected to the wrong Ethernet port on the back of your PC.
- During the "Correcting a Failed Upgrading Procedure":
    - An improper network cable was used.
    - The network cable was connected to the **Streaming** port of the X75.
- The PC network settings and the X75HD/X75SD network settings don't have matching subnets and/or belong to different subnets with no proper gateway linking the two networks together.
- The PC and the X75 have the same IP address.
- On the PC, you accidentally changed the network settings on the wrong LAN card.

6. If all of these causes have been investigated and the upgrade continues to fail, follow the instructions in "Correcting a Failed Upgrade Procedure" on page 330.

# Servicing

## Overview

This appendix includes the following information and procedures:

# Safety Precautions

Only qualified personnel should perform service procedures. Refer to the *X75HD/X75SD Product Safety Instructions* booklet before servicing the X75HD/X75SD or its components.

# Laser Caution

This product may contain lasers! Heed the following caution:

**Laser Radiation When Open**

**CAUTION:** To avoid damage from laser radiation, do not remove or displace any connections or protective panels.

CLASS 1 LASER PRODUCT

[Finland] LUOKAN 1 LASERLAITE.
[Sweden] KLASS 1 LASER APPARAT.

CLASS 1
LASER PRODUCT

# ESD Caution

When servicing the X75HD/X75SD and its components, take the proper precautions to avoid electrostatic discharge (ESD).

**Preventing Electrostatic Discharge**

**CAUTION:** Electrostatic discharge (ESD) can damage components in the product. To prevent ESD, observe these precautions when directed:

- **Use a ground strap.** Wear a grounded wrist strap to discharge the static voltage from your body while installing or removing sensitive components.

- **Use a safe work area.** Do not use any devices capable of generating or holding a static charge in the work area where you install or remove sensitive components. Avoid handling sensitive components in areas that have a floor or benchtop surface capable of generating a static charge.

- **Handle components carefully.** Do not slide sensitive components over any surface. Do not touch exposed connector pins. Handle sensitive components as little as possible.

- **Transport and store carefully.** Transport and store sensitive components in a static-protected bag or container.

# Understanding and Working With Fiber Optics

Input and output modules using optical fibre transmitters and receivers were developed in response to a growing demand for a flexible method of transporting very high speed digital video and audio over long distances.

Fiber optic technology offers many benefits over copper wire systems:

- Longer distance capability

- Higher bandwidth

- Better signal quality

- Immunity from EM radiation and lightning

- Advantage of being lightweight

- Ability to be easily upgraded

## Basic Principles

Fiber optic technology can be explained using these two concepts:

- Light is transmitted over optical fiber by reflecting it within a long "cylindrical mirror."

- The mirrored surface occurs at the core cladding interface. By sending on/off bursts of light within the optical fiber, light can be guided along varying paths.

See Figure C-1 and Table C-1 on page 276 for further explanation.
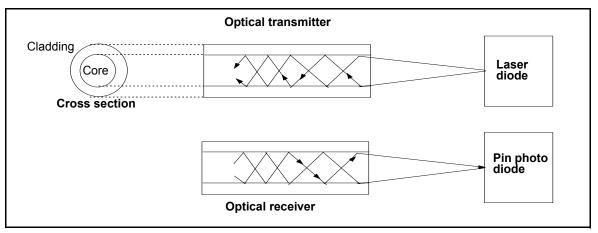


**Figure C-1.** Fiber Optic Transmitting and Receiving

**Table C-1.** Function and Description of Fiber Optic Components

| Item | Function | Composition |
|------|----------|-------------|
| Optical transmitter | Converts a data signal into an equivalent optical power waveform and couples it into an optical fiber. | • Laser diode<br>• Laser diode driver<br>The role of the driver is to bias the laser. Some laser drivers contain circuitry to control power and temperature. |
| Optical receiver | Converts the incoming optical power signal into an output data signal. | • PIN photo diode<br>• Transimpedance amplifier<br>• Decision circuitry<br>The receiver circuitry provides standard ECL outputs based on the input voltage. |

# Handling and Connecting Fibers

## Class 1 Laser Products

⚠ **Caution**

USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED IN THIS MANUAL MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

The X75OPT-HDUPG module with HDTV fiber input/output is a CLASS 1 laser product.

Avoid looking directly at a laser. Laser radiation is invisible and can cause serious eye damage.

**!DANGER!**
Class 1 Laser Product
LASER **Avoid Direct Exposure**

## General Precautions

> 📝 **Note**
>
> The X75SPR-HD is supplied with an SC interconnection housing built into the module. With this style of connector, the fiber assembly and the housing assembly can only be connected in one way and with very good repeatability. The optical fiber with SC connectors must be customer supplied.

Please take the following precautions when working with fiber optics:

- Never touch the end face of an optical fiber.
- Do not place optical fibers under heavy objects.
- Transmission characteristics of the fiber are dependent on the shape of the optical core; therefore, care must be taken to prevent fiber compression.
- Avoid abrupt fiber bending.

    A suggested minimum bending radius is 1.2 in. (3 cm). Bending radii smaller than this can lead to fiber bending loss which will decrease the maximum attainable link length by decreasing the available power budget.

- Make fiber interconnections very secure.
- Clean fiber *every time* that it is mated or unmated. (See "Cleaning Optical Fibers" below.)

    As dust particles on the ends of the optical fiber can add up to 1 dB of loss, it is important to clean them regularly. Larger dust particles can totally obscure light altogether.

- Cover a fiber *immediately* when unmated.

    Most fiber manufacturers provide a plastic boot that fits over the ferrule body for this purpose.

- Remove dust particles from the housing assembly with a blast of dry air when using interconnection housing to mate two optical fibres.

# Cleaning Optical Fibers

### Required Cleaning Equipment

Optical fibers must always be cleaned before mating and after unmating. You will need the following items:

- "Kimwipes" or a lens-grade, lint-free tissue
- Denatured alcohol
- Canned dry air

**Cleaning Technique**

Use the following method to clean the fibers:

1.  Fold the tissue twice so that it is four layers thick.

2.  Saturate the tissue with alcohol.

3.  Clean the sides of the connector ferrule.

    i.  Place the connector ferrule in the tissue and apply pressure to the sides of the ferrule.

    ii. Rotate the ferrule several times to remove all contamination from the ferrule sides.

4.  Clean the end of the connector ferrule.

    i.  Move to a clean part of the tissue.

    ii. Be sure it is still saturated with alcohol and that it is still four layers thick.

    iii. Put the tissue against the end of the connector ferrule.

    iv. Place your finger against the tissue so that it is directly over the ferrule.

    v.  Rotate the end of the connector.

5.  Mate the connector immediately. Do not let the connector lie unattended before mating.

> 📝 **Note**
>
> Dry air can be used to remove dust from the connector housing or the transmitter or receiver ports.

# Preparing the X75HD/X75SD for Servicing

Some versions of X75HD/X75SD units use a two-part chassis cover, making it possible for you to perform maintenance on power supplies without removing the frame from the rack. Other versions use a full-size cover. Follow these steps to remove either version of the chassis cover:

1. Read and heed the safety precautions outlined in the X75 safety manual, and in the section "Safety Precautions" on page 274.

2. Confirm that the X75HD/X75SD unit is turned off and that the power cord is disconnected from the rear panel.

3. Use a Phillips screwdriver to remove the retaining screws on the full chassis cover or split chassis cover. Figure C-2 shows the location of the screws along the back edge, front edge, top, and each side of the frame.

   Keep the screws, as they will be needed to replace the top cover.

![Caution triangle symbol] **Caution**

With the power cord disconnected, the unit is no longer grounded. Be aware of potential damage from static electricity.
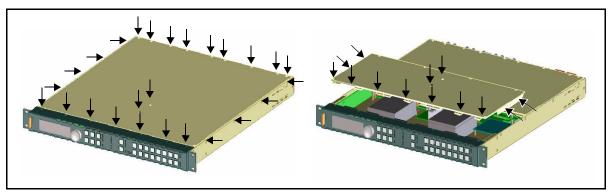


**Figure C-2.** Location of Chassis Cover Screws (Full Cover and Split Cover)

4. Lift off the chassis cover from the X75HD/X75SD.

To complete the installation of all hardware options:

1. Replace the top cover, and use the original screws to secure the top cover.

2. Plug the power cord back in.

# Common Replacement Part Numbers

The following parts are the most commonly ordered as replacements.

**Table C-2.** Common Replacement Part Numbers

| Part Number | Part Identification |
|---|---|
| 122-000024-00 | Power supply |
| 131-000014-00 | Fan |
| 159-000282-00 | Rubber keymat |
| 134-000212-00 | Board stacker 2x15 pin |
| 134-000228-00 | Single 2x7 analog audio connector |
| 170-000483-00 | X75 Whole local control panel assembly |
| X75SPR-KIT | Package that includes the following parts:<br>• 2 fans<br>• 4 stackers<br>• 1 power supply with no connectors<br>• 1 shaft encoder |
| X75OPT-LCP | Front control panel kit |

# Installing the X75OPT-HDDUOCON Software Key

If you have ordered the X75OPT-HDDUOCON software option separately, you will require a soft keycode. This unlock code, consisting of fourteen hexadecimal digits, will be provided when you purchase the option. Once you install the option, use a control panel or the web client server software to install the code.

Using the control panel or web server application, follow this thread to install the unlock code: **System Config > Setup > License Key**.

# Installing a Frame-Mounted Local Control Panel

The X75OPT-LCP field retrofit kit makes it possible to remove a blank front module from an X75 unit, and replace it with a local control panel. The new control panel in the retrofit kit includes a fan module. (You will not need to retain the fan module from the blank front panel.) To remove a blank front panel and replace it with a local control panel retrofit, follow these steps:

1.  Remove all power from the X75HD/X75SD unit.

2.  Remove the mounting ear screws that secure the X75HD/X75SD to the rack, and then slide the unit forward.

3.  Remove the seven screws along the top of the blank front panel that hold the panel to the frame.

    Retain the screws.

4.  Remove the seven screws along the bottom of the blank front panel that hold the panel to the frame (do *not* remove the line of four screws that secure the fan module). See Figure C-3 below.
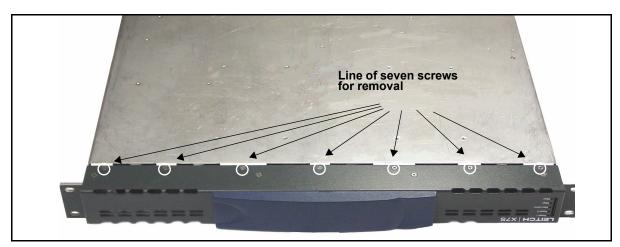


**Figure C-3.** Removing the Bottom Front Panel Screws

5.  Pull the blank front panel from the unit.

6.  Carefully insert the new front panel, ensuring that you align the connector pins located behind the VFD.

7.  Replace the screws on the bottom and top of the unit.

8.  Reconnect all cabling, and restore power.

# Installing and Removing an Audio Synchronizer Module

## Installing a New Module

> ⚠️ **Caution**
>
> This module is not hot-swappable. To prevent damage, ensure that the power to the X75 is off before inserting or removing the module.

If you have ordered an audio synchronizer module (X75OPT-AS-8, X75OPT-AS-8-L, X75OPT-AS-16, X75OPT-AS-16-L, X75OPT-AS-32, or X75OPT-AS-32-L) separately to upgrade your system, follow these installation steps:

1. Remove the chassis cover (see "Preparing the X75HD/X75SD for Servicing" on page 279).

2. Remove the screws from the blank filler plate on the rear panel where the new audio synchronizer module is to be installed, and then remove the plate.

   Retain the screws for later use.

3. Remove the packaging from the audio synchronizer module.

   The package includes one board, four stackers, and the required number of standoff screws.

4. Turn the module upside down and insert the four stackers into the corresponding connectors on the underside of the board. See Figure C-4.
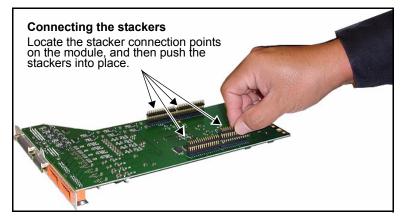


**Figure C-4.** Connecting Four Stackers to Module

5. Return the module to its upright position, and then align it with the installed standoffs on the main board.

There are two standoffs on the back of the main board, and one in the middle. To assist with alignment, the standoff in the back left corner is higher than the others in order. See Figure C-5 and Figure C-6.
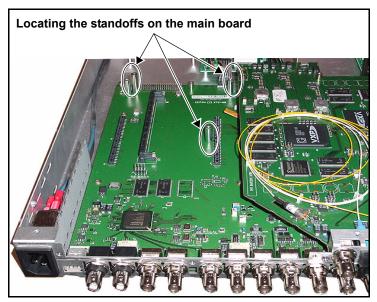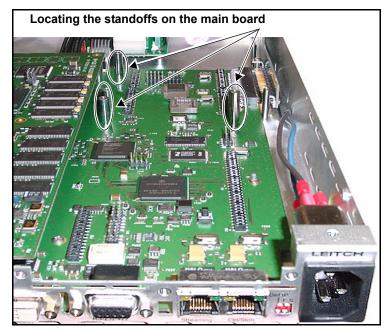


**Figure C-5.** Locating Main Board Standoffs
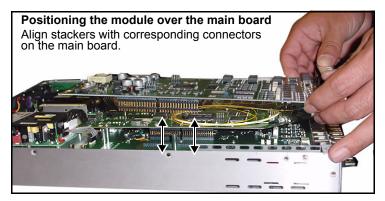


**Figure C-6.** Positioning Module over Standoffs

6. Inspect the connectors on both the module and the main board to ensure that all pins are straight, and then push the board gently over the main board stacker connection points until they lock into place.

Figure C-7 illustrates the area of the module you should push so that the stackers lock firmly into place.
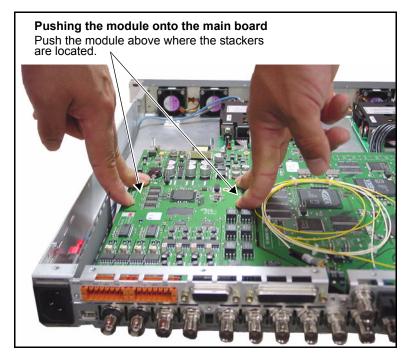


**Figure C-7.** Pushing the Module on to the Main Board

7. Secure the new module to the main board using the provided screws.

Figure C-8 on page 285 illustrates the location of the three module standoffs where you need to apply the screws.
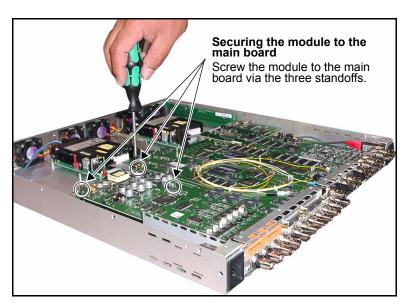
**Figure C-8.** Securing the Module to the Main Board

8. Screw the back panel into place using the screws removed in step 2.
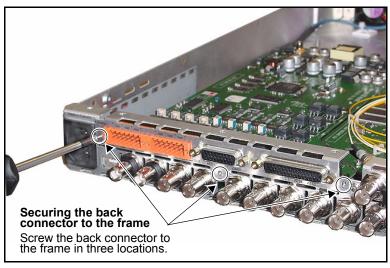


**Figure C-9.** Securing the Back Connector to the Frame

9. Replace the chassis cover using the original screws. See page 279 for more information on replacing the cover.

# Removing an Existing Module

If you must remove an existing audio synchronizer module from a unit, follow these steps:

1.  Remove the screws along the back edge and each side of the X75's chassis cover (see Figure C-2 on page 279), and then slide the cover off.

    Retain the screws for later use.

2.  Remove the three rear connector screws that secure the module to the frame.

    See Figure C-9 on page 285 to locate these screws.

3.  Remove the three screws that secure the module to the main board.

    See Figure C-8 on page 285 to locate these screws.

4.  Gently lift the module off of the main board.

    Be sure to lift the module off evenly to prevent the stacker connector pins from bending or breaking.

5.  Inspect the connectors on the module and main board to ensure that all pins are straight.

6.  Store the board in a protective bag to protect it from damage or ESD.

# Installing and Removing HDTV Modules

## Installing a New Module

⚠️ **Caution**

This module is not hot-swappable. To prevent damage, ensure that the power to the X75 is off before inserting or removing the module.

If you have ordered a replacement or spare HDTV module, follow these installation steps:

1. Remove the chassis cover (see "Preparing the X75HD/X75SD for Servicing" on page 279).

2. Remove the screws from the blank filler plate on the rear panel where the new fiber connector module is to be installed, and then remove the plate.

   Retain the screws for later use.

3. Remove the packaging from the connector module.

4. Turn the board upside down and insert the seven stackers into the corresponding connectors on the underside of the board. See Figure C-10.
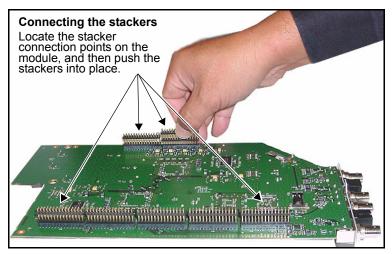


**Figure C-10.** Connecting Seven Stackers to Module

5. Return the module to its upright position, and then align it with the installed standoffs on the main board.

There are three standoffs on the back edge of the main board, and one in the middle. The middle standoff along the back edge of the module is higher than the others in order to assist with alignment. See Figure C-11 and Figure C-12.
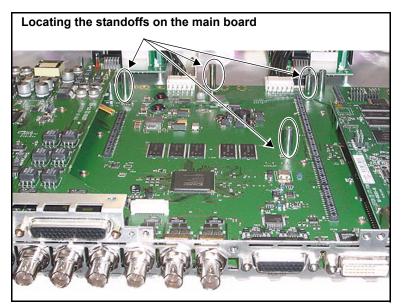


**Figure C-11.** Locating Main Board Standoffs
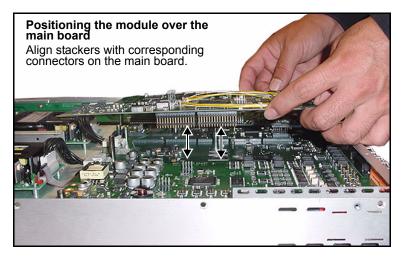


**Figure C-12.** Positioning Module over Standoffs

6. Inspect the connectors on both the module and the main board to ensure that all pins are straight, and then push the board gently over the main board stacker connection points until they lock into place.

Figure C-13 illustrates the area of the module you should push so that the stackers lock firmly into place.



**Pushing the module onto the main board**
Push the module above where the stackers are located.
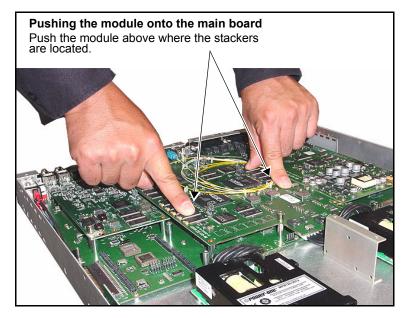
**Figure C-13.** Pushing the Module on to the Main Board

7. Secure the new module to the main board using the provided screws.

Figure C-14 on page 290 illustrates the location of the three module standoffs where you need to apply the screws.
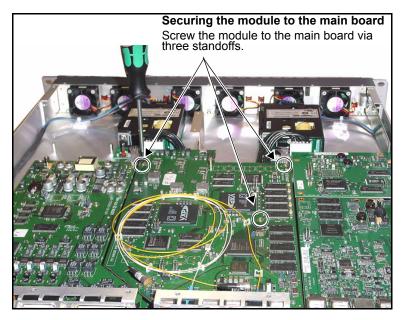
**Figure C-14.** Securing the Module to the Main Board

8. Screw the back panel into place using the screws removed in step 2.
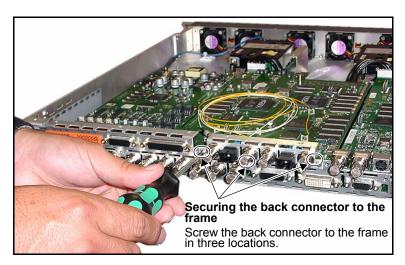


**Figure C-15.** Securing the Back Connector to the Frame

9. Replace the chassis cover using the original screws. See for more information on replacing the cover.

# Removing an Existing Module

If you must remove an existing HDTV module from an X75, follow these steps:

1.  Remove the screws along the back edge and each side of the X75's chassis cover (see Figure C-2 on page 279), and then slide off the cover.

    Retain the screws for later use.

2.  Remove the three rear connector screws that secure the module to the frame.

    See Figure C-15 on page 290 to locate these screws.

3.  Remove the three screws that secure the module to the main board.

    See Figure C-14 on page 290 to locate these screws.

4.  Gently lift the module off the main board.

    Be sure to lift the module evenly to prevent the stacker connector pins from bending or breaking.

5.  Inspect the connectors on the module and main board to ensure that all pins are straight.

6.  Store the board in a protective bag to protect it from damage or ESD.

# Installing and Removing X75OPT-A3D or X75OPT-PQM Modules

## Installing a New Module

> ⚠️ **Caution**
>
> This module is not hot-swappable. To prevent damage, ensure that the power to the X75 is off before inserting or removing the module.

If you have ordered an optional X75OPT-A3D or X75OPT-PQM module separately, follow these installation steps:

1.  Remove the chassis cover (see "Preparing the X75HD/X75SD for Servicing" on page 279).

2.  Remove the screws from the blank filler plate on the rear panel where the new module is to be installed, and then remove the plate.

    Retain the screws for later use.

3.  Remove the packaging from the module.

    The X75OPT-A3D and X75OPT-PQM packages include one board, three stackers, and the required number of standoff screws.

4.  Turn the board upside down and insert the three stackers into the corresponding connectors on the underside of the board. See Figure C-16.
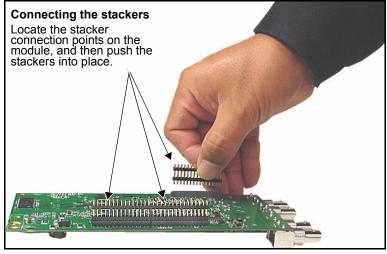


**Figure C-16.** Connecting Three Stackers to Module

5. Return the module to its upright position, and then align it with the installed standoffs on the main board.

There are three standoffs on the back edge of the main board, and one in the middle. The middle standoff along the back edge of the module is higher than the others in order to assist with alignment. See Figure C-17 and Figure C-18.



**Figure C-17.** Locating Main Board Standoffs
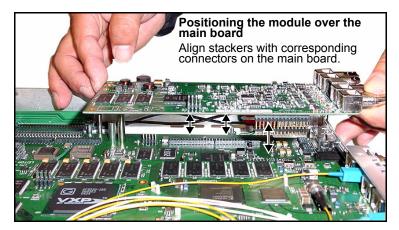


**Figure C-18.** Positioning Module over Standoffs

6. Inspect the connectors on both the module and the main board to ensure that all pins are straight, and then push the board gently over the main board stacker connection points until they lock into place.

Figure C-19 illustrates the area of the module you should push so that the stackers lock firmly into place.
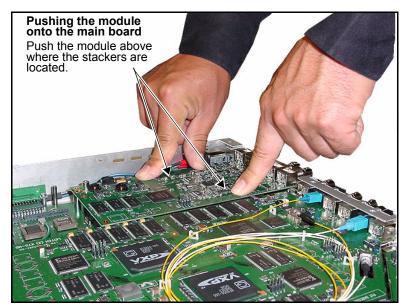


**Figure C-19.** Pushing the Module on to the Main Board

7. Secure the new module to the main board using the provided screws.

Figure C-20 on page 295 illustrates the location of the three module standoffs where you need to apply the screws.
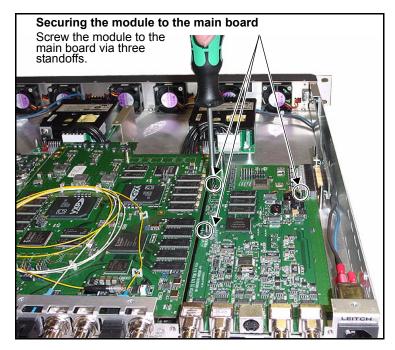
**Figure C-20.** Securing the Module to the Main Board

8. Screw the back panel into place using the screws removed in step 2.
9. Replace the chassis cover using the original screws. See page 279 for more information on replacing the cover.

# Removing an Existing Module

If you must remove an existing X75OPT-A3D or X75OPT-PQM module, follow these steps:

1.  Remove the screws along the back edge and each side of the frame's chassis cover (see Figure C-2 on page 279), and then slide the cover off.

    Retain the screws for later use.

2.  Remove the three rear connector screws that secure the module to the frame.

3.  Remove the three screws that secure the module to the main board.

    See Figure C-20 on page 295 to locate these screws.

4.  Gently lift the module off of the main board.

    Be sure to lift the module off evenly to prevent the stacker connector pins from bending or breaking.

5.  Inspect the connectors on the module and main board to ensure that all pins are straight.

6.  Store the board in a protective bag to protect it from damage or ESD.

# Installing and Removing the Streaming Module

## Installing a New Module

![Caution] **Caution**

This module is not hot-swappable. To prevent damage, ensure that the power to the X75 is off before inserting or removing the module.

This module requires version 1.7 or later X75 firmware.

If you have ordered an X75OPT-STR streaming module separately, follow these installation steps:

1. Inspect the connectors on both the module and the main board to ensure that all pins are straight, and then push then board gently over the main board stacker connection points until they lock into place.

   Figure C-21 illustrates the area of the module you should push to lock the stackers into place.
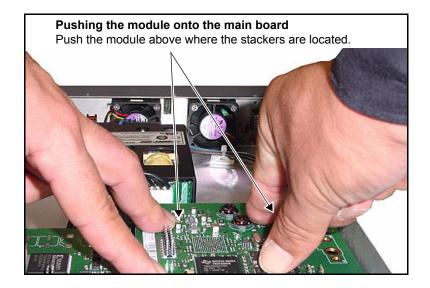


**Figure C-21.** Pushing the Module on to the Main Board

2. Secure the new module to the main board using the provided screws.

   Figure C-22 on page 298 illustrates the location of the three module standoffs where you must install the screws.
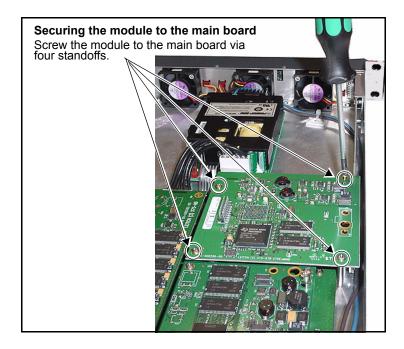
**Figure C-22.** Securing the Module to the Main Board

3. Replace the chassis cover using the original screws. See page 279 for more information on replacing the cover.

4. Using the control knob interface, follow this path to reach the streaming module's network address parameters:

   **High End Streaming > Network Settings**

5. Make the necessary **Gateway**, **Subnet Mask**, and **IP Address** settings in the **Network Settings** parameters, as shown in Figure C-23 on page 299, and then select **Save IP > Yes**.

   The default settings are:

   • Gateway: (192.168.100.1)

   • Subnet Mask: (255.255.255.0)

   • IP Address: (192.168.100.252)

6. On a computer linked via Ethernet to theX75HD/X75SD, visit www.apple.com and then download the free QuickTime™ version 7 player.

7. Launch QuickTime Player, click **File**, and then click **Open URL**.

8. Type the following text into the **Open URL** field (where **ipaddr** represents the IP Address of the streaming module):

```
rtsp://ipaddr:554/X75streaming
```

The QuickTime player should begin receiving streaming media from the X75HD/X75SD after a delay of 4 seconds.
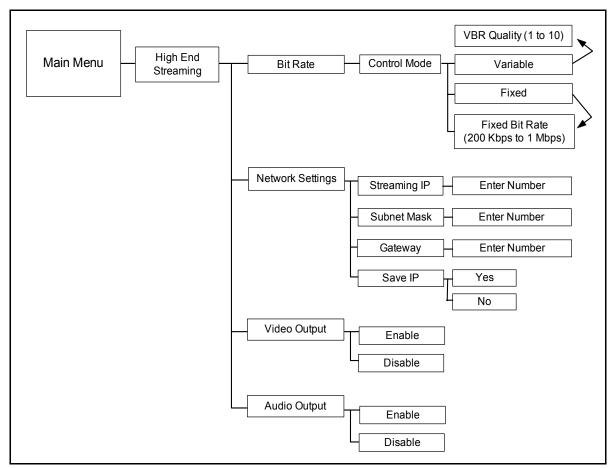


**Figure C-23.** Streaming Module Settings

# Removing an Existing Module

If you must remove an existing streaming module from a unit, follow these steps:

1. Remove the screws along the back edge and each side of the frame's chassis cover (see ), and then slide the cover off.

   Retain the screws for later use.

2. Remove the three screws that secure the module to the main board.

   See to locate these screws.

3. Gently lift the module off of the main board.

   Be sure to lift the module off evenly to prevent the stacker connector pins from bending or breaking.

4. Inspect the connectors on the module and main board to ensure that all pins are straight.

5. Store the board in a protective bag to protect it from damage or ESD

# Launching QuickTime in CCS Pilot and Navigator

The streaming video output is viewable using QuickTime Player directly, or via QuickTime in CCS Pilot and Navigator. (Version 7.0 of the player must be installed.)

In CCS Pilot and Navigator, you can add the streaming video module as a device icon in the **Navigation** window. In CCS Navigator only, you can view the streaming video either by adding a device icon in the **Navigation** window, or by installing a button on a Graphical Navigator page.

## Adding Streaming as a Device Icon in the Navigation Window

To add a device icon to launch X75 streaming video, follow these steps:

1. With Pilot or Navigator in Build mode, right click in the **Network**, **Discovery**, or **Temporary** folder of the Navigation window, and then select **Create** > **Server**.

   This will create a **Server** icon in the **Navigation** window.

2. Right-click on the server icon and select **Properties...** from the menu that appears.

   The **Navigation Properties** dialog box opens.

3. Select the **Command** tab, and fill it in with the following information:

   **Operation:** `Control`

   **Command:** `c:\program files\quicktime\quicktimeplayer.exe`

   (Or the complete path to your QuickTime Player installation, if it differs from the above)

   **Arguments:** `rtsp://[IP address]:554/x75streaming`

   (Replace `[IP address]` with the IP address of the X75 streaming Ethernet port)

   You can leave the **Initial Directory** field blank.

4. Close the **Navigation Properties** dialog box by clicking the **Close** button in the top right corner.

When you enter Control mode, double-click on the server icon. This will open a QuickTime Player and play streaming video from the X75.

## Adding Streaming via a Button in Navigator

To add a button to launch X75 streaming video, follow these steps:

1. With Navigator in Build mode, place a button on a Graphical Navigator page.

   For information on creating buttons, see "Adding Buttons" in the CCS Navigator online help.

2. Right-click on the button and select **Properties**... from the menu that appears.

   The **Object Properties** dialog box opens.

3. Select the **Rules** tab, and then click the **New Rule** button.

   A new line appears in the Rules table.

4. In the new rule's Event list, select **OnMouseClick**.

The default Condition setting for this event is **Always**; you can leave that as it is, or you can change it by clicking the **Condition** button. See "Defining Condition" in the CCS Navigator online help for information on completing the Condition dialog box.

5. From the new rule's Action list, select **Launch Application**.

6. Click the **Action Properties** button.

   The **Action Property** dialog box opens. Fill it in with the following information:

   • **Command**: `c:\program files\quicktime\quicktimeplayer.exe`

   • **Arguments**: `rtsp://[ip address]:554/ x75Streaming`

   You can leave the **Initial Directory** field blank.

7. Click OK to close the **Action Properties** dialog box.

8. Close the **Object Properties** window by clicking the X in the top right corner.

   When you enter Control mode, the new button will open a QuickTime Player and play streaming video from the X75.

# Installing Noise Reduction, Auto Audio/Video Timing, and Audio Limiter Software Options

## Installing a Software Option

If you have ordered the X75OPT-ASL, X75OPT-DOLBY-1, X75OPT-DOLBY-2, X75OPT-NR, X75OPT-SNMP, or X75OPT-V2A software options separately, you will require a soft keycode. (Dolby-1 and Dolby-2 options consist of a hardware plug-in with software key license.)

The software license is an unlock code, consisting of fourteen hexadecimal digits, will be provided when you purchase the option. Once you install the option, use a control panel or the web client server software to install the code.

Using the control panel or web server application, follow this thread to install the unlock code: **System Config > Setup > License Key**.

## Operating the X75OPT-AS-32 /16 /8-L Audio Limiters

Audio limiters are available for the 32-, 16-, and 8-channel versions of the X75OPT-AS-32 /16 /8 audio synchronizers. The audio limiters have the following available options:

- Soft Limit Level
- Slope
- Attack Time
- Decay Time
- Noise Gate Level
- Noise Gate Time

Table C-3 describes the various options of the audio limiter.

**Table C-3.** Audio Limiter Options

| Option | Description |
|---|---|
| Soft Limit Level | • Sets the threshold level for the input audio signal, measured in dB (decibels), where the audio signal limiter's attack and decaying function will be based<br><br>• When a signal exceeds this level, compression will be applied |
| Slope | • The amount a signal is reduced by the compressor<br><br>• When the slope is set to 0.25, the audio input signal exceeding the soft limit threshold level will be reduced by a factor of 4 at the output |
| Attack Time | • Limiter will be activated only after the input audio level remains over the Soft Limit Level for the duration specified in the Attack Time option<br><br>• Audio that exceeds the specified Soft Limit Level for less than the specified Attack time will not activate the limiter<br><br>• Attack Time indicates how long it takes for the compressor to act after a signal has exceeded the threshold level |
| Decay Time | • Once the input audio signal has exceeded the Soft Limit Level and the limiter has been activated, the limiter remains active until the audio signal has returned below the Soft Limit Level for the duration specified in the Decay Time option<br><br>• If the input audio signal returns below the Soft Limit Level for less than the specified Decay Time, the limiter remains active |
| Noise Gate Level | • Sets the noise gate threshold level, measured in dB (decibels)<br><br>• When an input signal has fallen below this level, the noise gate will be applied |
| Noise Gate Time | Indicates how long it takes for the noise gate to start or stop acting after the input signal has fallen below or risen above the threshold level |
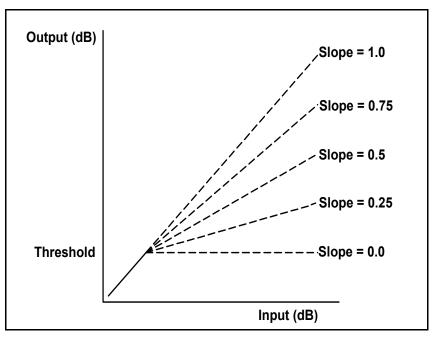
Figure C-24 shows the transfer function of the Audio Limiter:



**Figure C-24.** Audio Limiter Transfer Function

# Installing Dolby Modules

To add an X75OPT-DOLBY-1 decoder module or an X75OPT-DOLBY-2 encoder module, you must first remove the existing audio submodule or HD module, respectively, from the main board. Afterwards, the installation consists of two phases: hardware and softkey.

Information about the use of Dolby in broadcast applications is available at www.dolby.com.

## Hardware Installation

The installation process for the decoder and encoder modules is similar, except that the HD submodule (rather than the audio submodule) must be removed to insert the encoder. See Figure C-25 for the location of the two Dolby modules.
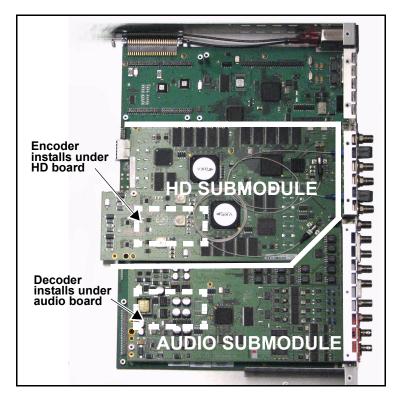


**Figure C-25.** Location of Dolby Decoder and Encoder

The following instructions describe the installation of the decoder (except for the location, the instructions are the same as for the encoder):

1.  Remove the screws along the back edge and each side of the frame's chassis cover (see Figure C-2 on page 279), and then slide the cover off.

    Retain the screws for later use.

2.  Remove the three rear connector screws that secure the audio submodule to the frame.

    See Figure C-9 on page 285 to locate these screws.

3.  Remove the three screws that secure the audio submodule to the main board.

    See Figure C-8 on page 285 to locate these screws.

4.  Gently lift the audio submodule off of the main board.

    Be sure to lift the module off evenly to prevent the stacker connector pins from bending or breaking.

5.  Inspect the connectors on the module and main board to ensure that all pins are straight.

6.  Insert the Dolby decoder module into the socket. (See Figure C-26 on page 307.)
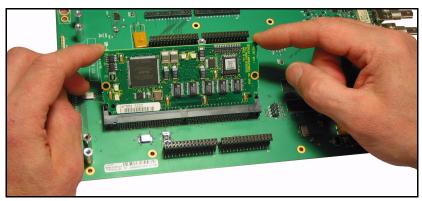


**Figure C-26.** Inserting Dolby Decoder Module into Socket

7. Press the module edges down slowly until you hear the metal clips click. (See Figure C-27.)



**Figure C-27.** Dolby Decoder Module Installed

8. Gently reinstall the audio module above the Dolby decoder, using all of the screws provided.

# Data Port Information

**Note**

Dolby audio metadata is typically an RS-485 balanced multi-drop interface. For the audio metadata implementation in the X75, either an unbalanced RS-232 or balanced RS-422 single drop interface is provided.

The X75OPT-DOLBY-1 decoder and X75OPT-DOLBY-2 encoder modules connect to the **RS-232/422** port located at the back of the X75HD/X75SD unit. Both modules use the same port, but are connected to different pins in this DB-9 connector (see Figure 4 below and Table 4 on page 309).



**Figure 4.** Data Port Pinouts

**Table 4.** Data Port Pinouts

| Audio Metadata | Module | Pins | Serial Interface |
|---|---|---|---|
| Output | X75OPT-DOLBY-1 Decoder | 2 (TX+) and 5 (Ground) | RS-232 |
| | | 2 (TX+) and 7 (TX-) and 5 (Ground) | RS-422 |
| Input | X75OPT-DOLBY-2 Encoder | 3 (RX-) and 5 (Ground) | RS-232 |
| | | 3 (RX-) and 8 (RX+) and 5 (Ground) | RS-422 |

To change the serial interface on this port, follow this parameter path:

**System Config > Setup> RS-232** or **RS-422**
(The default setting is RS-232.)

**Softkey Installation**

The Dolby decoder requires a softkey code to operate. The softkey can be entered using the control panel or the Web Server software application. Follow these instructions to enable the softkey option:

1. Go to the **System Config > Setup** menu and select the **License Key** parameter**.**

2. Enter the fourteen license key characters and then press **Enter**.

# Replacing a Power Supply

This section describes the replacement of a failed X75OPT-PS Power Supply. To install an additional, redundant power supply, see page 313.

Follow these steps to remove and replace an original power supply:

1. Remove all power from the frame, and then remove the chassis cover (see "Preparing the X75HD/X75SD for Servicing" on page 279 for more information).

2. Locate the failed power supply inside the system, at the front of the unit behind the fan board.

   Power supplies are secured to the chassis floor, and connected to the main board. See Figure C-28.



**Figure C-28.** Location of Connected Power Supply

## Note

The default power supply shipped with every X75HD/X75SD system is located on the left side of the frame (as seen from the front). An installed redundant power supply is located on the right side of the frame.

3. Remove the main DC power cable and secondary DC ribbon cable that connect the power supply. (See Figure C-29.)
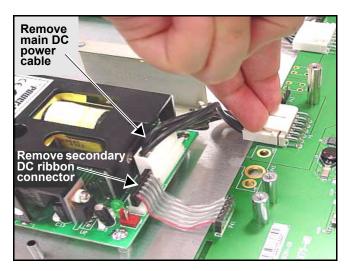


**Figure C-29.** Removing the DC and Ribbon Cables

4. Disconnect the polarized AC cables from the power supply. (See Figure C-30.)
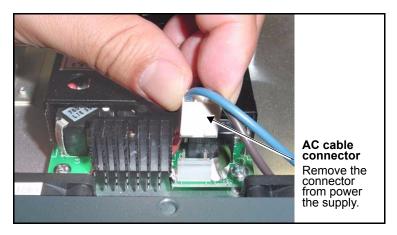


**Figure C-30.** Removing AC Cable from Power Supply

5. Unscrew the power supply from the chassis floor.

   Figure C-31 shows the location of the four screws you need to remove. Keep these screws for later reuse.



**Screw locations**
Remove these four screws to unfasten the power supply from the chassis floor.
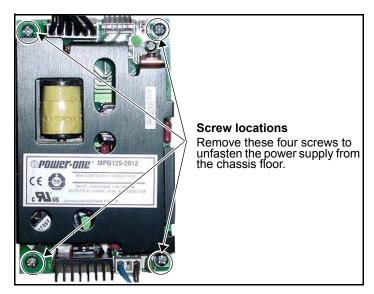
**Figure C-31.** Removing the Power Supply

6. Remove the power supply from the frame.
7. Replace the old power supply with a new one, following the previous steps in reverse.

**Note**

If you are removing a redundant power supply, replace the power supply prior to operation or install a cover plate over the AC inlet hole to maintain proper ventilation and avoid overheating.

# Installing a Redundant Power Supply

Follow this procedure to install a new, redundant power supply when there is only one power supply currently in the frame:

1. Remove all power from the frame, and then remove the chassis cover. (See "Preparing the X75HD/X75SD for Servicing" on page 279).

   A redundant power supply is installed on the right side of the frame (labelled 2, below), as seen from the front. (See Figure C-32.)
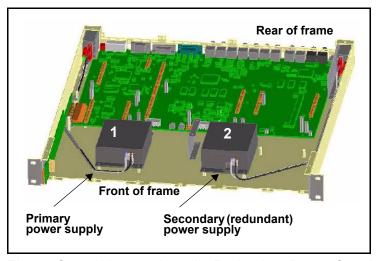


**Figure C-32.** Where to Install a Redundant Power Supply

> 📝 **Note**
>
> If the HD submodule is installed, you may need to remove it first before connecting the DC cables.

2. Install the power supply onto the four standoffs on the chassis floor, and then screw into place. (See Figure C-31 on page 312.)

   The two-pin AC cable connector faces the front of the chassis, while the six-pin DC cable connectors face the rear.

3. Connect one end of the main DC power cable and the secondary DC ribbon cable to the main board, and the other end of each cable to the power supply. (See Figure C-33.)

**Figure C-33.** Connecting DC and Ribbon Cables

4.  Plug the end of the AC cable assembly with a two-pin connector into the power supply.

    The two-pin connector has polarized live and neutral wires feeding into it, color-coded as follows:

    •   Black/Brown: Live wire

    •   White/Blue: Neutral wire

    For primary and secondary power supplies, ensure that the neutral wire is on the left side and the live wire is on the right, as seen from the front. (See Figure C-34 on page 315).

**AC cable assembly**
Neutral wire (left)
Live wire (right)
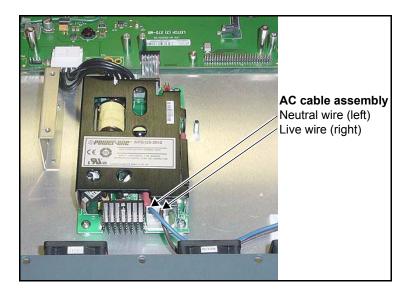
**Figure C-34.** Connecting AC Cables to Power Supply

5.  Secure the AC cabling to the chassis. (See .)

    To do this, follow these steps:

    a.  Attach the self-stick tie holders to chassis floor (two places for each power supply's AC cabling).

    b.  Feed the tie wraps through the holders.

    c.  Wrap the tie wraps around the AC cabling.

    d.  Clip any extra tie length.
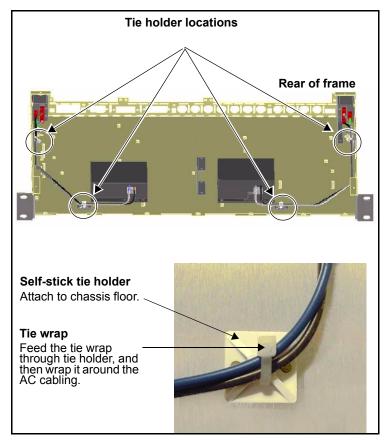
**Figure C-35.** Attaching Tie Wraps to AC Cabling

6. Take off the AC inlet cover plate by removing the inlet cover screw on the chassis side, and then install the new AC inlet into the slot. (See Figure C-36 on page 317.)

Ensure the following during installation:

• The ground plug on the inlet faces the outside chassis wall.

• The AC inlet snaps securely into place.

**AC inlet**
Install inlet into the
uncovered slot.

**AC inlet cover plate location**
Remove this screw in order to take off the cover plate.
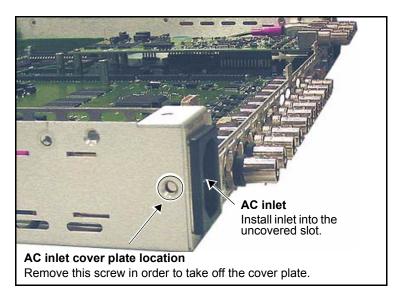
**Figure C-36.** Removing Cover Plate and Installing AC Inlet

7. Securely plug the AC wires into the appropriate AC inlet blade
   terminals.

   There are three wires: Live (black/brown), Neutral (white/blue),
   and Ground (green/yellow). The Live wire plugs on top of the
   Neutral wire, while the Ground wire always plugs into the single
   row slot that is closest to the chassis wall. (See Figure C-37.)



**Live wire**

**Neutral wire**

**Ground wire**
(with ring terminal
attached)
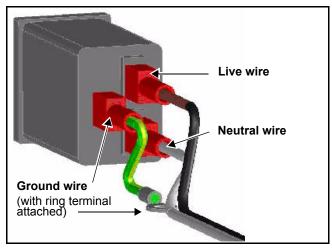
**Figure C-37.** Connecting AC Cables to Inlet

8. Place the attached ring terminal on the end of the ground wire over the stud on the chassis floor, and then secure it into place with the supplied nut to ground the unit.



**Grounding screw location**
Using the provided ring terminal and nut, attach the end of the grounding wire to the chassis floor to ground the unit.
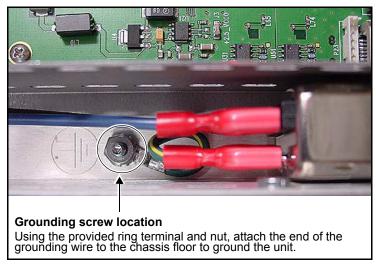
**Figure C-38.** Grounding AC Inlet

9. Replace the cover on the frame, and then return power to the unit.

See for more information on replacing the cover.

# Installing Fans

To replace a fan, or individual fans within the assembly, follow these steps:

1. Remove the four front mounting-ear screws, and then pull the frame out a few inches from the rack.

   Retain the screws.

2. Remove the seven screws along the top and bottom of the front panel that hold the control panel to the frame. (See Figure C-39.)

   Retain the screws.
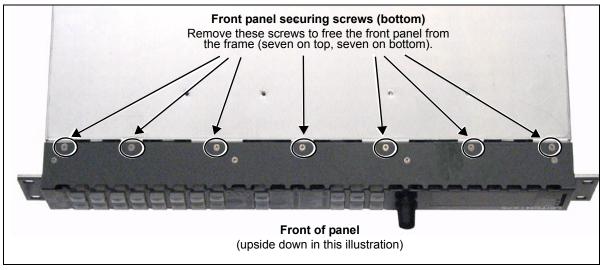


**Figure C-39.** Freeing the Front Panel from the Frame

3. Pull the front panel away from the frame. (See Figure C-40 on page 320.)

   Although a frame-mounted local control panel is shown, this procedure also applies to blank front panels.
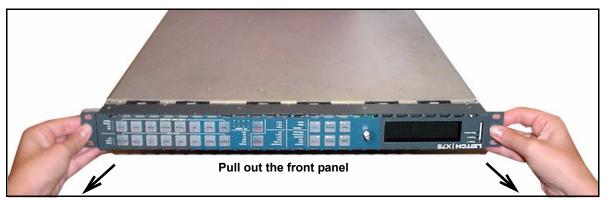
**Figure C-40.** Removing the Front Panel

4. Identify the fan you are replacing on the back side of the front panel, and then remove the corresponding header wires from the fan assembly connector. (See Figure C-41.)
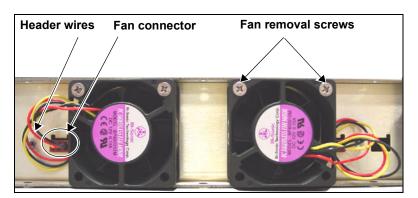


**Figure C-41.** Removing Header Wires from Fan Assembly Connector

5. Unscrew the fan, and then pull it away from the assembly to remove it.

6. Fasten a new fan into place on the assembly with the supplied screws. (See Figure C-42.)
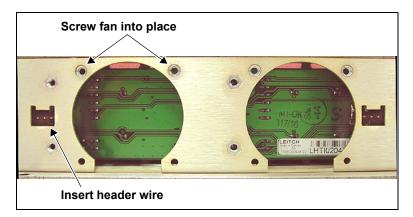


**Figure C-42.** Replacing a Fan within the Assembly

7. Connect the new fan's header wires to the corresponding fan assembly connector.

8. Secure the front panel to the X75HD/X75SD frame using the original screws from step 2.

9. Close the front panel, re-establish any connections, and then reapply power to the frame.

**X75HD/X75SD Installation and Operation Manual**

# Software

# Overview

This appendix provides information about upgrading the software used in X75HD/X75SD units. The following topics are covered:

- "Upgrading Module Firmware" on page 324
- "Configuring SNMP Support" on page 331
- "Monitoring and Control Using Leitch MIBs" on page 337

# Upgrading Module Firmware

Firmware upgrading is a routine procedure that you must perform to install newer versions of software on the X75HD/X75SD. Pilot, Co-Pilot, or Navigator software applications are required for this procedure. You can use either the Discovery or the drag-and-drop method. When performing the upgrading procedure, check the appropriate readme file to confirm which files are needed. Use care to ensure that you upload the correct files to the intended module.

If for some reason the upgrade fails, the module may not respond to controls and will appear to be non-functional. In that event, follow the steps described in "Correcting a Failed Upgrade Procedure" on page 330.

## Upgrading the Firmware

Follow these steps to upgrade the firmware:

1.  Download the most recent appropriate upgrade package from the Leitch Web site or from your CD-ROM.

2.  If the affected module has not been discovered, perform the Discovery operation, as described in your CCS software application manual or online help.

3.  From the **Tools** menu, select **Software Upgrade**.

The **Software Upgrade** window opens or is brought to the foreground.



Click here to access options for entering Telnet and FTP user name and password and creating automatic backups.

Package Info includes a list of the components contained in the ZIP file.

**Figure D-1.** Software Upgrade Tool's New Transfer Tab

4. On the **New Transfer** tab, click **Add**.

   The **Device Selection** dialog opens.

5. Select one or more X75s, and then click **OK** to close the **Add Device** dialog box.

   The selected devices appear in the table on the **New Transfer** tab of the **Software Upgrade** window. This table lists devices that are to receive the same upgrade package.

   For each device in this table, you can highlight its position in the Navigation Window by clicking **Find Device**. You can check the software revision numbers, etc., by clicking **Version Info**.

6. For each X75, click **Options**.



**Figure D-2.** Software Upgrade Options Box

7. If they are not already entered, fill out the **Telnet Username**, **Telnet Password, FTP Username**, and **FTP Password** fields.

8. Place a check beside **Automatic Backup**.

   This creates a backup of the current software installed on the X75. The backup is saved to the file name and location stated unless you click **Browse** to change it.

9. Click **OK** to close the **Software Upgrade Device Options** window.

10. On the **Software Upgrade** window's **New Transfer** tab, press **Browse...** to select the software upgrade package (ZIP file).

    A standard **Windows File Selection** dialog opens.

11. Choose the upgrade ZIP file on a local or network drive.

    The selected file's path name is displayed in the edit box to the left of the **Browse…** button.

    The extraction process on the ZIP file is handled as part of the upgrade process. You do not need to extract the files yourself.

> ## Note
>
> Closing the **Software Upgrade** window does not effect any of the transfer processes that may be running in the background.

## Note

If you try to log off or exit the CCS software while a transfer is underway, a notification window will alert you that processes are still active and will ask if you want to terminate these processes.

12. Press **Submit Transfer...**

A dialog box opens, requesting confirmation that you want to proceed with the request. If you have multiple devices selected, multiple transfer tasks are submitted—one per device.

The transfer now progresses. You may close the **Software Upgrade** window, or continue with other tasks.

Or you can switch to the **Progress** tab to view the status of the transfers.

13. Click on the **Log** tab and look at the **Progress** column to ensure that all files have correctly updated.

The module is automatically rebooted following an upgrade procedure.

### Stopping a Transfer Task

## Note

The **Resume** button is not available in this release. Its functionality will be implemented in a future release.

To stop a transfer task, select the task from the grid, and then click **Stop**. If the selected task is currently executing, it is placed into a an Aborted state. If the task has not yet started, it is placed into a "Waiting to Resume" state. A confirmation window appears to confirm that you want to stop as aborting the task will put the module into an inconsistent state the next time it is rebooted.

**Using the Software Upgrade Progress Tab**

![Note icon] **Note**

The **Resume** button is always unavailable in this release. Its functionality will be implemented in a future release.

Use the **Progress** tab to monitor the status of all the transfer requests in the queue. The grid displays the status of each transfer task, with each row in the grid representing a single device-package combination (transfer task).
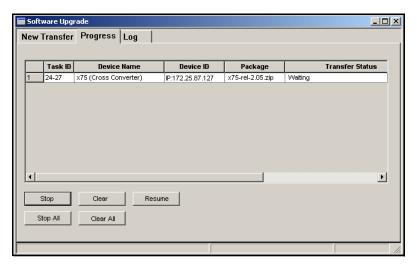


**Figure D-3.** Progress Tab of the Software Upgrade Window

Table 1-2 below describes the five buttons on the **Progress** tab.

**Table D-1.** Progress Tab Buttons

| Button | Description |
|---|---|
| Stop | Aborts a selected transfer task |
| Clear | Removes a selected transfer task from the grid; the task must be in a Waiting to Resume, Aborted, Failed, or Completed state in order for this button to be enabled |
| Stop All | Aborts all tasks in the queue; you will be asked to confirm |
| Clear All | Removes all stopped tasks from the queue; these tasks must be either Waiting to Resume, Aborted, Failed, or Completed |
| Resume | Restarts a task that is in the "Waiting to Resume" state |

### Using the Log Tab

The **Log** tab displays a running log of all the transfer operations completed since application startup. It contains information such as the package filename, versions being transferred, start times, errors during transfer, and so on. The log text is selectable, allowing you to copy and paste log information to another application.

### Software Upgrade Options

Right click in the Software Upgrade window to open an **Options** window.
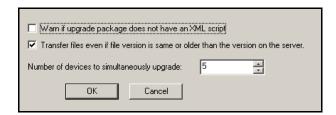


**Figure D-4.** Software Upgrade Options Window

**Table D-2.** Software Upgrade Options

| Option | Result |
|---|---|
| Warn if upgrade package does not have an XML script | File transfer is not supported without an XML script, so this will warn you before aborting. |
| Transfer files even if file version is same or older than the version on the server | When this is checked, you can potentially upgrade the software to an older revision. However, this may be useful for returning to your backed up version. |
| Number of devices to simultaneously upgrade | Limits the number of files that can be added to the table on the New Transfer tab to the number in the window, which you can change. |

**Correcting a Failed Upgrade Procedure**

A firmware upgrade may fail in the event of a network interruption or power failure. If one of these events occurs, you will be able to ping the device, but Multiple Path Converters and Frame Synchronizers will not be able to discover it.

See the documentation for the specific CCS device whose upgrade has failed for information on fail-safe mode, and if there are instructions for putting the device into fail-safe mode, follow them.

After a failed upgrade, some CCS devices will automatically go into a fail-safe mode where new software can be loaded but other functions are not enabled. If an upgrade fails, remove and then reapply power to the CCS device. You can then try the upgrade procedure again.

When you are performing the fail-safe upgrading procedure, check the readme file to confirm which files are needed. Use care to ensure that you transfer the correct files to the intended device.

1. Ensure that the CCS device is in fail-safe mode.

2. Change the network addresses on your Multiple Path Converters and Frame Synchronizers PC to match the default network addresses.

3. In Multiple Path Converters and Frame Synchronizers's Build mode, drag or copy and paste the device's icon from the **Catalog** folder to the **Network** or **Discovery** folder.

4. Right click on the device icon and then select **Properties**.

5. On the **Device** tab of the **Navigation Properties** box, press the **Set Default** button, and then click **Yes**.

6. Follow the software upgrade procedure for the device as described in "Upgrading Module Firmware" on page 324.

7. Return the upgraded device to its normal operating mode, including returning the fail-safe and Default IP switches to their up position. For information on doing this, please refer to the device's installation and operation manual.

8. Return the PC network settings to their original states. See "Changing the PC Network Settings" on page 104.

> ### Note
>
> Do not make changes in the third field (located above and to the right of the **Set Default** button).

# Configuring SNMP Support

With SNMP support, you can use a standard MIB browser to monitor parameters and alarms.

You must set SNMP options using Pilot, CoPilot or Navigator. Before you can configure SNMP support, you must discover the X75HD/X75SD. For instructions on discovering this module, see the CCS Pilot/Navigator online help.

### Activating Your SNMP License Key

A license key may have been included in your purchase of an SNMP-enabled system. Contact Leitch customer service to purchase one at a later date.

1. While your CCS Software is in Build mode, right click on the discovered X75HD/X75SD and choose **Configuration**.

    The **Configuration** window opens.

2. Click on the Device tab.

3. Enter your device key in the **License Key** field, and then click **Write and Reboot**.

4. Close the **Configuration** window.

### Setting SNMP Options

Devices that support SNMP will have an **SNMP** tab in the **Configuration** window. To configure an X75HD/X75SD that supports SNMP, follow these instructions.

1. While your CCS Software is in Build mode, right click on the X75HD/X75SD and choose **Configuration**.

    The **Configuration** window opens.

2. Click the **SNMP** tab, and then click the **Read** button.

The CCS network polls the module and retrieves its current settings. It fills in all the fields on the **SNMP** tab of the **Configuration** window with the settings that are on the device.
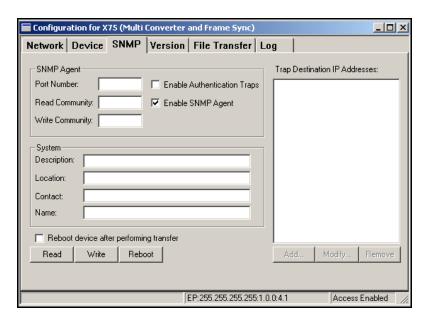


**Figure D-5.** SNMP Tab on device Configuration Window

If the Read function fails, your license key may not be entered correctly. See "Activating Your SNMP License Key" on page 331.

In the top left portion of the window are SNMP Agent settings.

**Table D-3.** SNMP Agent Fields of SNMP Tab

| Field | Function |
|-------|----------|
| Port Number | (Can be from 0 to 65535) The network port used by the SNMP agent; port 161 is the default for X75HD/X75SD |
| Read Community | Has to match the "read community" setting in your MIB browser |
| Write Community | Has to match the "write community" setting in your MIB browser |
| Enable Authentication Traps | When checked, authentication traps are sent if the read or write community doesn't match between the SNMP agent and MIB browser |
| Enable SNMP Agent | When checked, SNMP support is available; if not checked, SNMP support is disabled |

Below the **SNMP Agent** settings are **System** settings. The information in these fields describes the device that is currently selected in the **Navigation** window. This is user-defined information that, once provided by an administrator, is available on the device when it is retrieved by a MIB browser.

**Table D-4.** System Fields of SNMP Tab - MIB-2 System Information

| Field | Explanation |
|-------|-------------|
| Description | The default is "Leitch SNMP Agent" |
| Location | The physical location of the device |
| Contact | The contact person for this device |
| Name | Name of the device |

The **Trap Destination IP Addresses** field contains a list of IP addresses that will receive SNMP traps. It is in the format IP Address:Port Address:SNMP version.

3. To add new Trap Destination IP Addresses, see "Adding New Addresses for SNMP Traps" on page 334. To modify them, see "Modifying an SNMP Trap Destination" on page 335.

4. (Optional) If you wish the device to reboot automatically when you send the new configuration to it, place a check beside **Reboot device after performing transfer**.

> **Note**
>
> The device must be rebooted before changes will take effect.

5. Click **Write** to send the new configuration to the device.

6. If you did not place a check beside **Reboot device after performing transfer** in step 6, click **Reboot** now and your changes to the configuration will take effect.

## Adding New Addresses for SNMP Traps

To add a new SNMP trap destination, follow this procedure:

1. Click **Add** beneath the **Trap Destination IP Addresses** field. The **Add Trap Destination** window opens.
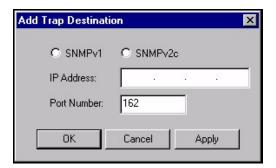


**Figure D-6.** Add Trap Destination Window

2. Choose the SNMP version that you would like to use for traps.

3. Choose the IP address of that trap destination.

4. Choose the port number. The default is 162, but an administrator can set this to any number between 0 and 65535.

5. Click **Apply**. A new line is added in the **Trap Destination IP Addresses** field.

6. Repeat steps 2 through 5 to add more rows to the window.

7. Click **OK** to return to the **SNMP** tab of the **Configuration** window.

**Modifying an SNMP Trap Destination**

To modify a trap destination, follow this procedure:

1. In the **Trap Destinations IP Addresses** list, click on the item you would like to modify.

2. Click the **Modify** button. The **Modify Trap Destination** window opens.
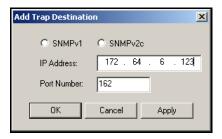


**Figure D-7.** Modify Trap Destination Window

3. Choose the SNMP version of the traps using the radio buttons at the top of the window.

4. Enter the IP address of that trap destination in the **IP Address** field.

5. Enter the port number in the **Port Number** field.

   The default value is 162.

6. Click **Apply**. The selected entry in the **Trap Destination IP Addresses** field is updated.

7. Repeat steps 2 through 6 to further update the row.

8. Click **OK** to close the **Modify Trap Destination** window.

# Configuring Third-Party SNMP Software Control

SNMP is an industry-standard protocol that allows other (non Leitch) control software to remotely monitor and control the X75HD/X75SD.

Leitch provides MIB files that can be downloaded from the Leitch Web site. Two general Leitch MIB files (**leitch.mib** and **ccsAlarm.mib**) set up the structure to define parameters and alarms. Once these two MIBs are installed, you will want to install a MIB for each distinct module for which you wish to set up third-party software control.

You can use any standard MIB browsing software with your X75HD/X75SD.

1. Make the required network connections between the X75HD/X75SD unit(s) and your PC with installed SNMP browser/control software.

   The SNMP configuration process for the X75HD/X75SD directs the SNMP agent where to send alarms (SNMP traps). This file must be modified before it is loaded back to the X75HD/X75SD. For information on configuring SNMP, see page 331.

2. Load the leitch.mib file into your SNMP browser/control software.

   This MIB sets up the basic structure for product specific Leitch MIBs. It can be found under the Private > Enterprise branch, and sets up the leitchProducts and leitchCommon sub-branches.

   The leitchCommon branch is initially empty. The leitchProducts branch contains folders for different families of Leitch devices—for example, LeitchX75, NEO and fam6800plus.

3. Load the ccsAlarm.mib file into your SNMP browser/control software.

   This MIB adds a ccsAlarms sub-branch to the leitchCommon folder. When it is installed, you will be able to receive traps with proper information as to where the alarms are triggered from.

4. Load product-specific X75HD/X75SD Leitch MIB files into your SNMP browser/control software.

   A product-specific MIB provides a clear path to the parameters and alarms on the device. Leitch MIBs can be downloaded from the Leitch Web site at www.leitch.com.

   X75HD/X75SD MIBs will appear in the X75 folder under the leitchProducts folder. See Figure D-8 on page 337.

5. Configure your MIB browser to connect to the X75HD/X75SD by entering the IP address, Port (if you have changed the Port from its default in the configuration), and other standard configuration settings.

📝 **Note**

To verify that your configurations are correct, you can walk MIB2.

Your browser should now be able to connect to the SNMP agent running on the X75HD/X75SD unit. If you wish to receive traps, start up the trap receiver in your MIB browser software.

For SNMP troubleshooting information, see page 242.

# Monitoring and Control Using Leitch MIBs

Each X75HD/X75SD unit's MIB can be fully expanded. When you expand an X75 MIB node in the tree view, there are three sub-folders (see Table D-5).

**Table D-5.** MIB Sub-Folders

| Tree View Item | Contents |
|---|---|
| Objects | Lists the parameters for the device; all configurable and read-only parameters appear here (see Figure D-8) |
| Identities | Lists the alarms information for the device which is used by the MIB browser to make trap messages more meaningful (see Figure D-9 on page 338.) |
| Conformities | A group of standard MIB information that guarantees that the MIB conforms to standard SNMP format |

To view a complete list of the parameter settings on the X75, walk the MIB for that X75, walk the X75 at an IP address, or walk the X75 type.
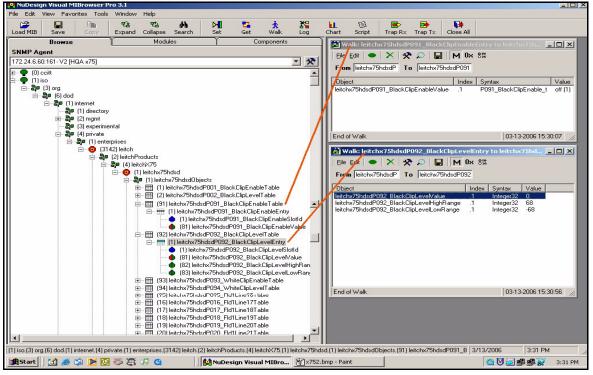


**Figure D-8.** Typical MIB Loaded into NuDesign MIB Browser

### Navigating Parameters in a Leitch MIB

Leitch product MIBs contain functionality so that you can view a parameter's range, walk a device or a frame, or receive alarm traps for a device. See Figure D-9 for an example of alarms shown in a MIB browser.

How you can access these standard features will depend on the MIB Browsing software you use. See the documentation that accompanies your third-party control software for more details.
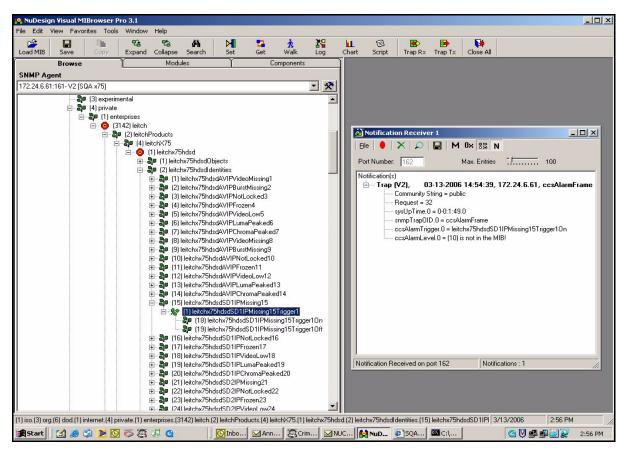


**Figure D-9.** Alarms in MIB Browser

Parameters that have a limited list of options have two listings under the Entry branch of the tree. Parameters that have a range (as in a slider) of options have four listings under the Entry branch of the tree.

The sub-branches described in Table D-6 are shown in.

**Table D-6.** Sub-Branches Under a Parameter in a Leitch MIB

| Sub-Branch | Contains |
|---|---|
| Slot ID | (Does not apply to the X75.) |
| Value | The current setting of this parameter |
| High Range (slider ranges only) | The top value of this parameter |
| Low Range (slider ranges only) | The bottom value of this parameter |

For information on the parameters for each individual device, see that device's documentation. Leitch device manuals are available on the Leitch Web site at www.leitch.com. In addition, some Leitch products have HTML forms that display their parameters. These HTML forms are available on the Leitch Web site as well.

Appendix E

# Alarms

# Overview

This appendix lists the alarms as they are shown in the **Configure Alarms** menu. Alarms on X75HD/X75SD units are divided into Major and Minor categories, and this list shows the default category. You can change the priority of the individual alarms by assigning them a number between 1 and 10. Minor alarms are those between 1 and 5; Major alarms are between 6 and 10.

The **Configure Alarms** menu includes the following items:

- Trigger Time
- Clear Time
- Priority
- Alarms Disabled
- Alarm Mute
- Acknowledged

More information about these menu items and the alarms themselves is provided in the following pages.

# Configure Alarms Options

Table E-1 lists the options available in the **Configure Alarms** menu and their meanings. To reach the individual alarms, press the **Option** button, and then select **Configure Alarms**.

**Table E-1.** Configure Alarms Menu

| Menu Item | Description |
| --- | --- |
| Trigger Time | A filter that sets the duration (in seconds) between the time an alarm is detected, and the time an alarm is reported to the Web Server, CCS application, or Alarms LED |
| Clear Time | A filter that sets the length of time the alarm continues to be reported after the alarm condition is no longer detected (default values are set at 0 seconds) |
| Priority | The numerical value given to the priority of the alarm<br>(1 = low priority and 10 = high priority; any alarm above 5 is designated Major) |
| Alarms Disabled | An option that silences the alarm, even though the alarm condition may continue to exist (If the alarm is re-enabled and the condition is not corrected, the alarm is reactivated immediately.) |
| Alarm Mute | An option that suppresses alarm messages when the state of the alarm changes (The control panel is affected when the mute is enabled. However, the Web Server application will display the alarm message in its next polling cycle, or when the user refreshes the screen. The Alarm Mute is not displayed in CCS applications.) |
| Acknowledged | A "flag" that indicates someone is attempting to correct the source of the alarm (In X75 control panels, an asterisk appears beside the alarm in the Active Alarms List.) |

# Alarms List

**Table E-2.** X75HD/X75SD Alarms List

| Alarm Name | Default Priority | Default Trigger Time Setting (seconds) | Default Clear Time Setting (seconds) |
|---|---|---|---|
| AV I/P video missing | Major | 0.0 | 0.0 |
| AV I/P burst missing | Major | 0.0 | 0.0 |
| AV I/P not locked | Major | 0.0 | 0.0 |
| AV I/P frozen | Minor | 5.0 | 0.0 |
| AV I/P video low | Major | 5.0 | 0.0 |
| AV I/P luma peaked | Major | 5.0 | 0.0 |
| AV I/P chroma peaked | Major | 5.0 | 0.0 |
| SD1 I/P missing | Major | 0.0 | 0.0 |
| SD1 I/P not locked | Major | 0.0 | 0.0 |
| SD1 I/P frozen | Minor | 5.0 | 0.0 |
| SD1 I/P video low | Major | 5.0 | 0.0 |
| SD1 I/P luma peaked | Major | 5.0 | 0.0 |
| SD1 I/P chroma peaked | Major | 5.0 | 0.0 |
| SD2 I/P missing | Major | 0.0 | 0.0 |
| SD2 I/P not locked | Major | 0.0 | 0.0 |
| SD2 I/P frozen | Minor | 5.0 | 0.0 |
| SD2 I/P video low | Major | 5.0 | 0.0 |
| SD2 I/P luma peaked | Major | 5.0 | 0.0 |
| SD2 I/P chroma peaked | Major | 5.0 | 0.0 |
| HD I/P missing | Major | 0.0 | 0.0 |
| HDFS I/P frozen | Minor | 0.0 | 0.0 |
| HD I/P video low | Major | 0.0 | 0.0 |
| HD I/P luma peaked | Major | 0.0 | 0.0 |
| HD I/P chroma peaked | Major | 0.0 | 0.0 |

**Table E-2.** X75HD/X75SD Alarms List

| Alarm Name | Default Priority | Default Trigger Time Setting (seconds) | Default Clear Time Setting (seconds) |
|---|---|---|---|
| Ref video missing | Major | 0.0 | 0.0 |
| Ref burst missing | Major | 0.0 | 0.0 |
| Ref not locked | Major | 0.0 | 0.0 |
| Ref SC/H error | Major | 0.0 | 0.0 |
| AA1 peaked | Major | 3.0 | 0.0 |
| AA1 silent | Minor | 30.0 | 0.0 |
| AA2 peaked | Major | 0.0 | 0.0 |
| AA2 silent | Minor | 30.0 | 0.0 |
| AA3 peaked | Major | 0.0 | 0.0 |
| AA3 silent | Minor | 30.0 | 0.0 |
| AA4 peaked | Major | 0.0 | 0.0 |
| AA4 silent | Minor | 30.0 | 0.0 |
| AES1 In missing | Major | 0.0 | 0.0 |
| AES1a peaked | Major | 0.0 | 0.0 |
| AES1a silent | Minor | 30.0 | 0.0 |
| AES1b peaked | Major | 0.0 | 0.0 |
| AES1b silent | Minor | 30.0 | 0.0 |
| AES2 In missing | Major | 0.0 | 0.0 |
| AES2a peaked | Major | 0.0 | 0.0 |
| AES2a silent | Minor | 30.0 | 0.0 |
| AES2b peaked | Major | 0.0 | 0.0 |
| AES2b silent | Minor | 30.0 | 0.0 |
| HDX Ch1/2 missing | Major | 0.0 | 0.0 |
| HDX Ch1 peaked | Major | 0.0 | 0.0 |
| HDX Ch1 silent | Minor | 30.0 | 0.0 |
| HDX Ch2 peaked | Major | 0.0 | 0.0 |

**Table E-2.** X75HD/X75SD Alarms List

| Alarm Name | Default Priority | Default Trigger Time Setting (seconds) | Default Clear Time Setting (seconds) |
|---|---|---|---|
| HDX Ch2 silent | Minor | 30.0 | 0 |
| HDX Ch3/4 missing | Major | 0.0 | 0 |
| HDX Ch3 peaked | Major | 0.0 | 0 |
| HDX Ch3 silent | Minor | 30.0 | 0 |
| HDX Ch4 peaked | Major | 0.0 | 0 |
| HDX Ch4 silent | Minor | 30.0 | 0 |
| HDX Ch5/6 missing | Major | 0.0 | 0 |
| HDX Ch5 peaked | Major | 0.0 | 0 |
| HDX Ch5 silent | Minor | 30.0 | 0 |
| HDX Ch6 peaked | Major | 0.0 | 0 |
| HDX Ch6 silent | Minor | 30.0 | 0 |
| HDX Ch7/8 missing | Major | 0.0 | 0 |
| HDX Ch7 peaked | Major | 0.0 | 0 |
| HDX Ch7 silent | Minor | 30.0 | 0 |
| HDX Ch8 peaked | Major | 0.0 | 0 |
| HDX Ch8 silent | Minor | 30.0 | 0 |
| HDX Ch9/10 missing | Major | 0.0 | 0 |
| HDX Ch9 peaked | Major | 0.0 | 0 |
| HDX Ch9 silent | Minor | 30.0 | 0 |
| HDX Ch10 peaked | Major | 0.0 | 0 |
| HDX Ch10 silent | Minor | 30.0 | 0 |
| HDX Ch11/12 missing | Major | 0.0 | 0 |
| HDX Ch11 peaked | Major | 0.0 | 0 |
| HDX Ch11 silent | Minor | 30.0 | 0 |
| HDX Ch12 peaked | Major | 0.0 | 0 |
| HDX Ch12 silent | Minor | 30.0 | 0 |

**Table E-2.** X75HD/X75SD Alarms List

| Alarm Name | Default Priority | Default Trigger Time Setting (seconds) | Default Clear Time Setting (seconds) |
|---|---|---|---|
| HDX Ch13/14 missing | Major | 0.0 | 0 |
| HDX Ch13 peaked | Major | 0.0 | 0 |
| HDX Ch13 silent | Minor | 30.0 | 0 |
| HDX Ch14 peaked | Major | 0.0 | 0 |
| HDX Ch14 silent | Minor | 30.0 | 0 |
| HDX Ch15/16 missing | Major | 0.0. | 0 |
| HDX Ch15 peaked | Major | 0.0 | 0 |
| HDX Ch15 silent | Minor | 30.0 | 0 |
| HDX Ch16 peaked | Major | 0.0 | 0 |
| HDX Ch16 silent | Minor | 30.0 | 0 |
| SDX Ch1/2 missing | Major | 0.0 | 0 |
| SDX Ch1 peaked | Major | 0.0 | 0 |
| SDX Ch1 silent | Minor | 30.0 | 0 |
| SDX Ch2 peaked | Major | 0.0 | 0 |
| SDX Ch2 silent | Minor | 30.0 | 0 |
| SDX Ch3/4 missing | Major | 0.0 | 0 |
| SDX Ch3 peaked | Major | 0.0 | 0 |
| SDX Ch3 silent | Minor | 30.0 | 0 |
| SDX Ch4 peaked | Major | 0.0 | 0 |
| SDX Ch4 silent | Minor | 30.0 | 0 |
| SDX Ch5/6 missing | Major | 0.0 | 0 |
| SDX Ch5 peaked | Major | 0.0 | 0 |
| SDX Ch5 silent | Minor | 30.0 | 0 |
| SDX Ch6 peaked | Major | 0.0 | 0 |
| SDX Ch6 silent | Minor | 30.0 | 0 |
| SDX Ch7/8 missing | Major | 0.0 | 0 |

**Table E-2.** X75HD/X75SD Alarms List

| Alarm Name | Default Priority | Default Trigger Time Setting (seconds) | Default Clear Time Setting (seconds) |
|---|---|---|---|
| SDX Ch7 peaked | Major | 0.0 | 0 |
| SDX Ch7 silent | Minor | 30.0 | 0 |
| SDX Ch8 peaked | Major | 0.0 | 0 |
| SDX Ch8 silent | Minor | 30.0 | 0 |
| SDX Ch9/10 missing | Major | 0.0 | 0 |
| SDX Ch9 peaked | Major | 0.0 | 0 |
| SDX Ch9 silent | Minor | 30.0 | 0 |
| SDX Ch10 peaked | Major | 0.0 | 0 |
| SDX Ch10 silent | Minor | 30.0 | 0 |
| SDX Ch11/12 missing | Major | 0.0 | 0 |
| SDX Ch11 peaked | Major | 0.0 | 0 |
| SDX Ch11 silent | Minor | 30.0 | 0 |
| SDX Ch12 peaked | Major | 0.0 | 0 |
| SDX Ch12 silent | Minor | 30.0 | 0 |
| SDX Ch13/14 missing | Major | 0.0 | 0 |
| SDX Ch13 peaked | Major | 0.0 | 0 |
| SDX Ch13 silent | Minor | 30.0 | 0 |
| SDX Ch14 peaked | Major | 0.0 | 0 |
| SDX Ch14 silent | Minor | 30.0 | 0 |
| SDX Ch15/16 missing | Major | 0.0 | 0 |
| SDX Ch15 peaked | Major | 0.0 | 0 |
| SDX Ch15 silent | Minor | 30.0 | 0 |
| SDX Ch16 peaked | Major | 0.0 | 0 |
| SDX Ch16 silent | Minor | 30.0 | 0 |
| Power Supply failed | Major | 0.0 | 0 |
| Fan failed | Major | 0.0 | 0 |

**Table E-2.** X75HD/X75SD Alarms List

| Alarm Name | Default Priority | Default Trigger Time Setting (seconds) | Default Clear Time Setting (seconds) |
|---|---|---|---|
| Frozen Video Detected | Minor | 0.0 | 0 |
| Dolby Decoder Ch1/2 missing | Major | 0.0 | 0 |
| Dolby Decoder Ch1 peaked | Major | 0.0 | 0 |
| Dolby Decoder Ch1 silent | Minor | 30.0 | 0 |
| Dolby Decoder Ch2 peaked | Major | 0.0 | 0 |
| Dolby Decoder Ch2 silent | Minor | 30.0 | 0 |
| Dolby Decoder Ch3/4 missing | Major | 0.0 | 0 |
| Dolby Decoder Ch3 peaked | Major | 0.0 | 0 |
| Dolby Decoder Ch3 silent | Minor | 30.0 | 0 |
| Dolby Decoder Ch4 peaked | Major | 0.0 | 0 |
| Dolby Decoder Ch4 silent | Minor | 30.0 | 0 |
| Dolby Decoder Ch5/6 missing | Major | 0.0 | 0 |
| Dolby Decoder Ch5 peaked | Major | 0.0 | 0 |
| Dolby Decoder Ch5 silent | Minor | 30.0 | 0 |
| Dolby Decoder Ch6 peaked | Major | 0.0 | 0 |
| Dolby Decoder Ch6 silent | Minor | 30.0 | 0 |
| Dolby Decoder Ch7/8 missing | Major | 0.0 | 0 |
| Dolby Decoder Ch7 peaked | Major | 0.0 | 0 |
| Dolby Decoder Ch7 silent | Minor | 30.0 | 0 |
| Dolby Decoder Ch8 peaked | Major | 0.0 | 0 |
| Dolby Decoder Ch8 silent | Minor | 30.0 | 0 |
| Dolby Decoder Aux missing | Major | 0.0 | 0 |
| Dolby Decoder AuxL peaked | Major | 0.0 | 0 |

**Table E-2.** X75HD/X75SD Alarms List

| Alarm Name | Default Priority | Default Trigger Time Setting (seconds) | Default Clear Time Setting (seconds) |
|---|---|---|---|
| Dolby Decoder AuxL silent | Minor | 30.0 | 0 |
| Dolby Decoder AuxR peaked | Major | 0.0 | 0 |
| Dolby Decoder AuxR silent | Minor | 30.0 | 0 |
| AES6 In missing | 10 | 0.0 | |
| AES6a peaked | 6 | 0.0 | |
| AES6a silent | 4 | 30.0 | |
| AES6b peaked | 6 | 0.0 | |
| AES6b silent | 4 | 30.0 | |
| AES7 In missing | 10 | 0.0 | |
| AES7a peaked | 6 | 0.0 | |
| AES7a silent | 4 | 30.0 | |
| AES7b peaked | 6 | 0.0 | |
| AES7b silent | 4 | 30.0 | |
| AES8 In missing | 10 | 0.0 | |
| AES8a peaked | 6 | 0.0 | |
| AES8a silent | 4 | 30.0 | |
| AES8b peaked | 6 | 0.0 | |
| AES8b silent | 4 | 30.0 | |
| Dolby encoder audio missing | | 0.0 | |

**X75HD/X75SD Installation and Operation Manual**

Appendix F

# Specifications

# Overview

This chapter describes all X75HD/X75SD video, audio, and other miscellaneous performance and hardware specifications.

The following specifications are included:

# Video Specifications

## Input

**Table F-1.** HD-SDI Video Input Specifications

| Item | Specification |
|------|---------------|
| Standard | SMPTE292M<br>(See "HD Conversion Capabilities" on page 369 for more information.) |
| Connector | BNC (IEC169-8) |
| Impedance | 75Ω |
| Return loss | > 18 dB, typical, from 5 MHz to 1485 MHz |
| Equalization | Adaptive cable equalization for up to—<br>• 328 ft (100 m), typical, of Belden 8281 co-axial cable<br>or<br>• 492 ft (150 m), typical, of Belden 1694A co-axial cable |

**Table F-2.** HDTV Fiber Video Input

| Item | Specification |
|------|---------------|
| Standard | SMPTE 292M, Mode B Operation<br>(See "HD Conversion Capabilities" on page 369 for more information.) |
| 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 |

**Table F-3.** SD-SDI Video Input Specifications

| Item | Specification |
|------|---------------|
| Standard | SMPTE259M-C, 270 Mbps, 525/625 component |
| Connector | BNC (IEC169-8) |
| Impedance | 75Ω |
| Return loss | > 18 dB from 5 MHz to 270 MHz |
| Equalization | > 23 dB Belden 8281 cable |

**Table F-4.** S-Video Input Specifications

| Item | Specification |
|------|---------------|
| Standard | • NTSC<br>• PAL-M<br>• PAL-B |
| Connector | 4-pin DIN |

**Table F-5.** X75OPT-A3D and X75OPT-PQM Analog Composite Video Input Specifications

| Item | Specification |
|------|---------------|
| Standard | • NTSC (SMPTE170M)<br>• PAL-B (ITU624-2)<br>• SECAM<br>• PAL-M |
| Connector | BNC (IEC 169-8) |
| Quantization | Normal mode, non-TBC:<br>• 12 bits (NTSC, PAL-B, PAL-M)<br>• 8 bits (SECAM)<br>TBC mode<br>• 8 bits (all standards) |

**Table F-5.** X75OPT-A3D and X75OPT-PQM Analog Composite Video Input Specifications *(Continued)*

| Item | Specification |
|------|---------------|
| Input level | 1.0 V pk-to-pk |
| Impedance | 75Ω |
| 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);<br>58 dB, typical (X75OPT-PQM) |
| Y/C gain error | <0.1 dB |
| Y/C delay error | <10 ns |

**Table F-6.** Component Input Specifications

| Item | Specification |
|------|---------------|
| Format | Betacam |
| Connector | BNC (IEC169-8) |
| Input level | 1.0 V pk-to-pk |
| Quantization | Normal mode, non-TBC mode CAV<br>• Y: 12 bits<br>• Cb: 10 bits<br>• Cr: 10 bits<br>Normal mode, non-TBC mode S-Video<br>• Luma: 12 bits<br>• Chroma: 10 bits<br><br>TBC mode<br>• CAV: Not supported<br>• S-Video: 8 bits all |
| Impedance | 75Ω |

**Table F-6.** Component Input Specifications *(Continued)*

| Item | Specification |
|---|---|
| Return loss | > 40 dB, 1 kHz to 6 MHz |
| Frequency response | • Y: ±0.15 dB to 5.5 MHz<br>• Pb/Pr: ±0.10 dB to 3.0 MHz |
| SNR | > 60 dB |

**Table F-7.** Genlock Input Specifications

| Item | Specification |
|---|---|
| Connector | BNC (IEC169-8) |
| Impedance | 75Ω |
| 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<br>• 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<br>±300 mV Tri-level sync (1080i/720p) |

# Output

**Table F-8.** HD-SDI Video Output Specifications

| Item | Specification |
|------|---------------|
| Standard | SMPTE292M<br>(See "HD Conversion Capabilities" on page 369 for more information.) |
| 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 |

**Table F-9.** HDTV Fiber Video Output Specifications

| Item | Specification |
|------|---------------|
| Standard | SMPTE 292M, Mode B Operation<br>(See "HD Conversion Capabilities" on page 369 for more information.) |
| 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 |

**Table F-10.** SD-SDI Video Output Specifications

| Item | Specification |
|---|---|
| Standard | SMPTE259M-C, 270 Mbps, 525/625 component |
| Quantization | 10 bits |
| Connector | BNC (IEC169-8) |
| Impedance | 75Ω |
| 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) |

**Table F-11.** Composite Video Output Specifications

| Item | Specification |
|---|---|
| Standard | • NTSC<br>• PAL-B<br>• PAL-M |
| Connector | BNC (IEC169-8) |
| Quantization | 12 bits |
| Impedance | 75Ω |
| 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 | <10 ns |
| Transient response | <0.5% K Factor |
| SNR | > 63 dB (0.1 MHz to 6 MHz) |

**Table F-12.** Component Output Specifications

| Item | Specification |
|------|---------------|
| Format | Betacam |
| Connector | BNC (IEC169-8) |
| Quantization | • Y: 12 bits<br>• Cb: 10 bits<br>• Cr: 10 bits |
| Impedance | 75Ω |
| Return loss | > 40 dB (1 kHz to 6 MHz) |
| Frequency response | • Y: ±0.1 dB to 5.5 MHz<br>• Pb/Pr: ±0.10 dB to 3.0 MHz |
| DC offset | <0.0 ± 5 mV |
| Relative delay | <±10 ns |
| SNR | > 63 dB |

**Table F-13.** Streaming Output Specifications

| Item | Specification |
|------|---------------|
| Video compression type | MPEG4 |
| Profile | Simple Profile |
| Modes | Fixed Bit Rate Mode, VBR (Variable Bit Rate) Mode |
| Bit rate range control | User-settable 200 Kb/s - 1 Mb/s |
| Frame rate (VBR) | 30 fps / 25 fps |
| Frame rate (fixed) | As bit rate is lowered, frame rate is lowered |
| Audio compression type | AAC (Advanced Audio Coding) format |
| Profile | LC (Low Complexity) |
| Sample rate | 48 K |
| Stereo bit rate (two channels) | 64 Kbps |

**Table F-14.** DVI Output Specifications

| Item | Specification |
|------|---------------|
| Standard | • 1080i/59.94<br>• 1080i/50<br>• 720p/59.94<br>• 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 |

# Audio Specifications

## Input

**Table F-15.** AES/DARS Input Specifications

| Item | Specification |
|------|---------------|
| **Balanced** | |
| 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 96 kHz |
| **Unbalanced** | |
| Standard | AES3, SMPTE276M |
| Type | Unbalanced, AC coupled |
| Connector | BNC (IEC169-8) |
| Sensitivity | <100 mV |
| Impedance | 75Ω |
| Return loss | > 25 dB, 0.1MHz to 6 MHz |
| Input audio rate | 32 kHz to 108 kHz |

**Table F-16.** Analog Audio Input Specifications

| Item | Specification |
|---|---|
| Connector | Removable barrier strip |
| Input impedance | Jumper selectable with J5~J8<br>• Pin 2-3: 100 kΩ<br>• Pin 1-2: 600 Ω |
| Input analog level | 28 dBu to 16 dBu (adjustable by 2 dB increments) |
| 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 (@ -1 dBFS, 20 Hz to 20 KHz) |
| SNR | > 100 dB |

# Output

**Table F-17.** AES Output Specifications

| Item | Specification |
|---|---|
| **Balanced** | |
| Standard | AES3 |
| Type | Balanced, transformer coupled |
| Connector | 2 female DB-26/DB-44 connector with breakout cable |
| Signal level | 4.0 V (typical 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%) |
| **Unbalanced** | |
| Standard | AES3, SMPTE276M |
| Type | Unbalanced, AC coupled |

**Table F-17.** AES Output Specifications *(Continued)*

| Item | Specification |
|------|---------------|
| Connector | BNC (IEC169-8) |
| Signal level | 1.0 V ± 10% (pk-to-pk) |
| Impedance | 75Ω |
| 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%) |

**Table F-18.** Analog Audio Output Specifications

| Item | Specification |
|------|---------------|
| Connector | Removable barrier strip |
| Output impedance | Jumper selectable with J1~J4, J9~J12<br>• Pin 2-3: 66Ω<br>• Pin 1-2: 600Ω |
| 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 typical (@ -1 dBFS, 20 Hz to 20 KHz) |
| SNR | > 100 dB |

# I/O Specifications

**Table F-19.** Multi-I/O Specifications

| Item | Specification |
|---|---|
| Composite output | • NTSC<br>• PAL-B<br>• SECAM<br>• Sync |
| Component output | GBR |
| Quantization | 8 bits all |
| Time code | Input |
| GPI inputs | • Number: 2<br>• Internally pulled HIGH<br>• External contact closure to ground to trigger |
| GPI outputs | • Number: 2<br>• TTL-compatible<br>• 75Ω impedance<br>• Sink 64 mA, source 32 mA |
| Connector | DB-26 |

**Table F-20.** DV I/O Specifications (Future Use)

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

**Table F-21.** Thumbnail Streaming Specifications

| Item | Specification |
|------|---------------|
| Connector | RJ-45 |
| Protocols | • CCS<br>• SNMP<br>• HTTP |

**Table F-22.** V2A Specifications

| Item | Specification |
|------|---------------|
| Measurement window | ± 1.2 seconds between video and audio |
| Time to provide measurement | 5 seconds |
| Measurement resolution | ±2 video lines |

# Communication Specifications

**Table F-23.** RS-232/RS-422 Specifications

| Item | Specification |
|------|---------------|
| Standard | Electrical specification EIA-232C |
| Connector | • DB-9<br>• 232/422 switchable<br>• 422 termination can be selected from the menu |

# Hardware Specifications

**Table F-24.** Weight and Dimension Measurements

| Item | Specification |
|------|---------------|
| Weight | • Fully loaded unit, no power cords: 11 lbs (4.9 kg)<br>• 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 Consumption

**Table F-25.** Power Consumption by Individual Component

| Component | Description | Power Consumption @ 115V AC |
|---|---|---|
| 1 | X75HD/X75SD frame with mainboard | 17.2 W |
| 2 | Local control panel | 7.0 W |
| 3 | Blank front panel | 5.3 W |
| 4 | HDTV submodule | 28.4 W |
| 5 | 8-, 16-, or 32-channel audio submodule | • 19.7 W (8- and 16-channel)<br>• 6.1 W (32-channel) |
| 6 | Analog video in submodule (A3D or PQM) | 7.9 W |
| 7 | Streaming submodule (future use) | 4.0W |
| 8 | Second power supply | Adds extra 5% to single power supply system configuration |

**Table F-26.** Power Consumption of Complete Packages

| Systems Configuration | Individual Components | Description | Power Consumption @115VAC |
|---|---|---|---|
| **X75HD Models** | | | |
| X75HD | 1+2+4 | X75HD frame with mainboard, local control panel, and HDTV submodule | 53 W |
| X75HD-2PS | 1+2+4+8 | X75HD frame with mainboard, local control panel, HDTV submodule, and second power supply | 55 W |
| X75HD-AV | 1+2+4+5 | X75HD frame with mainboard, local control panel, HDTV submodule, and 16-channel audio submodule | 72 W |
| X75HD-AV-2PS | 1+2+4+5+8 | X75HD frame with mainboard, local control panel, HDTV submodule, 16-channel audio submodule, and second power supply | 76 W |

**Table F-26.** Power Consumption of Complete Packages

| Systems Configuration | Individual Components | Description | Power Consumption @115VAC |
|---|---|---|---|
| X75HD-LC | 1+3+4 | X75HD frame with mainboard, blank front panel, and HDTV submodule | 51 W |
| X75HD-LC-2PS | 1+3+4+8 | X75HD frame with mainboard, blank front panel, HDTV submodule, and second power supply | 53 W |
| X75HD-LCAV | 1+3+4+5 | X75HD frame with mainboard, blank front panel, HDTV submodule and 16-channel audio submodule | 70 W |
| X75HD-LCAV-2PS | 1+3+4+5+8 | X75HD frame with mainboard, blank front panel, HDTV submodule, 16-channel audio submodule, and second power supply | 74 W |
| **X75SD Models** | | | |
| X75SD | 1+2 | X75SD frame with mainboard, local control panel | 24 W |
| X75SD-2PS | 1+2+8 | X75SD frame with mainboard, local control panel and second power supply | 25 W |
| X75SD-AV | 1+2+5 | X75SD frame with mainboard, local control panel and 8-channel audio submodule | 44 W |
| X75SD-AV-2PS | 1+2+5+8 | X75SD frame with mainboard, local control panel, 8-channel audio submodule and second power supply | 46 W |
| X75SD-LC | 1+3 | X75SD frame with mainboard, blank front panel | 22 W |
| X75SD-LC-2PS | 1+3+8 | X75SD frame with mainboard, blank front panel and second power supply | 24 W |
| X75SD-LCAV | 1+3+5 | X75SD frame with mainboard, blank front panel and 8-channel audio submodule | 42 W |
| X75SD-LCAV-2PS | 1+3+5+8 | X75SD frame with mainboard, blank front panel, 8-channel audio submodule and second power supply | 44 W |
| **X75-DPS-575 Models** | | | |

**Table F-26.** Power Consumption of Complete Packages

| Systems Configuration | Individual Components | Description | Power Consumption @115VAC |
|---|---|---|---|
| X75-DPS-575 | 1+2+6 | X75SD equivalent frame to DPS-575 with mainboard, local control panel and PQM analog video in submodule. | 32 W |
| X75-DPS-575AV | 1+2+5+6 | X75SD equivalent frame to DPS-575AV with mainboard, local control panel, PQM analog video in and 8-channel audio submodule. | 52 W |
| X75-DPS-575LC | 1+3+6 | X75SD equivalent frame to DPS-575LC with mainboard, blank front panel, and PQM analog video in submodule. | 30 W |
| X75-DPS-575LCAV | 1+3+5+6 | X75SD equivalent frame to DPS-575LCAV with mainboard, blank front panel, PQM analog video in and 8-channel audio submodule. | 50 W |

# HD Conversion Capabilities


## Note

"Y" indicates that this format conversion is supported.

The X75HD model can convert any of the input signals and formats listed in Table F-27 to any of the specified output signals and formats.

**Table F-27.** X75HD Supported Conversion Formats

| | | Outputs | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 486i/ 59.94 | 720p/ 59.94 | 1080i/ 59.94 | 1080p/ 23.98* | 576i/ 50 | 720p/ 50 | 1080i/ 50 | 1080p/ 25 |
| **Input** | **486i/59.94** | Y | Y | Y | Y2 | | | | |
| | **720p/59.94** | Y | Y | Y | Y2 | | | | |
| | **1080i/59.94** | Y | Y | Y | Y2 | | | | |
| | **1080p/23.98** | Y1 | Y1 | Y1 | Y | | | | |
| | **1080psf/23.98** | Y1 | Y1 | Y1 | Y | | | | |
| | **576i/50** | | | | | Y | Y | Y | Y |
| | **720p/50** | | | | | Y | Y | Y | Y |
| | **1080i/50** | | | | | Y | Y | Y | Y |
| | **1080p/25** | | | | | Y | Y | Y | Y |

Y1 indicates that 2:3 cadence is used; Y2 indicates material with 3:2 cadence converted with no motion artifacts

# Video Propagation Delay

Table F-28 on page 370 shows the video propagation delays encountered in the X75HD/X75SD when processing CVBS, S-Video/ CAV; SD1/SD2/DV, 1080i/59.94, and 720p/59.94 signals.

Table F-29 on page 372 shows the video propagation delays encountered in the X75HD/X75SD when processing 1080i/50, 1080p/ 25, and 720p/50 signals.

See "Video Path" on page 372 for important information about the propagation delays.

**Table F-28.** Propagation Delay For CVBS, S-Video/CAV;SD1/SD2/DV, 1080i/59.94, and 720p/59.94

| Input | Decoding | FrameSync | HD User Video Delay | Up/Dn/Cross | SD NR | SD User Video Delay |
|---|---|---|---|---|---|---|
| | 1 line | 0~1 I-frame | N/A | N/A | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| | 1 line | 0~1 I-frame | N/A | N/A | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| | 1 line | 0~1 I-frame | N/A | Up: 1 I-field to 3 I-fields. By default 1 I-frame | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| S-Video/CAV;SD1/SD2/DV | N/A | 0~1 I-frame | N/A | N/A | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| S-Video/CAV;SD1/SD2/DV | N/A | 0~1 I-frame | N/A | N/A | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| S-Video/CAV;SD1/SD2/DV | N/A | 0~1 I-frame | N/A | Up: 1 I-field to 3 I-fields. By default 1 I-frame | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| 1080i/59.94 | N/A | 0~1 I-frame | 0~7 I-frames | Dn: 1 I-field to 3 I-fields. By default 1 I-frame | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| 1080i/59.94 | N/A | 0~1 I-frame | 0~7 I-frames | Dn: 1 I-field to 3 I-fields. By default 1 I-frame | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| 1080i/59.94 | N/A | 0~1 I-frame | 0~7 I-frames | 1 I-field to 3 I-fields. By default 1 I-frame | N/A | N/A |
| 1080i/59.94 | N/A | 0~1 I-frame | 0~7 I-frames | Cross: 1 I-field to 3 I-fields. By default 1 I-frame | N/A | N/A |
| 720p/59.94 | N/A | 0~1 P-frame | 0~15 P-frames | Dn: several lines to 2 P-frames. By default 1 P-frame | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| 720p/59.94 | N/A | 0~1 P-frame | 0~15 P-frames | Dn: several lines to 2 P-frames. By default 1 P-frame | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| 720p/59.94 | N/A | 0~1 P-frame | 0~15 P-frames | Cross: several lines to 2 P-frames. By default 1 P-frame | N/A | N/A |
| 720p/59.94 | N/A | 0~1 P-frame | 0~15 P-frames | several lines to 1 P-frame. By default 1 P-frame | N/A | N/A |

| | | Output | Minimum/Maximum Delays | | | |
|---|---|---|---|---|---|---|
| **SD ARC** | **Encoding** | | **Min. Total Delay** | **Min. Total Delay (ms)** | **Max. Total Delay** | **Max. Total Delay (ms)** |
| | 6.28uS | CVBS, CAV, S-Vid | < 3 lines | <0.192 (PAL), <0.191(NTSC) | Up to: 7 I-frames | <280 (PAL), <234(NTSC) |
| 1 ~ 3 I-field | N/A | SD-SDI | < 3 lines | <0.192 (PAL), <0.191(NTSC) | Up to: 7 I-frames | <280 (PAL), <234(NTSC) |
| N/A | N/A | HD-SDI | 1 I-field | <20(PAL), <16.7(NTSC) | Up to: 6 I-frames | <240 (PAL), <200(NTSC) |
| 1 ~ 3 I-field | 6.28uS | CVBS, CAV, S-Vid | < 2 lines | <0.128 (PAL), <0.127(NTSC) | Up to: 7 I-frames | <280 (PAL), <234(NTSC) |
| 1 ~ 3 I-field | N/A | SD-SDI | < 2 lines | <0.128 (PAL), <0.127(NTSC) | Up to: 7 I-frames | <280 (PAL), <234(NTSC) |
| N/A | N/A | HD-SDI | 1 I-field | <20(PAL), <16.7(NTSC) | Up to: 6 I-frames | <240 (PAL), <200(NTSC) |
| | 6.28uS | CVBS, CAV, S-Vid | | <16.7 | Up to: 14 I-frames | <467 |
| N/A | N/A | SD-SDI | | <16.7 | Up to: 14 I-frames | <467 |
| N/A | N/A | 1080i/59.94 | | <16.7 | Up to: 9.5 I-frames | <317 |
| N/A | N/A | 720p/59.94 | | <16.7 | Up to: 9.5 I-frames | <317 |
| N/A | 6.28uS | CVBS, CAV, S-Vid | < 50 lines | <1.11 | Up to: 18 P-frames + 4.5 I-frames | <450 |
| N/A | N/A | SD-SDI | < 50 lines | <1.11 | Up to: 18 P-frames + 4.5 I-frames | <450 |
| N/A | N/A | 1080i/59.94 | < 50 lines | <1.11 | Up to: 18 P-frames | <300 |
| N/A | N/A | 720p/59.94 | < 50 lines | <1.11 | Up to: 17 P-frames | <284 |

**Table F-29.** Propagation Delay For 1080i/50, 1080p/25, and 720p/50

| Input | Decod-ing | Frame Sync | HD User Video Delay | Up/Dn/Cross | SD NR | SD User Video Delay |
|---|---|---|---|---|---|---|
| | N/A | 0~1 I-frame | 0~7 I-frames | Dn: 1 I-field to 3 I-fields. By default 1 I-frame | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| 1080i/50 | N/A | 0~1 I-frame | 0~7 I-frames | Dn: 1 I-field to 3 I-fields. By default 1 I-frame | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| 1080i/50 | N/A | 0~1 I-frame | 0~7 I-frames | 1 I-field to 3 I-fields. By default 1 I-frame | N/A | N/A |
| 1080i/50 | N/A | 0~1 I-frame | 0~7 I-frames | Cross: 1 I-field to 3 I-fields. By default 1 I-frame | N/A | N/A |
| 1080i/50 | N/A | 0~1 I-frame | 0~7 I-frames | Cross: 1 I-field to 3 I-fields. By default 1 I-frame | N/A | N/A |
| 1080p/25 | N/A | 0~1 P-frame | 0~7 P-frames | Dn: 0.5 P-frame to 1 P-frame. By default 1 P-frame | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| 1080p/25 | N/A | 0~1 P-frame | 0~7 P-frames | Dn: 0.5 P-frame to 1 P-frame. By default 1 P-frame | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| 1080p/25 | N/A | 0~1 P-frame | 0~7 P-frames | Cross: 0.5 P-frame to 1 P-frame. By default 1 P-frame | N/A | N/A |
| 1080p/25 | N/A | 0~1 P-frame | 0~7 P-frames | 0.8 P-frame to 1.8 P-frame. By default 1 P-frame | N/A | N/A |
| 1080p/25 | N/A | 0~1 P-frame | 0~7 P-frames | Cross: 0.5 1080P-frame to 1 1080P-frame. By default: 1 P-frame | N/A | N/A |
| 720p/50 | N/A | 0~1 P-frame | 0~15 P-frames | Dn: several lines to 2 P-frames. By default 1 P-frame | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| 720p/50 | N/A | 0~1 P-frame | 0~15 P-frames | Dn: several lines to 2 P-frames. By default 1 P-frame | 1 line ~ 1 I-field | 0 ~ 4 I-frames |
| 720p/50 | N/A | 0~1 P-frame | 0~15 P-frames | Cross: several lines to 2 P-frames. By default 1 P-frame | N/A | N/A |
| 720p/50 | N/A | 0~1 P-frame | 0~15 P-frames | Cross: several lines to 3 720P-frames. By default 2 720P-frame | N/A | N/A |
| 720p/50 | N/A | 0~1 P-frame | 0~15 P-frames | several lines to 1 P-frame. By default 1 P-frame | N/A | N/A |

# Video Path

When a block is inserted, the FS phase or SD-ARC will be compensated to maintain output, and the H/V phases won't change. If the SDNR is inserted, the propagation delay may not change or may add one extra I-frame, depending upon the FS phasing. The total FS+SDNR delay will be less than 1.5 I-frames.

If the SD-ARC is inserted, the propagation delay will add an extra 0.5 to 1.5 I-frames, depending upon FS phases and SD-ARC/HD-Dn phase settings.

If the strobe is inserted, the propagation delay most likely will not change; if a delay-line is inserted, the propagation delay will add an extra 0 to 4 I-frames, depending upon the delay line settings.

If a keyer is inserted, the propagation delay most likely will not change.

| SD ARC | Encoding | Output | Min. Total Delay | Min. Total Delay (ms) | Max. Total Delay | Max. Total Delay (ms) |
|--------|----------|--------|------------------|----------------------|------------------|----------------------|
|  | 6.28uS | CVBS, CAV, S-Vid | 1 I-field | <20 | Up to: 14 I-frames | <560 |
| N/A | N/A | SD-SDI | 1 I-field | <20 | Up to: 14 I-frames | <560 |
| N/A | N/A | 1080i/50 | 1 I-field | <20 | Up to: 9.5 I-frames | <380 |
| N/A | N/A | 1080p/25 | 1 I-field | <20 | Up to: 9.5 I-frames | <380 |
| N/A | N/A | 720p/50 | 1 I-field | <20 | Up to: 9.5 I-frames | <380 |
| N/A | 6.28uS | CVBS, CAV, S-Vid | 0.5 P-frame | <20 | Up to: 9 P-frames + 4.5 I-frames | <540 |
| N/A | N/A | SD-SDI | 0.5 P-frame | <20 | Up to: 9 P-frames + 4.5 I-frames | <540 |
| N/A | N/A | 1080i/50 | 0.5 P-frame | <20 | Up to: 9 P-frames | <360 |
| N/A | N/A | 1080p/25 | 0.8 P-frame | <32 | Up to: 10 P-frames | <400 |
| N/A | N/A | 720p/50 | 0.5 P-frame | <20 | Up to: 9 P-frames | <360 |
| N/A | 6.28uS | CVBS, CAV, S-Vid | < 50 lines | <1.33 | Up to: 18 P-frames + 4.5 I-frames | <540 |
| N/A | N/A | SD-SDI | < 50 lines | <1.33 | Up to: 18 P-frames + 4.5 I-frames | <540 |
| N/A | N/A | 1080i/50 | < 50 lines | <1.33 | Up to: 18 P-frames | |
| N/A | N/A | 1080p/25 | < 50 lines | <1.33 | Up to: 19 P-frames | |
| N/A | N/A | 720p/50 | < 50 lines | <1.33 | Up to: 17 P-frames | <340 |

Using current software, the SD video path could be as shown in Figure F-1.



**Figure F-1.** SD Video Path

# Index

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