Imagestore 750

Master control and channel branding processor

User Manual

872-99M00-301

10 May 2012

Miranda

www.miranda.com

Copyright © 2012 by Miranda Technologies

- Document revision: 301
- Document part number: 872-99M00-301
- Software Version: 4.4

Notice

Because of continued product development, the accuracy of the information in this document may change without notice. The information and intellectual property contained herein is confidential between Miranda and the client and remains the exclusive property of Miranda. If you find any problems in the documentation, please report them to us in writing. Miranda does not warrant that this document is error-free.

Trademarks

Miranda is a registered trademark of Miranda Technologies, Inc..

Brand and product names mentioned in this manual may be trademarks, registered trademarks or copyrights of their respective holders. All brand and product names mentioned in this manual serve as comments or examples and are not to be understood as advertising for the products or their manufacturers.

Software License Agreement and Warranty Information

Contact Miranda for details on the software license agreement and product warranty.

Safety Compliance

This equipment complies with:

- CSA C22.2 No. 60950-1-07 Safety of Information Technology Equipment
- UL 60950-1 (2nd Edition) Safety of Information Technology Equipment
- IEC 60950-1 (2ndEdition) Safety of Information Technology Equipment
- K60065 Audio, video and similar electronic apparatus - Safety requirements

The power cord supplied with this equipment meets the appropriate national standards for the country of destination.

WARNING: **An appropriately listed/certified mains power supply cord must be used for the connection of the equipment to the mains voltage at either 120V~ or 240V~.**

CAUTION: **These servicing instructions are for use by qualified personnel only.**

T*o reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.*

Electromagnetic Compatibility

This equipment has been tested for verification of compliance with FCC Part 15, Subpart B requirements for Class A digital devices.

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

This equipment has been tested and found to comply with the requirements of the EMC directive 2004/108/CE:

- EN 55022 Conducted emissions, Class A
- EN 55022 Radiated emissions, Class A
- EN 61000-3-2 Harmonic current emission limits
- EN 61000-3-3 Voltage fluctuation and flicker limitations
- EN 61000-4-2 Electrostatic discharge immunity
- EN 61000-4-3 Radiated electromagnetic field immunity - RF
- EN 61000-4-4 EFT immunity
- EN 61000-4-5 Surge immunity
- EN 61000-4-6 Conducted immunity
- EN 61000-4-11 Voltage dips, short-interruption and voltage variation immunity

- K00022
- K00024

Important Safeguards and Notices

This section provides important safety guidelines for operators and service personnel. Specific warnings and cautions appear throughout the manual where they apply. Please read and follow this important information, especially those instructions related to the risk of electric shock or injury to persons.

WARNING

Any instructions in this manual that require opening the equipment cover or enclosure are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any service other than that contained in the operating instructions unless you are qualified to do so.

Restriction on Hazardous Substances (RoHS)

Miranda is in compliance with EU Directive RoHS 2002/95/EC governing the restricted use of certain hazardous substances and materials in products and in our manufacturing processes.

Miranda has a substantial program in place for RoHS compliance that includes significant investment in our manufacturing process, and a migration of Miranda product electronic components and structural materials to RoHS compliance.

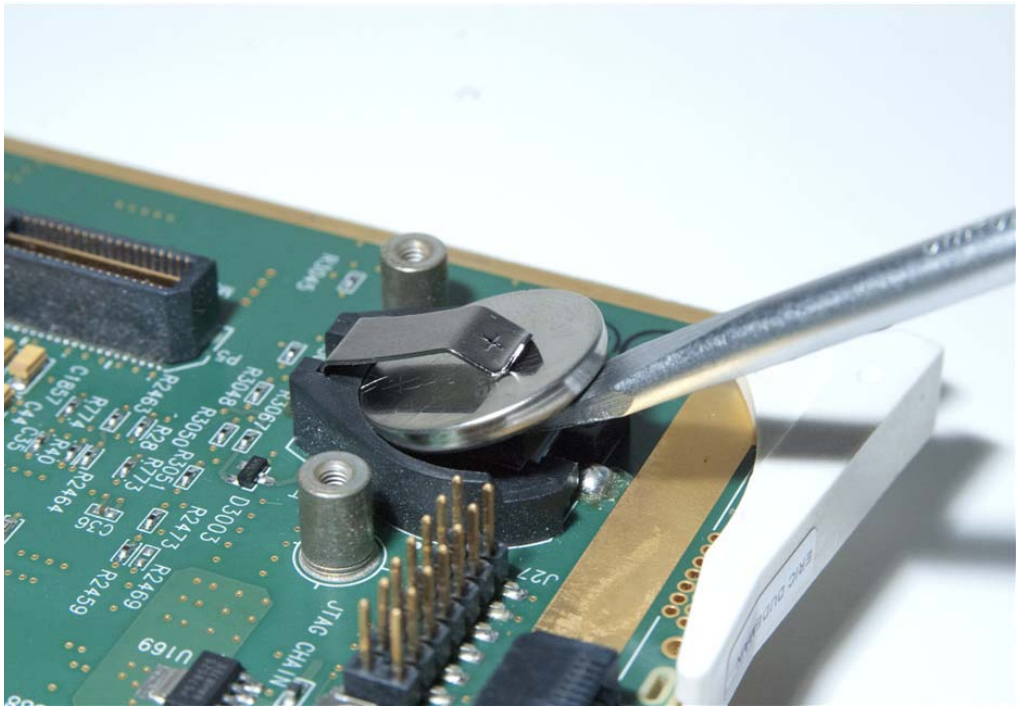
It is our objective at Miranda to maintain compliance with all relevant environmental and product regulatory requirements. Detailed information on specific products or on the RoHS program at Miranda is available from Miranda Customer Support.

Disposal and Recycling Information

Your Miranda equipment comes with at least one lithium button battery (Li-MnO2) located on the main printed circuit board. The batteries are used for backup and should not need to be replaced during the lifetime of the equipment.

Before disposing of your Miranda equipment, please remove the battery as follows:

1. Make sure the equipment is unplugged from the power source.
2. Remove the protective cover from your equipment.
3. Gently remove the battery from its casing, using a blunt instrument such as a screwdriver for leverage if necessary.



4. Dispose of the battery and equipment according to your local environmental laws and guidelines.

WARNING:	Be careful not to short-circuit the batteries by adhering to the appropriate safe handling practices. Do not dispose of batteries in a fire as they may explode. Batteries may explode if damaged or overheated. Do not dispose of batteries as household waste. Do not dismantle, open or shred batteries. Keep batteries out of the reach of children. In the event of a bettery leak, do not allow battery liquid to come into contact with skin or eyes. Seek medical help immediately in case of ingestion, inhalation, skin or eye contact, or suspected exposure to the contents of an opened battery.

For more information about recycling, please contact Miranda Technologies.

General Warnings

A warning indicates a possible hazard to personnel which may cause injury or death. Observe the following general warnings when using or working on this equipment:

- Heed all warnings on the unit and in the operating instructions.
- Do not use this equipment in or near water.
- This equipment is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting the equipment inputs or outputs.
- Route power cords and other cables so they are not likely to be damaged.
- Disconnect power before cleaning the equipment. Do not use liquid or aerosol cleaners; use only a damp cloth.
- Dangerous voltages may exist at several points in this equipment. To avoid injury, do not touch exposed connections and components while power is on.
- Do not wear rings or wristwatches when troubleshooting high current circuits such as the power supplies.
- To avoid fire hazard, use only the specified fuse(s) with the correct type number, voltage and current ratings as referenced in the appropriate locations in the service instructions or on the equipment. Always refer fuse replacements to qualified service personnel.
- There are no user-serviceable fuses in this equipment. Connection to the mains supply should be via a circuit breaker or by a mains plug which meets the relevant local standards in the country of installation.
- To avoid explosion, do not operate this equipment in an explosive atmosphere.
- Have qualified service personnel perform safety checks after any service.
- To avoid electrical shock or fire hazard, do not operate the equipment with its covers removed.
- To prevent equipment from overheating, provide proper ventilation.

General Cautions

A caution indicates a possible hazard to equipment that could result in equipment damage. Observe the following cautions when operating or working on this equipment:

- When installing this equipment, do not attach the power cord to building surfaces.
- To prevent damage to equipment when replacing fuses, locate and correct the problem that caused the fuse to blow before re-applying power.
- Use only the specified replacement parts.
- Follow static precautions at all times when handling this equipment.
- This product should only be powered as described in the manual. To prevent equipment damage, select the proper line voltage on the power supply(ies) as described in the installation documentation.
- To prevent damage to the equipment, read the instructions in the equipment manual for proper input voltage range selection.

Symbols and Their Meanings

The lightning flash with arrowhead symbol within an equilateral triangle alerts the user to the presence of dangerous voltages within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle alerts the user to the presence of important operating and maintenance/service instructions.

The ground symbol represents a protective grounding terminal. Such a terminal must be connected to earth ground prior to making any other connections to the equipment.

The fuse symbol indicates that the fuse referenced in the text must be replaced with one having the ratings indicated.

The presence of this symbol in or on Miranda equipment means that it has been designed, tested and certified as complying with applicable Underwriter's Laboratory (USA) regulations and recommendations.

The presence of this symbol in or on Miranda equipment means that it has been designed, tested and certified as essentially complying with all applicable European Union (CE) regulations and recommendations.

When shipped into member countries of the European Community, this equipment is accompanied by authentic copies of original Declarations of Conformance on file in Miranda Technologies Inc. offices in Montreal, Canada.

toc

Table of Contents

1 Preface

Chapter 1 is an introduction to the user manual itself.

Topics

Chapter Structure

This guide provides installation guidelines for Miranda's Imagestore 750 systems. It includes the following chapters:

- Chapter 1, Preface (this chapter) outlines effective ways to use this guide, presents an overview of the user manual.
- Chapter 2, Introduction, is a brief introduction to the Imagestore 750.
- Chapter 3, Applications, describes typical applications of the Imagestore 750.
- Chapter 4, Features, presents important characteristics and functions of the Imagestore 750.
- Chapter 5, Master Control, provides information regarding the Imagestore 750's master control option and its use in the iMC master control system.
- Chapter 6, Advanced Audio, provides information about optional Dolby and up-mix modules, Audio Description (AD), silence detection and audio delays.
- Chapter 7, Control and Monitoring, provides information about controlling the Imagestore 750 and monitoring its status.
- Chapter 8, Imagestore 750 Configurator, describes the Imagestore 750's configuration software.
- Chapter 9, Web Interface, provides information regarding the Imagestore 750's web interface.
- Chapter 10, FTP Interface, provides information about transferring media to the Imagestore 750 via FTP
- Chapter 11, Options, briefly presents the Imagestore 750's purchase options.
- Chapter 12, Installation, provides information about connecting the Imagestore 750.
- Chapter 13, Specifications, presents a few basic specifications for the Imagestore 750.
- Appendix A, Front Panel Menu, presents a complete list of front panel menu items.
- Appendix B, GPI Event Types, provides a complete list of GPI events.

- Appendix C, Imagestore 750 Hardware Revisions, is a brief statement about Imagestore 750 versions.
- Appendix D is a Glossary.
- An Index is also provided.

The PDF Document

This manual is provided in PDF format, allowing you to use Acrobat's "bookmarks" to navigate to any desired location when you are reading it on your computer. You can also easily print a hard-copy. Please note:

- Use the Table of Contents bookmarks to jump to any desired section.
- Many hyperlinks are provided within the chapters.
- Use the Index to jump to specific topics within a chapter. Each page number in the index is a hyperlink.
- Use Acrobat's 'Go to Previous View' and 'Return to Next View' buttons to retrace your complete navigational path.
- Use the 'First Page', 'Previous Page', 'Next Page', and 'Last Page' buttons to go to the first, previous, next, or last page within a PDF file.

Note To display the Acrobat navigation buttons, right-click the Tool Bar area, and check 'Navigation'.

- Use Acrobat's extensive search capabilities, such as the 'Find' tool and 'Search' tool to perform comprehensive searches as required.

Terms, Conventions and Abbreviations

The following conventions are used throughout this manual:

- The symbol ▲ denotes a note, an example, a warning, or a special message.
- Entries written in a **bold** font, in Capital Letters, or enclosed in single quotation marks (' ') denote the names of menus, buttons, commands, and knobs:

  Click 'Apply' to . . .

  Press **Transition** to . . .
- Double quotation marks (" ") denote colloquial or informal language. Single quotes and double quotes do ***not*** have the same meaning.
- Entries written in a monospaced font denote pathnames, parts of your file system, or items that you must select or enter:

  ```
  C:\Program Files\Miranda\Master Control\...
  ```

  or

  ```
  Operate > Clean Output
  ```
- The term "MC" is an abbreviation for "master control."
- The terms "panel" and "control panel" refer to master control panels, either hardware or software.

Other terms, used occasionally, include the following:

- Intuition XG is a single- or dual-channel graphics processor. The term “Intuition XG” can encompass all the hardware and software involved in the Intuition XG component of master control.
- XMedia is a term that includes different software applications that create and manage images, keyers, logos, etc. used by Intuition XG.
- Xplay and the XG Dashboard are software applications under XMedia. Both of these are used to configure the Intuition XG processor.
- Oxtel identifies a Miranda automation protocol used by the Imagestore 750.

Scope of the Manual

This user manual includes all the information required to install, configure, and operate an Imagestore 750.

This user manual addresses the Imagestore 750 in three contexts:

- A non-master control environment,
- A Presmaster master control environment,
- An iMC master control environment.

The manual addresses the Imagestore 750 in a general way and is suitable for all contexts.

Note: Chapter 5, Master Control, describes the Imagestore 750 as it is used in an iMC master control environment.

The serial automation control protocols used by the Imagestore 750 are outside the scope of this manual. Details of this protocol and other related topics are found in the documents listed under Applicable Publications and Tools, following.

Applicable Publications and Tools

Publications

Electronic copies of these documents are available from the Miranda website at

http://www.miranda.com/support

As an alternative, you may contact Miranda Customer Support to obtain the latest documents. The documents and their part numbers (ordering codes) are listed here:

- Automation

Oxtel Series Automation Protocol	01035-16
Presmaster Automation Protocol	01235-14

- Imagestore 750

Imagestore 750 User Manual	872-99M00-301
Imagestore 750 Quick Start Guide	872-54M05-200

- Intuition XG

Intuition XG Installation and Quick Start Guide	
Intuition XG Configuration Guide	v.4.50

- NV9000

NV9000 Quickstart Guide	QG0005-xx
NV9000-SE Utilities Users Guide	UG0007-xx

- iMC Master Control

iMC-Panel-GUI Operators Guide for IS750	UG0053-*xx*
iMC-Panel-100 Operators Guide for IS750	UG0069-*xx*
iMC-Panel-200 Operators Guide for IS750	UG0054-*xx*
iMC-Panel-300 Operators Guide for IS750	UG0055-*xx*
iMC-Panel-GUI Operators Guide for MCEs	UG0057-xx
iMC-Panel-100 Operators Guide for MCEs	UG0070-xx
iMC-Panel-200 Operators Guide for MCEs	UG0058-xx
iMC-Panel-300 Operators Guide for MCEs	UG0059-xx
MasterConfig Users Guide	UG0061-*xx*
MasterDiag Users Guide	UG0062-*xx*
MasterLogo Users Guide	UG0063-*xx*
iMC Installation Guide	UG0064-*xx*
iMC Reference Manual	UG0065-*xx*
MCS Panel Configuration Editor Users Guide	UG0066-*xx*

- Presmaster

Presmaster User Manual	01232-10
PresStation User Manual	03251-06
Presmaster Integration Guide	01234-05

- Tools

Vertigo After Effects[1] Plug-in User Manual	4.60
Text Builder 2 Software User Manual	02760-03
Media Conversion Software User Manual	01033-14

Software Tools

Electronic copies of these tools are available from the Miranda website at

`http://www.miranda.com/support`

As an alternative, you may contact Miranda Customer Support to obtain the latest versions of these tools:

- Imagestore 750 Configurator 1.5
- After Effects Plugin 5.60
- Media Conversion Suite

Animation Builder	5.11
Clock Builder	5.11
Audio Builder	5.11
DVE Editor	5.11
Text Builder (Easytext)	2.08

1. *After Effects* is a digital motion graphics and compositing software package published by Adobe Systems. Its main purpose is for film and video post-production.

2 Introduction

Chapter 2 is a brief introduction to the Imagestore 750.

Topics

Overview

The Imagestore 750 is a master control and branding processor for highly automated specialty channels, capable of inserting up to four layers of graphics into HD or SD. The graphics layers can be fed by an external graphics device such as an Intuition XG or from internally stored stills and animations. The Imagestore 750 also offers character generation and clock insertion. It is ideal for downstream banding or master control switching applications.

Its integrated audio engine provides multi-channel mixing and voice-overs. Audio is accepted either as embedded SDI or from 16 AES input connectors. The Imagestore 750 provides 16-channel audio mixing and playout with dynamic shuffling and gain control. Background audio is automatically "ducked" during voice-overs. It supports multi-channel audio clip storage and playback of up to 16 channels in four audio streams. Playback of stored audio clips is called *Easy-play 2*. Advanced audio options include audio description (AD), stereo-to-5.1 up-mixing, and Dolby processing with up to 4 Dolby decoders or encoders and sophisticated metadata processing.

An extensive range of options and upgrades are available for the Imagestore 750, including video A/B mixing, audio mixing, Emergency Alert System (EAS) and a temperature probe. Its high-performance graphics capability includes dual-window 2D DVEs on both program and preview outputs. See figures 2-1 and 2-2.

A template-based character generator (called Easytext) can insert crawl layers or static text layers that are dynamically updated. High quality characters are output with 256 level anti-aliasing, with easy control over drop shadows and transparency. Unicode characters in TrueType fonts are available from 6 to 600 pixels, in any RGB color.

The Imagestore 750 has a *master control* option. This option turns the Imagestore 750 into a powerful master control switching and branding channel designed for automated, multi-channel environments. The option provides multi-channel arbitration for multiple panels, channel branding (through Intuition XG or internal stores), video and audio switching and a robust and scalable control system. The master control option is typically used in conjunction with other associated devices such as automation, the NV9000 Router Control System, Intuition XG, iMC control panels and monitor walls such as Kaleido-X. Automation drives upstream content from video servers and causes the channel to synchronize router switches with appropriate video/audio mixing, graphics keying events, DVE moves, audio switches, and so on. The

Imagestore 750 transition engine synchronizes the overall transition by driving the NV9000 Router Control System to make router switches at appropriate times, driving the Intuition XG graphics output, and performing its own internal transitions as required. Panel operators may use any iMC control panel to acquire ownership of the channel manually to preview channel states, override automation, and adjust a number of other channel settings related to transitions, media loading or system configuration.

The Imagestore 750 can be used with the Xmedia Suite's work order management, graphics preparation, asset management, data interfacing and playout automation workflow tools. The Xmedia Suite streamlines graphics operations in localized and distributed environments, and contributes to lower costs, faster delivery, and greater creativity.

The Imagestore 750 provides SNMP support for system monitoring and diagnostics, and provides configurable alarms and traps.

Functional Features

This is a summary of the Imagestore 750's features:

Multi-level Branding Graphics

- High-impact multi-level channel branding.
- Easy selection of video format.
- Four independent keying layers.
- Preview output.
- SD and HD video standards. (SD is 525i or 625i; HD is 720p or 1080i at 50 Hz and 59.94 Hz.)
- Integral flash-based storage for more than 4000 HD or SD images, animations, and text.
  Maximum animation playout memory size (2 GB) requires the IS-750-MEM-2GB option.[1]
- Dual fill and key inputs that allow operation with an Intuition XG graphics co-processor.
- Emergency Alert System (EAS) crawls and audio messages (in the USA).
  This is available with the IS-750-EAS option.
- Digital or analog clock insertion with a "bugclock" option.
  This is available with the IS-750-Clock option.
- "Easytext" template-based, automated character generator option for data-driven graphics, such as in-show promos.
  This is available with the IS-750-ET option.
- Temperature probe for dynamic display of temperature in Celsius or Fahrenheit. The probe is typically located on or near the studio building.
  This is available with the IS-750-TEMP option.
- Full compatibility with Vertigo graphics automation and asset management.

1. See Chapter 11 for a complete list of Imagestore 750 options.

Advanced Audio Mixing and Processing

- 16-channel audio mixing from embedded audio and 16 external AES pairs. Support for 5.1 audio and multi-lingual audio.
- Versatile multi-channel audio clip playback, with simultaneous playout of up to four clips on up to 16 channels. This is called Easyplay 2.

  This is available with the IS-750-EP16 option.
- Up to 4 Dolby decoders and encoders.

  These are available with the various IS-750-DOLBY-*xxxx* options.
- 5.1 up-mixing using Linear Acoustic's AutoMAX-II™ technology.

  This is available with the IS-750-UMX or IS-750-UMX-UPG options.
- Advanced metadata processor with support for embedded metadata, metadata switching, metadata generation, dynamic metadata modification, metadata pass-through and metadata delay.
- Audio description (AD) — automated mixing of commentary track, e.g. for the visually impaired.

  This is available with the IS-750-AD-1 option.
- Silence detection to automate control of multiple independent voice-overs fed from the same wide Easyplay clip.
- Multiple voice-overs with background audio automatically ducked during voice-overs.
- Dynamic control of shuffle, gain level, trim, phase, and mute for each channel.
- Dynamic selection of audio preview points and metering.
- Fades to silence and configurable audio delays.
- Graphical audio configuration tool (in the Imagestore 750 Configurator) for creating, viewing, and editing audio routing.

Video Mixing

- A/B mixing of video sources for cuts, V-fades, U-fades, X-fades, and arbitrary asymmetric V-fade transitions.
- Variable rates: fast, medium, slow, and automation.
- Independent clean feed and auxiliary outputs.
- Single- or dual-window 2D DVE options (SD and HD) for squeeze-and-reveal and picture-in-picture effects, using 10-bit processing, advanced interpolation, sub-pixel motion and scaling calculations.

  These are available with the IS-750-DVE and IS-750-DVE-DUAL options.
- The Imagestore 750's C and D inputs are available to feed the DVEs. They can also be used as extra fill and key inputs. See figures 2-1 and 2-2.

Master Control

- The master control option is suitable for automated, multi-channel environments. This is available with the IS-750-Master-Control option.[2]
- Control of router switching through the NV9000 router control system.
- Configuration of router sources, source groups and salvos for each channel.
- Automatic retrieval of source names from the NV9000 router control system, with channel-specific source name overrides.
- Selectable router sources for program, preset and aux buses.
- Hot-cut transitions on the program bus for video source, keyers, DVE moves, voice-overs and macros.
- Armable transitions for A/B mixing, keyer cuts and fades, DVE moves, voice-overs, and macros.
- Arm and take capability for synchronizing an overall transition, with preview of the upcoming video and audio on the preset bus.
- Full integration with Intuition XG., allowing advanced graphics effects.
- Configurable wide-audio shuffles and per-channel gains saved on a per-source basis.
- The iMC master control panels allow manual preview and override of channels with an acquisition time of under 3 seconds.
- Configurable channel acquisition privileges/permissions for different panel users.
- The iMC master control panels control channel settings including automation on/off, source selection (on the program, preset, and aux buses), hot-cuts, arm/take transitions, browsing of media files using thumbnail proxies, source group editing, and audio configuration.
- The iMC master control panels can show the current source regardless of whether the source is in the active source group.
- A globally active source group can be shared among panels.
- Dynamic monitor wall updates on channel changes.
- Support for Presmaster automation protocol.

Automated and Manual Control

- Full automation control using the widely supported Oxtel protocol (serial, Ethernet) and GPI.
- Manual control alternatively provided by the branding panel, PresStation, or Vertigo Xpanel.

Robust Design

- Compact flash memory for graphics storage.
- Robust, real-time Linux operating system.
- Redundant, hot-swappable power supplies.
- Mechanical bypass of program input to program output.
- Dedicated GPI support for 16 GPI signals (inputs or outputs).

2. See Chapter 11 for a complete list of Imagestore 750 options.

- Built-in web server providing front panel control, system information, message logs and diagnostics, media management, audio templates, system backup and restore, and software upgrades.
- Front panel diagnostics for configuration, temperature, power supplies, and PLL.
- SNMP support for system monitoring and diagnostics.
- Configuration tool (the Imagestore 750 Configurator) for system setup and graphical audio route management.

Architectural Summary

The following block diagrams shows the functions of the Imagestore 750:

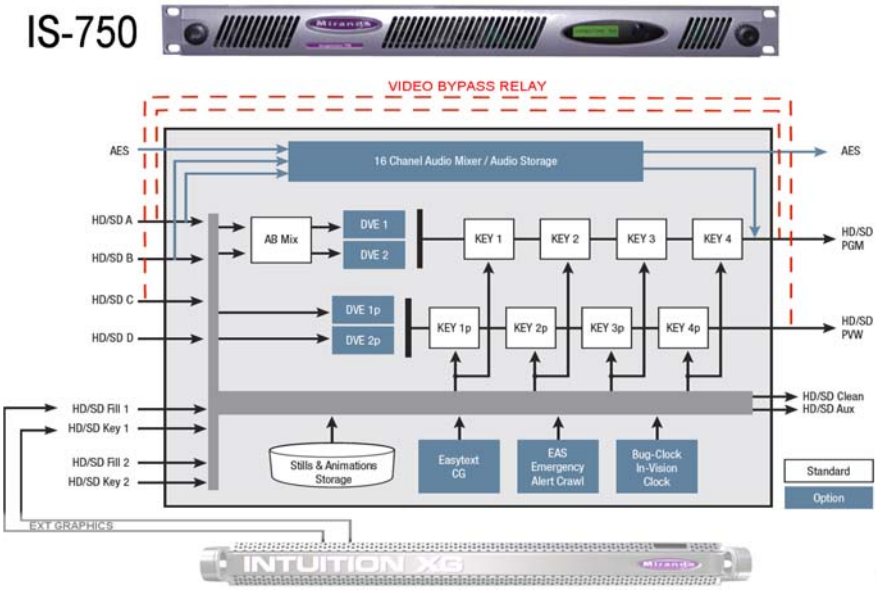


Fig. 2-1: Simplified Functional Diagram of the Imagestore 750 (Video)

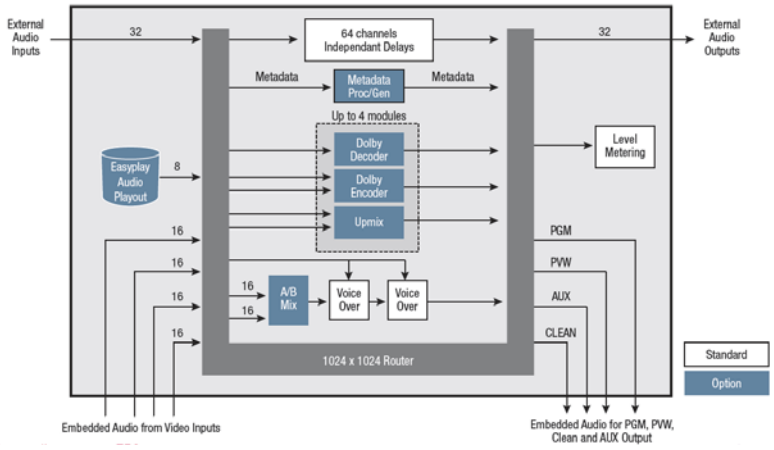


Fig. 2-2: Simplified Functional Diagram of the Imagestore 750 (Audio)

The Imagestore 750 has 8 video inputs, HD or SD. Each SDI video input feeds the internal video buses (program, preview, monitor, and clean-feed) and one parallel audio-processing block. The Imagestore 750 has line FIFOs for all 8 SDI inputs for timing adjustment. Embedded audio can be de-embedded from any 4 of the 8 inputs, and then be manipulated as required by the Imagestore 750's audio engine.

The program video bus (PGM) has an A/B mixer, four keying layers and an optional dual-window 2D DVE. The A/B mixer allows the PGM output to be transitioned between two SDI video streams. Each of the keying layers may be fed graphics content from its own dedicated store or any of the three available external fill and key pairs, and then keyed over the background video. The stores can be loaded with a still image, animation, Easytext template, analog/digital clock, or Emergency Alert System (EAS) crawl. All available media files are stored in the media library (compact flash or hard disk, depending upon the option purchased) and then loaded into the internal stores on demand. The dual-window 2D DVE is used to create picture-in-picture squeeze effects which can be dynamically positioned between different keying layers on the program video bus.

The preview video bus (PVW) has four keying layers and an optional dual-window 2D DVE. Each keying layer shares graphics content with the corresponding program keying layer, but can be controlled independently in order to preview graphics before they are viewed on-air. Similarly the dual-window 2D DVE can be used to preview DVE moves before they are played on-air.

The clean-feed (CLN) and monitor (MON) video outputs allow a number of different internal points within the video system to be sampled and viewed for partial branding or monitoring purposes. For example, the CLN output can take its output from DSK3 of the program bus to show a partially branded version of the program output, without a station logo.

A fail-safe mechanical video relay bypass connects the A video source to the program output directly and connects the C video input to the preview output (PVW) directly when a power supply problem occurs. The bypass mechanism is shown in Figure 2-1.

The Imagestore 750's audio engine accepts audio inputs from four embedded SDI feeds, 16 AES pairs, and from the multi-channel Easyplay2 audio clip player, which gives simultaneous playout of up to four audio clips sharing a total of 16 channels. The audio engine provides 16-channel A/B mixing and multiple voice-overs. During voice-overs, background audio is automatically ducked. Silence detection automates control of multiple independent voice-overs fed from the same Easyplay clip. (Silence detection is typically used in a multi-language broadcast environment.)

Optional audio modules can be added that provide integrated support for Dolby encoding and decoding, and stereo-to-5.1 up-mixing. The audio engine complements Dolby and up-mixing with advanced metadata processing. Audio description (AD) allows a background commentary track to be mixed with the background audio for people who are visually impaired.

One of up to 16 possible tap points from the audio engine can then be dynamically assigned to each of the available unit outputs, to the four embedded outputs (PGM, PVW, CLN, MON), to the external AES outputs, and to the level metering.

- The audio engine is configured using the 'Audio Graph' page of the Imagestore 750 Configurator.

An Ethernet interface provides rapid transfer of images and animations using Media Conversion Software (MCS) and other third-party media management applications. This interface also allows the transfer of images between a PC and the Imagestore 750 using Miranda's Vertigo Xplorer.

The Media Conversion Software (MCS) and its documentation is available on a CD and includes:

- Audio Builder
- Clip Builder
- Clock Builder
- Batch Converter
- Animation Builder
- DVE Editor

Miranda's *Vertigo Xplorer* provides for the transfer and management of still images and animations. See the *Xplorer User Guide* for details regarding Xplorer.

Files may also be transferred between a PC workstation and the Imagestore 750 using a secure FTP program, DOS-formatted USB device, or the Imagestore 750's web page. (The files must be in an appropriate format.) Miranda's Media Conversion Suite (MCS) applications are designed for this purpose and ship with each Imagestore 750.

Physical Features

The Imagestore 750 is a 1RU master control and branding processor.

Fig. 2-3: Imagestore 750

It has a small control panel and a USB port at the front, and a number of connectors at the rear.

The front panel's fascia is removable. Turn the thumbscrews to remove or replace it:

Fig. 2-4: Imagestore 750 front panel

Behind the fascia are bays for two removable power supply modules and a USB port:

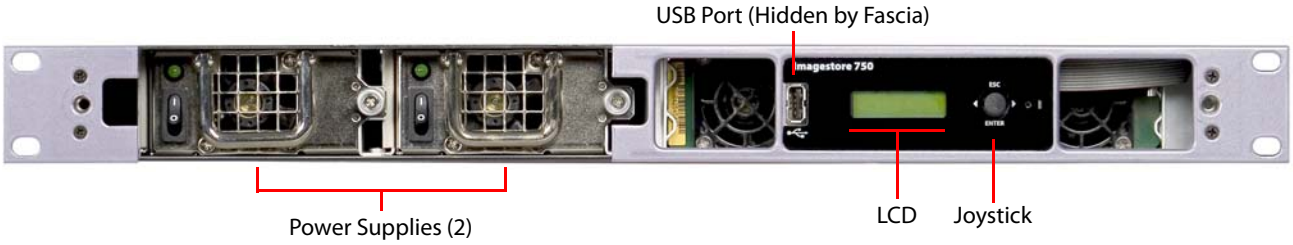


Fig. 2-5: Imagestore 750 front panel with fascia removed

The USB port can be used for loading new license options, load and saving configurations, saving device diagnostics, copying image, animation, and audio files to the Imagestore 750, and booting the Imagestore 750 from USB for software upgrades.

The rear panel connections are arranged as shown:

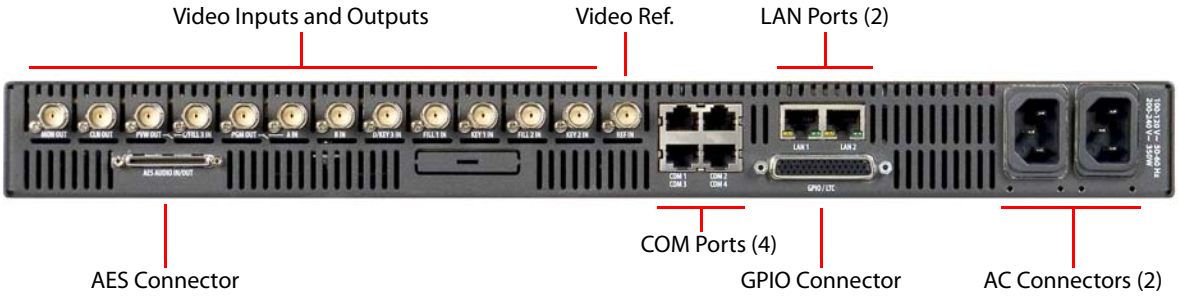


Fig. 2-6: Imagestore 750 rear panel

The AES connector provides 16 AES input pairs and 16 AES output pairs.

The GPIO connector provides 16 GPIs (individually configurable as an input or output), LTC terminals, and 4 RS-485 ports.

The COM ports (RJ45) can be configured as RS-422 or RS-232.

The LAN ports (RJ45) are for Ethernet connections. These are either "bonded" to the same IP address for networking redundancy, or un-bonded on independent IP addresses to separate media management from automation control.

The video inputs are A, B, C/Fill-3, D/Key-3, Fill-1, Key-1, Fill-2, and Key-2, supporting HD and SD video formats. See Video Frame Rates on page 212 for details.

(C and D inputs can be used as fill and key inputs if the Imagestore 750 is so configured.)

The video outputs are PGM Out, PVW Out, CLN Out, and MON Out, supporting HD and SD video formats.

The Front Panel

The front panel has a 16×2 alphanumeric display which is used for status and for configuration. It is used in connection with a 4-position joystick:

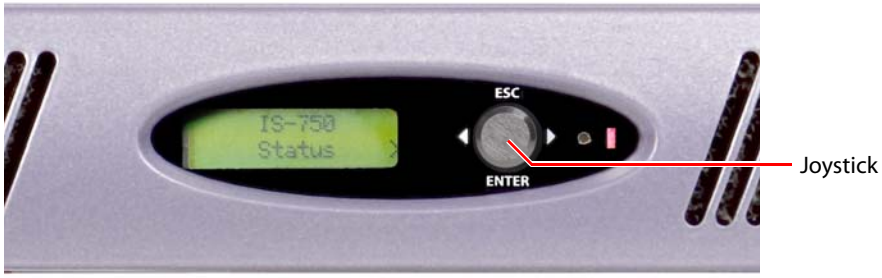


Fig. 2-7: Imagestore 750 front panel display and joystick

Using the joystick, an operator can navigate efficiently through a fairly large menu system. The menu system is hierarchical. See Appendix A for a complete description of the menu.

Moving the joystick down has two functions, depending on the current position in the menu system.

- It accesses the first item in the list of items belonging to the menu currently displayed.
- If the current menu item has no list of items (i.e., it is a leaf node in the menu tree), the item is an *operand* and moving the joystick down selects the value of the operand as the current value of the parameter it represents.

Moving the joystick up causes the display to go up one level in the menu tree. At the top level, moving the joystick up has no effect.

Moving the joystick left or right selects the previous, or next, item in the list of items at the current menu level.

Symbols and Conventions

Where this user manual discusses joystick input, it represents the 4 positions of the joystick with the terms '[esc]', '[enter]' or the arrow icons ◄ and ►.

At times, additional symbols are shown on the top line of the display, at the right hand edge. These highlight the state of either the A/B Mixer (video or audio) or the keyers. These symbols represent:

A Source A
B Source B
– Intermediate state, transition being processed.
↑ Image/voice-over keyed up (to air)
↓ Image/voice-over keyed down (from air)
B Fade to black
S Fade to silence

Page Intentionally blank

3 Applications

Chapter 3 presents several applications of the Imagestore 750.

Topics

Three Scenarios

Downstream Branding

In many specialty channels, branding is performed downstream of a dedicated video server. In this scenario, an Imagestore 750 provides a combination of logo insertion, animations, basic text crawls and picture-in-picture DVE squeeze effects. Moreover, advanced graphics can be achieved using an Intuition XG, advanced audio processing (Dolby decode/encode, up-mix, AD). Voice-over mixing can also be applied to the background signal. In this scenario, everything is under control of automation, but an RCP-BR control panel can also be used for branding control.

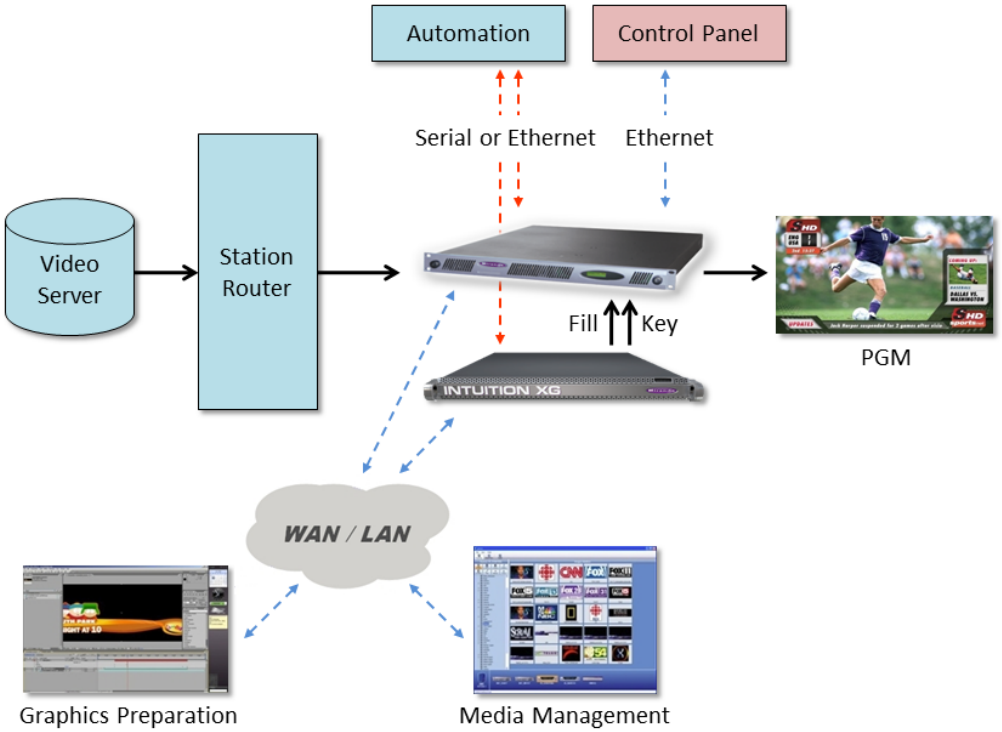


Fig. 3-1: Downstream Branding

Master Control Switching

The Imagestore 750 can be used as a traditional master control switcher. Automation controls arm-and-take transitions involving router sources for A/B mixing, keyer control, DVE squeezes, voice-overs and Intuition XG graphics. iMC panel operators can take manual control of the channel processor whenever it is required to override automation. Output from the channel processor is fed back to the station router for distribution to the outside world; media servers, local monitor walls, and so on. Sources are grouped to make it easier to manage multiple sources.

The Imagestore 750 is the hub of this control system, managing routing through an NV9000 router control system and using the advanced graphics of an Intuition XG. If the Imagestore 750 ever fails, it can be quickly bypassed using a redundant backup channel.

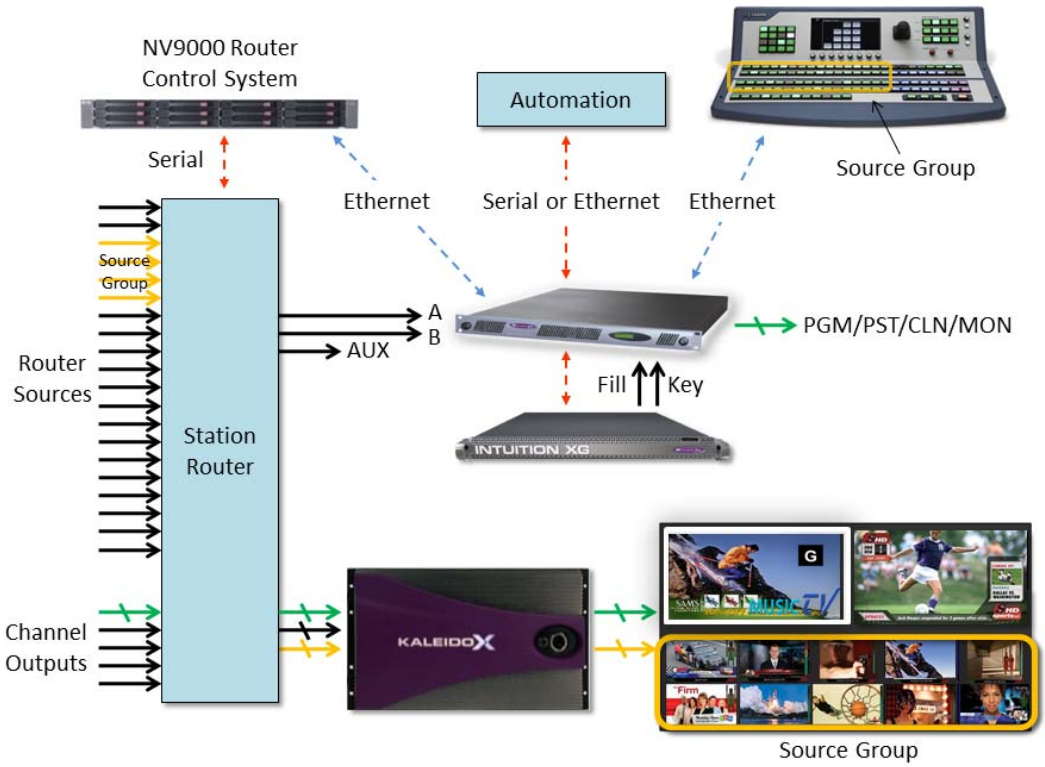


Fig. 3-2: Master Control Switching

See Chapter 5, Master Control, for details regarding the iMC master control system.

Branding Insertion Options for Intuition XG

Advanced branding from the Intuition XG (including audio embedded in the fill signal) can be inserted into the program output in several different ways.

Fill/Key Branding Insertion

This example feeds the video source into the Imagestore 750, which performs A/B mixing, DVE squeezes and basic branding. The Intuition XG's fill and key outputs also feed rich multi-layered graphics into one of the Imagestore 750 keying layers, contributing to the final program output. All audio mixing and processing is performed by the Imagestore 750, although the Intuition XG can supply voice-overs in its fill signal.

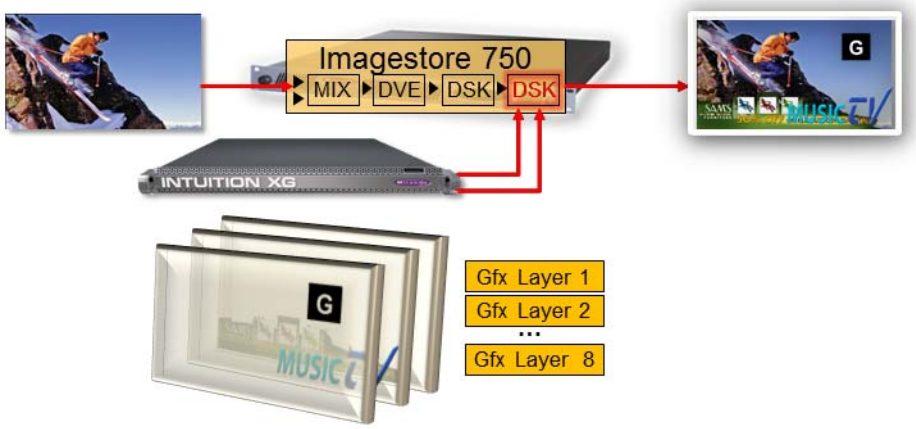


Fig. 3-3: Fill/Key Branding Insertion

A benefit of fill/key branding insertion is that the graphics device is not in the direct signal path and will not affect output in the event of a failure. Also both devices can be controlled as a single "channel processor" by automation and iMC control panels. The main disadvantage is that it is difficult to synchronize Intuition XG graphics with DVE squeezes.

Downstream Branding Insertion

This example feeds the video source to the Imagestore 750, which performs A/B mixing of video and audio plus performs advanced audio processing such as Dolby decoding or up-mix. Output from the Imagestore 750 is then passed downstream into the Intuition XG which performs DVE squeezes and applies rich multi-layered graphics to give the final program output. The Intuition XG can also play out and mix audio clips with the program output as embedded audio.

Fig. 3-4: Downstream Branding Insertion

A benefit of downstream branding insertion is that the DVE and branding are performed by the same device, which is much simpler to configure and automate. Also AFD data can be used for graphics positioning. Dolby E and Dolby Digital (AC-3) can be passed through the Intuition XG, but cannot be manipulated. The main disadvantage is that the graphics device is in the direct signal path. In addition, this scenario is not supported by the master control option.

In-Stream Branding Insertion

This example feeds the video source to the Imagestore 750, which starts by performing A/B mixing of video and of audio. Output from the A/B mixer is then routed into the Intuition XG, which performs DVE squeezes and applies rich multi-layered graphics to the video signal. The fill output of the Intuition XG then feeds one of the Imagestore 750's keying layers to provide the final program video output. Advanced audio mixing and processing (Dolby decode/encode, up-mix, AD) is performed by the Imagestore 750 in parallel with video through the Intuition XG. The Intuition XG can play out and mix audio clips with its output as embedded audio to be used by the Imagestore 750 as a voice-over. Although simple processing of PCM background audio could be performed by the Intuition XG, there are better monitoring possibilities if it is always done by the Imagestore 750. Further, there will be no inconsistencies in audio output if the Intuition XG is ever removed from the signal path.

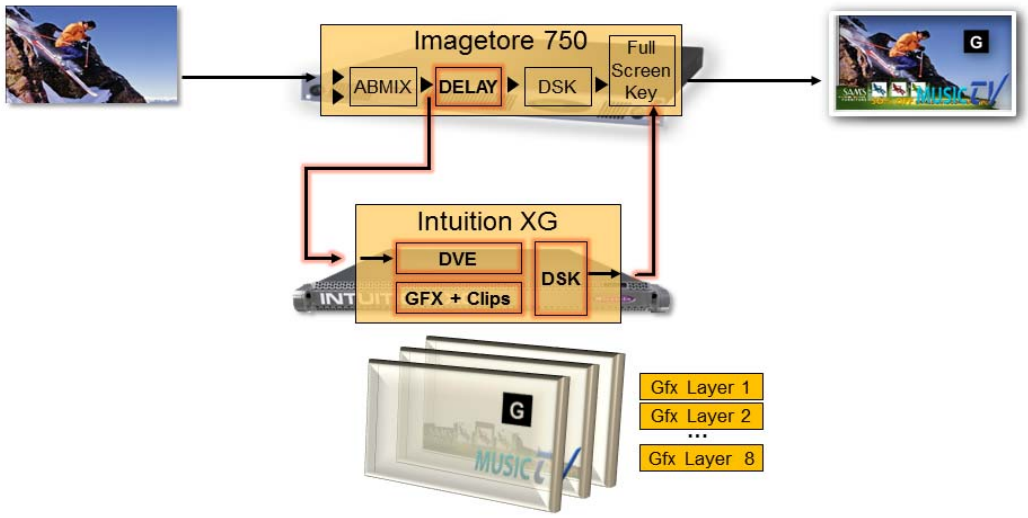


Fig. 3-5: In-Stream Branding

This scenario combines the advantages of both "fill/key branding insertion" and "downstream branding insertion." The Imagestore 750 acts as a robust bypass for the Intuition XG. If the Intuition XG ever fails, the Imagestore 750 keyer receiving Intuition XG graphics is cut down and an unbranded (or lightly-branded) version of the original video source will continue to be output without any break in signal integrity.

Agile Audio Handling

Video sources feeding the Imagestore 750 can have different input audio configurations, some including Dolby data and others, PCM audio. To maintain a constant output audio mapping as the A and B inputs switch between different router sources (or sources change audio format dynamically), the Imagestore 750 mixes between different audio configurations by selectively using Dolby decode, up-mix and Dolby encode audio modules.

Example 1

In this example, sources that feed the Imagestore 750 inputs will always be in one of two possible audio formats: 5.1 PCM + 2.0 PCM and 5.1 Dolby E + 2.0 PCM.

The two input audio streams are passed into Dolby E decoders which dynamically convert audio to a format suitable for A/B mixing (5.1 PCM + 2.0 PCM). The audio A/B mixer then transitions (fades or cuts) between sources, a voice-over can be mixed, and the output is encoded back into the required Dolby E configuration (5.1 Dolby E + 2.0 PCM).

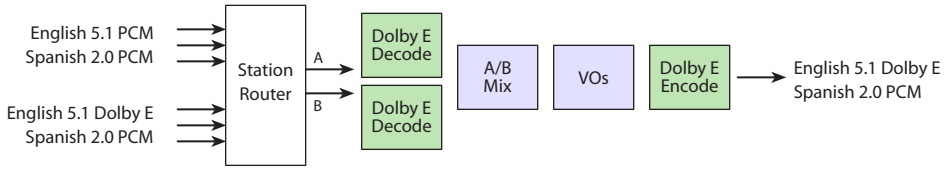


Fig. 3-6: Agile Audio Handling - 2 Dolby Decodes and an Encode

Three of a possible four audio module slots are used.

Example 2

In this example below, sources that feed the Imagestore 750 inputs will always be in one of three possible audio formats:

- 5.1 PCM + 2.0 PCM
- 5.1 Dolby E + 2.0 PCM
- 2.0 PCM + 2.0 PCM.

The two input audio streams are passed into Dolby E decoders and 5.1 up-mix modules which dynamically convert audio into a fixed format suitable for A/B mixing (5.1 PCM + 2.0 PCM). The audio A/B mixer then transitions (fades or cuts) between the sources, and a voice-over can be mixed into the output in the required configuration (5.1 PCM + 2.0 PCM).

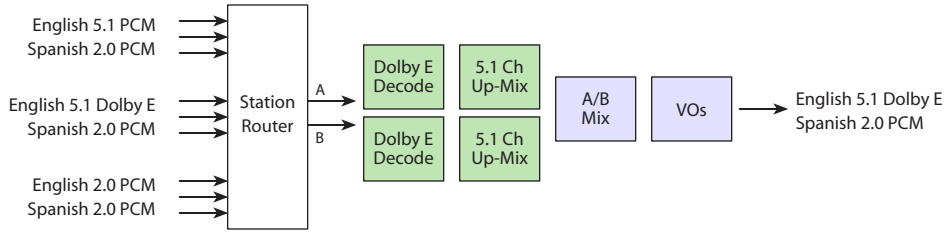


Fig. 3-7: Agile Audio Handling - 2 Dolby Decodes and 2 UpMixes

All four audio module slots are used in this case

4 Features

Chapter 4 presents the important characteristics and functions of an Imagestore 750 in detail.

Topics

Major features of the Imagestore 750, including master control and advanced audio, are covered in their own chapters.

Video Standards

Output

The Imagestore 750 can receive and transmit the following SDI video standards:

525i / 59.94 Hz	SMPTE 259M-1997	270 Mb/s
625i / 50 Hz	SMPTE 259M-1997	270 Mb/s
1920 x 1080i / 59.94 Hz	SMPTE 274M-1998	1.485 Gb/s
1920 x 1080i / 50 Hz	SMPTE 274M-1998	1.485 Gb/s
1280 x 720 / 59.94 Hz	SMPTE 296M-2001	1.485 Gb/s
1280 x 720 / 50 Hz	SMPTE 296M-2001	1.485 Gb/s

See Video Frame Rates on page 212 for additional detail.

Propagation Delay

With the DVE in circuit, the delay through the Imagestore 750 is 2 interlaced fields or 2 progressive frames depending on the video standard. See DVE (for Program and Preview) on page 41 for more information.

Without the DVE in circuit, the delay through the Imagestore 750 can be up to 1 line. The delay consists of input line's FIFO depth delay (which depends on the adjustment of the reference timing) plus a minimum video processing propagation delay.

The video propagation delay for the Imagestore 750 is as follows:

Video Standard	Propagation Delay
525i / 59.94 Hz	5.4 µs
625i / 50 Hz	5.4 µs
1920 × 1080i / 59.94 Hz	2.6 µs
1920 × 1080i / 50 Hz	2.6 µs
1280 × 720p / 59.94 Hz	2.6 µs
1280 × 720p / 50 Hz	2.6 µs

Table 4-1: Video Standard Propagation Delay

Embedded audio delays are different from those of video. Embedding and de-embedding circuits are required by SMPTE standards to buffer many samples before processing. The Imagestore 750's audio "through-path" propagation delay is measured in audio samples (~20 µs per audio sample at 48 kHz). Because audio sample duration is significant compared to video line duration, embedded audio samples present on input video line *L* will be processed, then output, on video line *L* + *N*, where *N* is variable and depends on both the video standard and line *L*. As a rough guide, *N* is generally 5 to 12 lines.

Reference

Reference Types

The Imagestore 750 locks to one of the following inputs, in order of priority:

REF IN	Analog reference input, if present and compatible
PGM IN	If present and at the correct video standard

Otherwise the Imagestore 750 will free-run.

The compatibility matrix between REF IN type and output video format is shown here:

		REF IN Type					
		525i / 59.94	625i / 50	1080i / 59.94	1080i / 50	720p / 59.94	720p / 50
Output Video Format	525i / 59.94	✓					
	625i / 50		✓				
	1080i / 59.94	✓		✓			
	1080i / 50		✓		✓		
	720p / 59.94	✓				✓	
	720p / 50		✓				✓

Table 4-2: Reference In compatibility with Output Video Standard

Adjusting Reference Timing

▲ Always adjust reference timing off-air because it can result in a loss of picture in downstream equipment. Errors can occur in the SDI stream as the adjustment is taking place.

The Imagestore 750 has one FIFO on each input for simplified system timing. You can modify the reference offset using the front panel menu. Select `Setup > Reference > Offset`.

Then choose either:

```
Lines/Samples
Lines/uS
```

Use the front panel arrows to increase or decrease the offset value. For any video standard, the factory default reference timing is 0 lines plus half the length of a video line. This setting buffers about half a video line for inputs that are timed to a reference offset of + 0 lines + 0 samples (or + 0 lines + 0 µs).

Reference adjustment affects the line number marking of the output stream. The reference must be adjusted to match the input signal timing of the local facility. Ancillary data such as timecode, captions and audio metadata may be missed by downstream equipment if they are not present on the same line on which they were input. If the output reference timing is not set correctly, problems might be seen such as:

- Loss of timecode.
- Loss of closed captions.
- Errors in embedded audio.
- Errors in Dolby E streams.

Note that reference adjustment affects the line number marking of the output stream. The reference must be adjusted to match the input signal timing of the local facility.

An SDI data analyzer is needed to monitor the timing of the SDI input sources and the outputs with respect to the facility reference.

Clean switching between the inputs is made possible by buffering the input FIFOs to co-time them before processing. The reference timing adjusts the active depth of the FIFOs to accommodate small timing differences between the input signals.

The shortest video processing delay from any input through the Imagestore 750 to the program output occurs when the input FIFO depth is at its minimum. By increasing the output reference timing with respect to PGM IN, the FIFO depth is lengthened, up to its maximum of 1 line.

▲ To be valid, the input timing value must be negative. If the value is not negative, the reference offset must be adjusted so that the input timing value is negative.

HD Example (1080i)

Timing is dependent on the relative phase between the SDI input and the reference. The following example illustrates how to set up HD signals with a tri-level sync to achieve the minimum delay through the unit:

- Assume that the HD input arrives 3 µs later than the associated tri-level sync (+0 line +3 µs).
- Assume that the minimum processing delay is about 2.6 µs for HD.

  Example: Because PGM IN is 3 µs later than the tri-level sync and PGM OUT is at least 2.6 µs later than PGM IN, the minimum starting point at which to set the reference timing is (0 line +3µs) + 2.6 µs= 0 line + 5.6µs.

The reference timing must now be increased so that some data is buffered in the line FIFOs. In this example, the line FIFO is almost empty. This is a very undesirable timing point because the FIFO is on the threshold of going from empty to full if the input timing changes slightly, resulting in a 1-line vertical shift. Furthermore, the whole video picture may show corruption precisely at the FIFO empty point.

Adding half a video line to the above reference timing provides enough buffering to accommodate the largest timing differences when the input is switched to a source that is not correctly co-timed. Co-timed inputs will then have approximately half a line buffered in their FIFOs. Any sources that arrive earlier or later will increase or reduce the FIFO depth respectively.

The following table shows line lengths of the SDI standards:

Video Standard	Line Length	Samples
525i / 59.94 Hz	63.5 µs	1716
625i / 50 Hz	64.0 µs	1728
1920 x 1080i / 59.94 Hz	29.6 µs	2200
1920 x 1080i / 50 Hz	35.5 µs	2640
1280 x 720p / 59.94 Hz	22.2 µs	1650
1280 x 720p / 50 Hz	26.7 µs	1980

Table 4-3: Video Line Duration

Half a line at 1080i / 59.94 is approximately 15 µs. To buffer half a line of 1080i / 59.94, increase the reference timing (in the example) to 0 line + 5.6 µs (+ 15 µs) = 0 line + 20.6 µs.

▲ **Note:** If the path delays of the SDI input sources are such that they are all offset from reference by several lines then adjust the reference by the same number of lines to align the output to the unusual input timing. Then add 10 to 20 microseconds to give some buffering in the line FIFOs.

Audio Processing

Audio processing requires the IS-750-Audio6 or IS-750-Audio16 audio option to be enabled.

The audio engine has the following characteristics:

- Input selection from embedded SDI (4 feeds having 16 channels) or external AES (32 channels).
- A/B mixing of multi-channel audio sources for cuts and variable rate fades (1–48 channels).
- Multi-channel voice-overs for program and preview with background automatically ducked during voice-over (1–48 channels).
- Easyplay clip storage and playout of four streams sharing 16 audio channels.
- Ability to associate Easyplay audio files automatically with video image/animation files.
- "Wide" shuffles and control of gain level, trim, phase, and mute for each channel (1–48 channels).
- Dolby E and Dolby Digital (AC-3) decoding and encoding.
- 5.1 Up-mixing using Linear Acoustic's AutoMAX-II™ technology.
- Advanced metadata processor with support for embedded metadata, metadata switching, metadata generation, dynamic metadata modification, metadata pass-through, and metadata delay.
- Audio description (AD) with automated mixing of commentary track for the visually impaired.
- Silence detection that automates the control of multiple independent voice-overs fed from the same Easyplay clip.
- Fade-to-silence (1–48 channels).
- Configurable audio delays (48 channels shared between 6 delay banks).
- Output re-embedded onto PGM, PVW, CLN and MON outputs (16 channels) or external AES (32 channels).
- Audio level metering (48 channels).
- Dynamic selection of audio preview points and metering through output multiplexors (1–48 channels, 16 sources).
- All internal processing is 24-bit at 48 kHz.
- Graphical configuration tool (the 'Audio Graph' page of the Imagestore 750 Configurator) for creating, viewing, and editing audio routing.

The following inputs and outputs are available to the audio engine:

Audio Inputs	Channels
SDI Feed 1 (embedded)	16
SDI Feed 2 (embedded)	16
SDI Feed 3 (embedded)	16
SDI Feed 4 (embedded)	16
AES Inputs	32
Easyplay2	16
Silence	1
Test Tone	1

Audio Outputs	Channels
SDI PGM (embedded)	16
SDI PVW (embedded)	16
SDI CLN (embedded)	16
SDI MON (embedded)	16
AES Outputs	32
Level Meters	48

Table 4-4: Audio Engine Inputs and Outputs

Audio Graph

To set up audio routing in the Imagestore 750 Configurator, drag audio blocks onto the 'Audio Graph' view. Then connect appropriate pins between input and output blocks.

- Please see Chapter 8, Imagestore 750 Configurator, for detailed information about the Imagestore 750 Configurator.
- Please see Audio Graph on page 161 for more details of the various audio blocks which are available for the Imagestore 750.

Figure 4-1, following, shows a sample of the 'Audio Graph' page.

In Figure 4-1, the 16 channels of two embedded SDI feeds are mixed at the A/B mixer. An AES voice-over is then applied before the audio is sent to SDI PGM output. This example does not incorporate typical control blocks for features such as input gain, input shuffling, fade to silence, output gain, preview and meter multiplexing or meters.

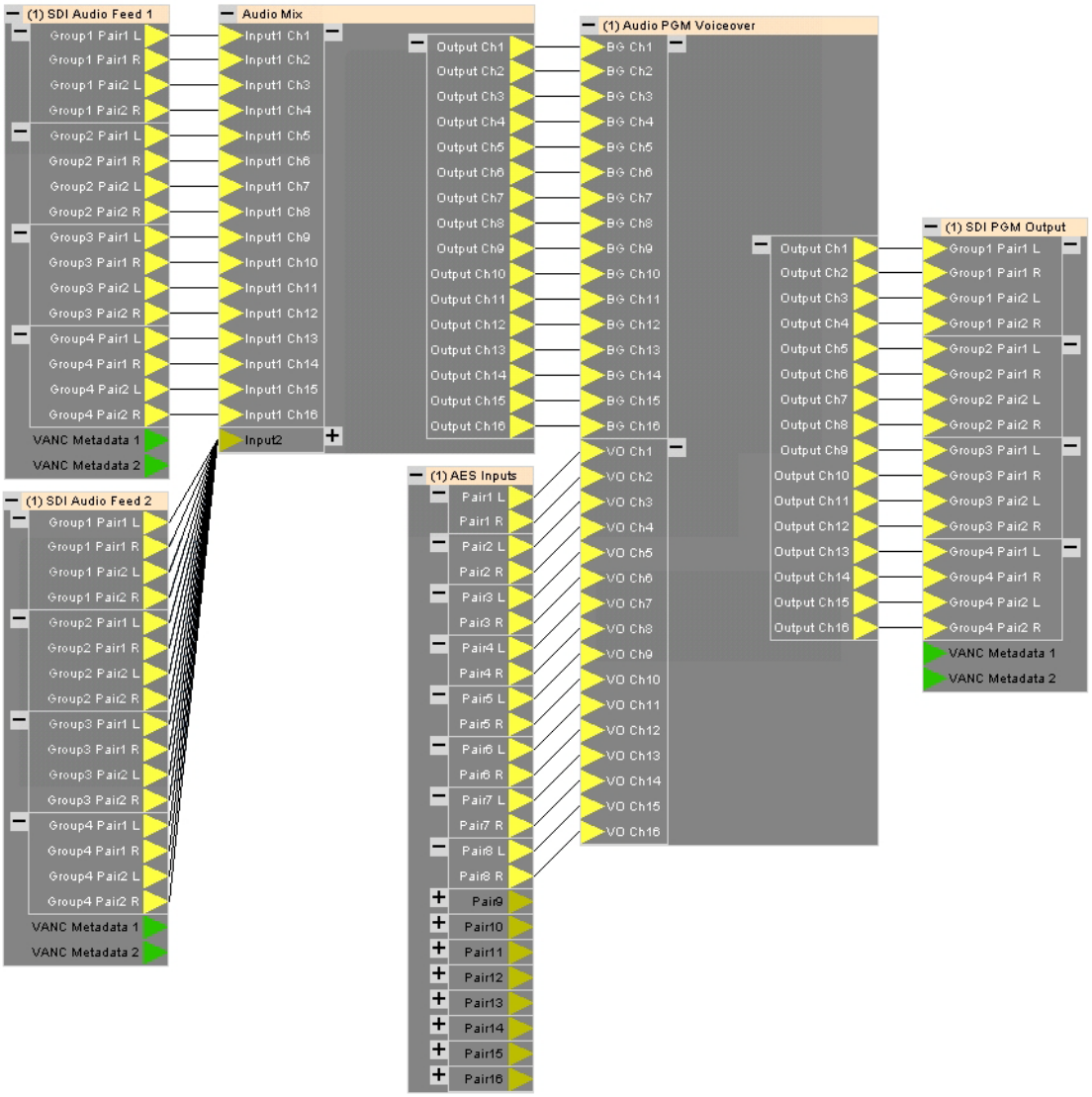


Fig. 4-1: Imagestore 750 Configurator - Audio Graph view

Some audio blocks are controlled by automation, and others can be set up to follow other system states automatically. For example, audio A/B mixing might follow video A/B mixing and Easyplay clips might drive voice-overs or follow the up/down state of keying layers on program or preview.

Sample Audio Graph Templates

The Imagestore 750 Configurator provides many different 'Audio Graph' templates so that you can build custom audio setups. These are the templates:

- AB Mixer

  16-channel embedded A/B mix.

  16-channel embedded A/B mix with 2 channel AES voice-over (EAS).

16-channel embedded A/B mix with 16 channel AES voice-over.

- AB Mixer with Easyplay

  16-channel embedded A/B mix with 16 channel AES voice-over and 16 channel Easyplay voice-over.

  16-channel embedded A/B mix with 16 channel AES voice-over and multilingual Easyplay setup (independent automatic duck control of Easyplay channels 6-6-2-2).

  16-channel embedded A/B mix with 16 channel AES voice-over and 8 channel Easyplay voice-over (independent control of voice-overs on PGM and PST).

  16-channel embedded A/B mix with 16 channel AES voice-over and 8 channel Easyplay voice-over (independent control of voice-overs on PGM and PST, Easyplay follows video stores and keyers).

- Pass-through (non-A/B mix)

  16-channel embedded pass-through with 2 channel AES voice-over (EAS).

  16-channel embedded pass-through with 16 channel AES voice-over.

- Pass-through (non-A/B mix) with Easyplay

  16-channel embedded pass-through with 16 channel AES voice-over and 16 channel Easyplay voice-over.

  16-channel embedded pass-through with 16 channel AES voice-over and multilingual Easyplay setup (independent automatic duck control of Easyplay channels 6-6-2-2).

- Dolby AB Mixer

  Dolby E in (Dolby E out) embedded AB mix with 8 channel AES voice-over.

  Dolby E/PCM in (Dolby E out) embedded AB mix with 8 channel AES voice-over.

  Dolby E/PCM/up-mix in (PCM out) embedded AB mix with 8 channel AES voice-over.

  Dolby E/PCM/up-mix in (PCM out) embedded AB mix with 8 channel AES voice-over and Easyplay voice-over.

- Dolby Pass-through (non AB mix)

  Dolby E/PCM in (Dolby E out) with 8 channel AES voice-over.

  Dolby E/PCM/up-mix in (Dolby E out) with 8 channel AES voice-over.

  Dolby E/PCM/up-mix in (Dolby E out) with 8 channel AES voice-over and Easyplay voice-over.

- Test Setups

  Test tone to all outputs.

- Each template is described in the Imagestore 750's web page, listing the following details:
- Functional description
- Inputs
- Outputs
- Preview modes

To select a template upon which to build, choose 'Import Audio Graph' from the Imagestore 750 Configurator's 'File' menu. Then choose 'From Device Template . . .' in the submenu and select the appropriate filename in the dialog that appears subsequently:

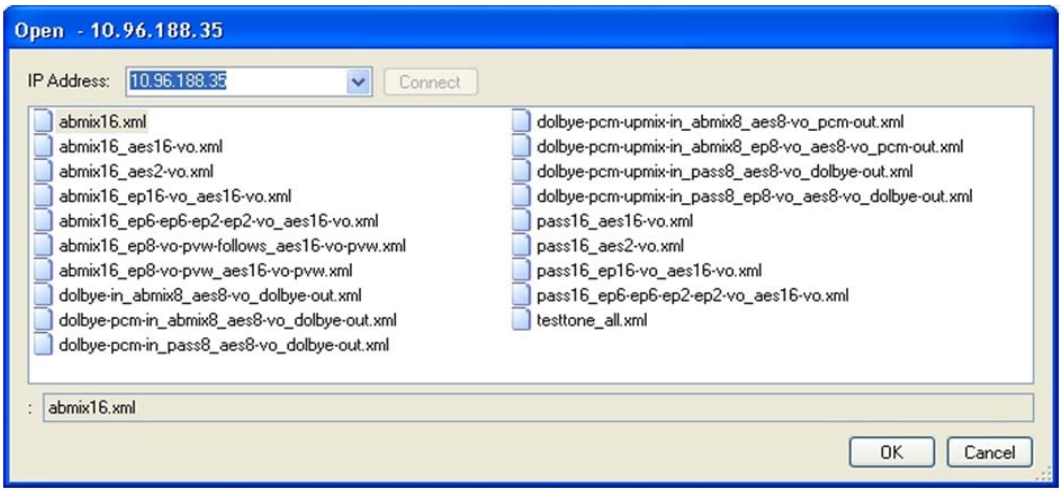


Fig. 4-2: Import Audio Graph dialog

(See Audio Templates on page 182 for more information.)

Embedded SDI Audio

Embedded audio processing requires the IS-750-Audio6 or IS-750-Audio16 audio option to be enabled.

Audio can be de-embedded from 4 of the 8 available SDI inputs and re-embedded in the 4 SDI outputs. The IS-750-Audio6 option provides 4 channels of de-embedding for each feed, and the IS-750-Audio16 option provides 16 channels of de-embedding for each feed.

External AES Audio

There are 16 AES pairs (32 discrete channels) available for both audio input and audio output. The AES inputs and outputs are presented on a 68-pin SCSI D-connector to enable wiring of mating connectors to a 1RU breakout box. (The order codes for those products are ABT-32-32-D110 and ABT-32-32-D75.) All AES inputs and outputs are sampled at 48 kHz and locked to video.

Audio A/B Mixing

Audio A/B mixing requires that the video A/B mixing option be enabled. It is not available for the IS-750-LOGO.

The Imagestore 750 allows A/B mixing of multi-channel audio sources for cuts and variable rate fades with mixes being up to 48 channels wide. Audio can be configured to follow the video A/B mixer position automatically, or it can be controlled independently for lead/lag or breakaways. Depending on the type of video A/B mix, audio mixes pass through either silence (V-fades) or a 50% mix of the A and B sources (X-fades).

Voice-Overs

Voice-overs adjust the combined levels of the background audio and incoming voice-over so the audio level does not exceed the original background volume. The diagram shows how the 'duck' and voice-over presets adjust the actual audio levels.

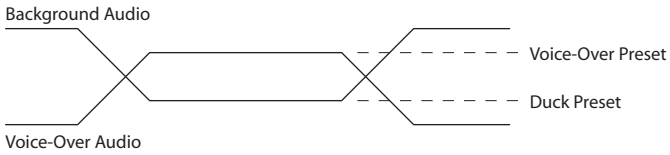


Fig. 4-3: Audio level during Voice-Over - duck and voice-over preset

The duck value is the amount by which the background audio level is attenuated when the voice-over is fully on. The voice-over preset value is the level of the voice-over audio when the voice-over is fully on. Both values are given in decibels.

The Imagestore 750 Configurator's 'Audio Graph' page allows you to define 8 independent voice-overs for use on the program bus. There are also 8 preview voice-overs for the preview bus which can be set to cut up or down automatically based on the arm state of the corresponding program voice-over. (See Audio Mix Blocks on page 165 for more information.)

Easyplay

- Easyplay2 requires the IS-750-EP16 option to be enabled.
- Note: In software versions 3.1 and later, 16 channels of audio clip playout are also enabled by IS-750-EP2 and IS-750-EP8 options.

The Easyplay feature allows digital audio clip storage and playout of up to four independent streams sharing a total of sixteen audio channels. Many variations are possible, such as:

Name	Description	Streams	Channels
16	One stream playing out the widest possible audio clips	1	16
2.0 + 5.1	One language with two streams of different width	2	8
2.0 + 5.1 + 2.0 + 5.1	Two languages each with two streams of different widths	4	16
2.0 + 2.0	Two stereo streams under independent control	2	4
2.0 + 2.0 + 2.0 + 2.0	Four stereo streams under independent control	4	8

Table 4-5: Example Easyplay2 streams and channels possibilities

Easyplay audio clips are often associated with one of the 16 available voice-overs on PGM and PVW. The associated voice-over may be configured to fade up automatically when the Easyplay stream starts playing, and fade down automatically when the Easyplay stream stops. Alternatively, the Easyplay stream can be configured to start or stop playing when its associated voice-over is faded up or down.

You can place Easyplay in a mode in which it follows video layers cuts, fades, loads and unloads automatically. In this mode, audio clips are loaded by association with image file names, and the audio clips play out (or stop) automatically when the keyer associated to the media file is cut up (or down). The association may be made with either program or preview keyers.

The Imagestore 750 supports the following Easyplay audio clip file formats:

.wav Multi-channel WAV files. (This is the preferred format.)

.oxw 2-channel clips created with Audio Builder (available on the MCS CD).

.oxe Multi-channel Imagestore 750 audio file created with Audio Builder.

All audio clips must be generated at 48 kHz (48,000 samples per second). You can generate WAV files with 16 bits or 24 bits per sample. WAV files of 24 bits are preferred.

Switching Dolby E Signals

When it is operating in a progressive video standard (720p at 50 or 59.94 Hz) and switching Dolby E signals, the Imagestore 750 must be given an interlaced reference input — such as 1080i tri-level or SD bi-level analog reference — and the Dolby E data must be aligned to this reference. That is because Dolby E data are locked to the interlaced frame.

- 720p at 59.94 Hz = 59.94 Hz frame rate
- 1080i at 59.94 Hz = 29.97 Hz frame rate

This requirement applies to all Imagestore 750s that receive Dolby audio data, regardless of whether any Dolby decode/encode options are enabled. Imagestore 750s without enabled Dolby options can cut-switch between Dolby data streams, with the transition occurring at the mid-point of an A/B mix.

Advanced Audio

Chapter 6, Advanced Audio, discusses advanced audio features available in the Imagestore 750. Please reference these sections:

- Dolby page 105
- Dolby Metadata page 120
- Up-Mix page 133
- Audio Description (AD) page 140
- Silence Detection page 143
- Audio Delays page 146

Video A/B Mixing

The Imagestore 750's video A/B mixer is fed by any of its input sources or by an external router. The mixer's output provides the background video source for the PGM keyers. The mixer can be dynamically configured either to cut or to fade the video. The Imagestore 750 supports cross-fades, cut-fades, fade-cuts, V-fades and U-fades over variable durations, with V-fades transitioning through a predefined color field. You can define the profile of each fade type.

You can configure the audio mix to follow the video mix automatically. Choose `Setup > Audio Setup > Follow Video > A/B Mix` at the Imagestore 750's front panel. Alternatively, you can configure the audio mix to be completely independent of the video.

Store Memory

The entry-level Imagestore 750 (either an IS-750 or an IS-750-LOGO) provides storage shared between the 4 keying layers for up to 512 MB of images or animations with their associated keys. The IS-750-MEM-2GB upgrade expands this storage to 2 GB total.

The percentage of total store memory allocated to each of the four stores can be configured. This is useful if you want to assign one keying layer to long animations, and other layers for smaller logos or external fill/key. There are two ways to change the allocation:

- At the front panel: use 'Setup > Stores > Stores Memory'.
- In the Imagestore 750 Configurator: choose the 'Store Manager' tab under 'Configuration Mode'. See Store Manager on page 161.

You should always load media files into the store memory before they are keyed over background video. Stored images and animations can be taken to air by fade or cut transitions. An automation pre-load capability (command **R7**) allows the next animation to be loaded in advance while another animation is on-air, provided there is sufficient memory, to avoid playout delays on-air. However, it is preferable to use two keying layers to switch between different media whenever possible.

It is recommended that a media management system is used to transfer media to the Imagestore 750. It is possible to load media using Miranda's Media Conversion Software (or other Miranda tools), from a USB device or via an FTP transfer (see the FTP Interface section for more information).

Keying Graphics

Keying is the process of inserting one video signal (a *fill* signal) into another video signal (the *background* signal) according to a third signal (the *key* signal). The key signal governs the transparency of the fill signal.

Fill and key signals can be obtained from the following sources:

- An external graphics playout device, such as the Intuition XG, fed into a fill and key input.
- Internal media files loaded into store memory.

You can control the following keying parameters:

- Source
- Clip, gain and transparency
- Type
- Sense
- Masking

External Graphics

You can connect an external graphics device or CG to the Imagestore 750's BNC pairs (Fill-1, Key-1), (Fill-2, Key-2) or (Fill-3, Key-3). The fill and key signals may then be fed to any of the supported keying layers and keyed up, or down, as required.

See Keying Parameters on page 39 for a description of the various keying parameters.

Internal Media

The following internal image file types can be cut or faded onto any keying layer with an associated store:

Images	**.oxt**
Animations	**.oxa**
Easytext	**.oxa**
Bugclock	**.oxa**

See Keying Parameters on page 39 for a description of the various keying parameters. The images may be any size up to full-screen. Stored images and their associated keys are processed at 10-bit resolution (unless the image is stored without a key to save space in which case it is stored at 8-bit resolution).

Images

Logos and full-frame still images are defined within **.oxt** image files. The image file embeds information such as the on-screen position, keying source and keying type. The image's transparency can be defined in a key image, so effects such as soft edges can be applied.

(See Keying Parameters on page 39 for more information.)

You can generate **.oxt** image files using one of the following applications:

- Xplorer
- Animation Builder (available on the MCS CD).

Animations

Cell animations are defined in **.oxa** animation files. The animation file embeds information such as the on-screen position (for each field or frame of the animation if necessary), keying source and keying type. The transparency of each frame may be defined in a sequence of key images, so effects such as soft edges and dynamic fades can be applied. You can define any of the following loop modes:

- Single shot
- Cycle
- In-loop-out
- Linear control
- Ping-pong
- Multiple loop

(See Keying Parameters on page 39 for more information.)

The maximum length of a cell animation is limited by the available store memory, as determined by the installed memory and the amount of memory allocated to the associated keyer, in combination with the screen area of the animation. The duration of larger animations, up to full screen, is reduced proportionally to the area used. Because areas are evaluated at each frame, animations can change in size with no penalty.

▲ If the last animation frame is completely transparent, then the keyer stays cut up after the last animation frame. If the last animation frame is small (2×2) then the keyer cuts down after the last animation frame.

With 128 MB of playout memory per store, a logo that is 1/64 of the screen size can be animated for just over half a minute. Larger screen sizes or smaller playout memory sizes affect the maximum animation duration *pro rata*. This table shows the duration for animations at 1080i. The frame rate is 29.97 frames per second and the size of a frame is 7.91 MB:

	Memory Allocated (MB)			
	128	256	512	1024
Animation size	Maximum Duration			
Full frame	16.1 f	32.2 f	64.4 f	128.8 f
1/16 frame	8.6 s	17.2 s	34.4 s	68.8 s
1/64 frame	34.3 s	68.8 s	137.6 s	275.2 s

Table 4-6: Animation size, duration for allocated Styores Memory

The animation's load time (into storage) depends on the total size of the animation file.

You can generate **.oxa** animation files using one of the following applications:

- Xplorer
- Animation Builder (available on the MCS CD)
- Miranda's Adobe After Effects[1] Plug-in (available on the MCS CD)

Component images can also be imported into the animation builder from 32-bit Targa image files, allowing components to originate from almost any computer graphics system.

Easytext

▲ Easytext requires the IS-750-ET option.

CG text effects, including static text and simple crawls, are defined in **.oxa** Easytext files, or templates. The templates can comprise many text and image elements, all of which can be updated dynamically through automation. Data sources can also be defined within text elements to help achieve dynamic data-driven updates including timers, date, stopwatch, countdown, and custom data.

You can generate **.oxa** Easytext files using one of the following applications:

- XStudioLT.
- TextBuilder2 (available on the MCS CD).

Bugclocks

▲ "Bugclocks" require the IS-750-Clock option.

Analog or digital clocks are defined within **.oxa** Bugclock files. The Bugclock file defines the properties of the clock, such as hand and face styles, and whether it shows hours, minutes, and seconds. Digital clocks can be 12 or 24 hour style. A bugclock can be locked to a station's LTC or VITC timecode. Clocks are loaded, previewed, positioned, keyed and controlled through GPIs and automation, as are animations and static logos.

1. *After Effects* is a digital motion graphics and compositing software package published by Adobe Systems. Its main purpose is film and video post-production.

You can generate **.oxa** Bugclock files using the Clock Builder application (available on the MCS CD).

'Emergency to Air' and 'Emergency from Air'

If a background video failure occurs, an emergency image message can be brought to air using the 'Emergency to Air' feature. The message can be triggered by automation, a GPI event, from a control panel, or from the Imagestore 750's front panel.

When 'Emergency To Air' is selected, the most downstream keyer that is associated with a store (on the program output channel) fades down over 25 fields. Image **V000.oxt** is then loaded and faded up over a further 25 fields.

When 'Emergency from Air' is selected, the most downstream keyer that is associated with a store (on the program output channel) fades down over 25 fields and the previous image is restored, but not faded up.

▲ **Note:** The emergency image must be stored in the image library under filename **V000.oxt**.

Emergency Alert System (EAS)

▲ The Emergency Alert System feature requires the IS-750-EAS option.

The Emergency Alert System (EAS) is a national warning system in the United States that notifies the general public of pending or imminent situations such as weather emergencies. It can also be used by the President of the United States to deliver a message. All television stations in the USA are required to transmit EAS messages. Cable head-ends are also required to transmit EAS messages on all programmed channels. For more information on EAS, see the FCC website or the websites of the EAS receiver manufacturers.

A televised EAS alert consists of two components:

- An on-screen crawl displaying the nature of the emergency and the regions affected in the broadcast area.
- An audio message up to two minutes in length.

The EAS option provides a mechanism for the Imagestore 750 to receive information from an external EAS receiver and then generate the required video crawl and audio voice-over. The Imagestore 750 provides flexible branding capabilities for the video crawl, using an Easytext template, such as adjustable font type, size, and color, additional images or text, etc. It provides full GPI macro programmability and enforces keyer control so that the crawl is shown for the duration of the alert.

▲ **Note:** For EAS messages (a.k.a straps) to appear correctly on DSK 4, the fourth store must be allocated sufficient memory. See `Setup > Stores > Stores Memory` on the Imagestore 750's front panel.

EAS Receivers and Interfacing

The Imagestore 750 supports the following EAS receivers:

- Sage ENDEC Model 1822.
- TFT EAS 911.

Select the EAS receiver model and Baud rate in the Imagestore 750 Configurator or at the Imagestore 750's front panel. Choose `Setup > Serial Comms > Serial Ports > Com x > Protocol / Baud Rate.`

The following external interfaces to the Imagestore 750 are required:

- Serial input

  The EAS receiver connects to the Imagestore 750 over an RS-232 serial connection. This connection provides the EAS alert data including the alert level and crawl text data.

  EAS messages can be up to 1990 characters long.

- GPI input

  A GPI trigger on the Imagestore 750 is used to initiate, and then terminate, the EAS alert. This GPI can come directly from the EAS receiver, from automation, or from a manually initiated trigger.

  The GPI trigger drives separate 'EAS On' and 'EAS Off' macros that allow you to build a custom branding event around the EAS crawl. The macro usually includes triggering of an AES voice-over (which will duck the background audio) but can play a pre-recorded Easyplay audio clip instead.

- Voice-over input

  Audio voice-over input is fed into an external AES pair on the Imagestore 750. The EAS audio message is up to two minutes duration and stored in the receiver until the alert is triggered.

  Because most receivers have analog audio outputs, the audio must first be converted to AES using an external converter (such as the Miranda ADC-1711 or ASD-771p). The AES audio is then fed to the Imagestore 750 through an external AES input pair and the audio is mixed with the background through a voice-over:

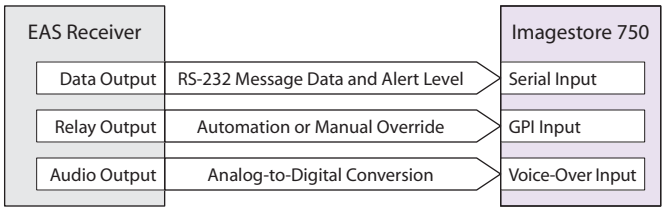


Fig. 4-4: EAS Receiver interfacing

EAS Crawl Templates

The Imagestore 750 monitors its COM ports for a serial string from an EAS receiver. When a message is received, its priority (high, medium, low, or none) is established and the text is updated in one of the following default Easytext crawl templates.

For each video standard, there is a standard set of files that correspond to the appropriate EAS alert level with the appropriate background color.

Filename	Priority	Video Standards
EASHigh.oxa	1 (high)	525i / 59.94, 625i / 50
EASHighHD1080.oxa	1 (high)	1080i / 59.94, 1080i / 50
EASHighHD720.oxa	1 (high)	720p / 59.94, 720p / 50
EASMed.oxa	2 (medium)	525i / 59.94, 625i / 50
EASMedHD1080.oxa	2 (medium)	1080i / 59.94, 1080i / 50
EASMedHD720.oxa	2 (medium)	720p / 59.94, 720p / 50

Table 4-7: Standard EAS alert crawl template Filenames

EASLow.oxa	3 (low)	525i / 59.94, 625i / 50
EASLowHD1080.oxa	3 (low)	1080i / 59.94, 1080i / 50
EASLowHD720.oxa	3 (low)	720p / 59.94, 720p / 50
EASNone.oxa	None	525i / 59.94, 625i / 50
EASNoneHD1080.oxa	None	1080i / 59.94, 1080i / 50
EASNoneHD720.oxa	None	720p / 59.94, 720p / 50

Table 4-7: Standard EAS alert crawl template Filenames

Each default EAS template file can be copied (from `/etc/eas/` into `/home/images/`) and then modified to suit your requirements in the TextBuilder application (available on the Media Conversion Suite CD). You can customize background color, crawl speed, font, size, shadow, and positioning. You can also add additional elements to the crawl such as another text field or a logo or graphical element.

Note the following considerations relating to EAS template files:

- The EAS template filename ***should not be changed.*** Otherwise, the EAS option will not be able to find the template.
- Always use Text Builder to transfer modified files to the Imagestore 750 so that all fonts associated with the template are also transferred.
- The datasource name "EAS_TEXT" is associated with the text crawl element in an EAS template. Ensure that its datasource value is not inadvertently adjusted by automation because doing so can affect the EAS message on-air.
- If no text has been received from the EAS receiver, blank text will be seen in the EAS template. Either leave this blank, or pre-set the data-source to something harmless such as "Stand by for an important EAS alert."

EAS Triggering

▲ **Note:** EAS messages are displayed on-air following appropriate GPI triggers or automation commands. Refer to General Purpose Interface (GPI) on page 47 for information about setting up the relevant GPI. For automation commands, refer to the automation publications listed under Applicable Publications and Tools on page 3.

When an EAS alert is triggered 'on' by GPI or by automation, the following internal events occur:

- The 'EAS Layer', which is the most downstream keyer, is cut down. Its prior keyer state and the image loaded (if any) are saved for later use.
- The appropriate EAS crawl template is loaded into the 'EAS Layer'. The selected crawl file is determined by the alert level in the crawl data and the video standard. The crawl data must be received before the EAS alert is initiated, otherwise stale data will be displayed.
- The 'EAS Layer' is cut up to reveal the EAS alert (in the video foreground).

When an EAS alert is triggered 'off' by GPI or automation, the following internal events occur:

- The current EAS crawl will complete, after which the 'EAS Layer' cuts down.
- The previous image (if any) is reloaded into the 'EAS Layer'.
- The 'EAS Layer' is restored to its prior state.

- Any remaining events in the EAS alert 'off' GPI macro are processed. These macro events are suspended until the preceding events complete.

Additional commands can be added to the GPI macros to provide other EAS actions. At a minimum, these events must include a 'Voiceover On' and 'Voiceover Off' command and appropriate delays to ensure that the data for the crawl is received. Such GPI macros are outside the scope of this manual, but can be discussed with Miranda Support.

Because the Imagestore 750 retains the last EAS text message received, the EASNone.oxa crawl will be seen only when the EAS mode is activated with *no* alert level. When verbose logging is enabled, all EAS transactions are recorded in the standard Imagestore 750 log files.

Temperature Probe

▲ The temperature probe feature requires the IS-750-TEMP option.

This option provides a low-cost temperature sensor (Sensorsoft ST6154J) for measuring the local temperature, typically from the roof of the building. The temperature can be recorded in Celsius or Fahrenheit, and can be displayed (and continually updated) on a keying layer of the Imagestore 750 using an Easytext template.

The thermometer connects by cable to an RS-232 serial port of the Imagestore 750 and can be located up to 1000 feet away without the need for a battery or external power adapter. It has an external stainless steel probe, suitable for outdoor applications or where liquids are present.

More information is found on the temperature probe option's instruction sheet. That is Miranda document M987-9805-101.

Temperature Probe Parts

This table lists the probe parts:

Miranda Part Number	Description
4100-0041-0	Sensorsoft ST6154J RS-232 temperature sensor with external probe
3503-0024-0	Sensorsoft C2000 cable, DB9-to-RJ45, 20 feet
1897-1700-100	Miranda adapter, RJ45-to-DB9 for RS-232 DTE
0702-1400-100	Ethernet cable, RJ45-to-RJ45 CAT5 UTP, flex 10 feet

Table 4-8: Temperature Probe Parts

▲ **Note:** For pin-outs to be correct at the Imagestore 750, the parts must be connected in the order listed in the table above.

Temperature Probe Serial Port Settings

Set the probe's serial port protocol and Baud rate to the following values at the Imagestore 750's front panel or in the Imagestore 750 Configurator:

Protocol ST61XX Thermometer

Baud rate 1200

Temperature Probe Easytext Templates

When the Easytext option is enabled, you can use the special temperature probe datasource names (show in the table below) for text boxes within any Easytext template used on the

system. When the Easytext option is not enabled, a special template name **temperature.oxa** is reserved for displaying the special temperature probe datasources. This is the only Easytext file that can be displayed on such a system.

Temperature Probe Datasource Name	Displays	Accuracy
TEMPERATURE_CELSIUS	Celsius	Rounds to nearest integer
TEMPERATURE_CELSIUS_TENTHS	Celsius	Rounds to one decimal place
TEMPERATURE_FAHRENHEIT	Fahrenheit	Rounds to nearest integer
TEMPERATURE_FAHRENHEIT_TENTHS	Fahrenheit	Rounds to one decimal place

Table 4-9: Temperature Probe Easytext Template files

After an Easytext template has been generated containing one or more of the temperature probe datasource names, you can load it into a keying layer, and cut up, to display the temperature on-air.

Keying Parameters

You can configure the following keying parameters for both internal and external graphics.

- Source

  The key source (actually the keying method) may be chosen from the following:

Separate Key	The key values are derived from the luminance content (Y value) of the separate key.
Self Key	The key values are derived from the luminance content (Y value) of the fill signal itself.
None	The key for an image is set to white so that there is no image transparency.

- Clip, gain and transparency

  After the key source is selected, the key signal is processed with clip, gain, and transparency to alter the mapping from key input luminance to key output values. Transparency modifies the maximum key value as follows:

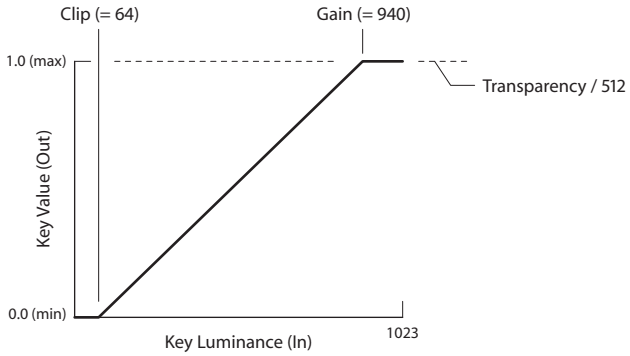


Fig. 4-5: Keying Parameters - Clip, Gain, Transparency

- Type

  After the key output is generated, the type controls the combining of the background and fill video signals. The Imagestore 750 supports both *linear* and *full* keying types.

Linear keying is where the fill signal has been pre-computed to match the key signal. In this case, the fill has already been cut by its own key independently of the Imagestore 750. The keyer computes (1 – key) and uses this to "cut a hole" in the background signal. The fill is then simply added to this.

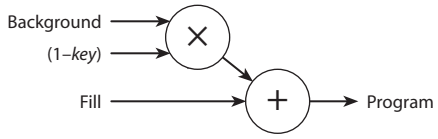


Fig. 4-6: Linear Keying (pre-cut Fill)

Full keying is where the fill signal must be multiplied by the key signal prior to being added to the modified background signal. In this case, the fill has ***not*** already been cut by its key. The keyer cuts a hole in the fill with the key values and cuts a hole in the background with computed (1 – *key*) values. The cut fill and cut background are then added. *Full Keying*

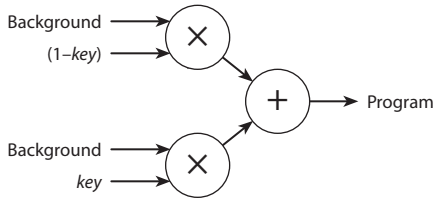


Fig. 4-7: (both Fill and Background cut by Key)

- Sense

  Key inversion switches the key value with the (1 – key), thereby inverting the sense of the key signal.

  The Imagestore 750 supports *normal* and *invert* sense.

  - Normal

    A black key level causes the fill pixel to be fully transparent.

    A white key level causes the fill pixel to be fully opaque.

    Intermediate keying levels produce a *pro rata* transparency effect.

  - Invert

    This is the reverse of the *normal* sense.

    A white key level causes the fill pixel to be fully transparent.

    A black key level causes the fill pixel to be fully opaque.

    Intermediate keying levels produce a *pro rata* transparency effect.

- Masking

  The Imagestore 750 allows a rectangular masking area to be defined for each of the 4 keyers. This mask applies to any signals received by the keyer; whether they are external fill and key signals or the output from internal stores.

  For internal images, the area range of the mask is determined by the width and height of the image in pixels, and is limited by the selected video standard. To maintain correct YUV values, the pixel count increments by 2.

  For external fill and key signals, the area range of the mask is limited by the selected video standard. Here too, the pixel count increments by 2.

One situation where masking an external fill and key signal is useful is when output from an external graphics device must be split between two keying layers in different regions of screen area.

DVE (for Program and Preview)

The Imagestore 750 digital video effects (DVE) options provide visual effects giving comprehensive video image manipulation, including picture-in-picture squeeze transitions over a background. The main DVE features include:

- Single or dual 2D (rectangular) squeezes over a background.
- Independent control of DVE squeezes on the program and preview buses.
- Cropping and masking of squeezes, including soft edges and colored borders.
- Adjustable layering of dual DVEs, to bring new content to the front.
- Editor for creating and modifying DVE sequences to move between different squeeze positions.
- Up to 97 different DVE sequences stored on the Imagestore 750.
- Compensating video delays, post-A/B-mix on program and preview.

The following DVE options are available for the Imagestore 750:

IS-750-DVE	Enables a single DVE window on PGM and PVW.
IS-750-DVE-DUAL	Enabled two DVE windows on PGM and PVW.

The DVE processors provide digital video effects on any of the input video streams or A/B mixer output. Digital video effects are suitable for picture-in-picture applications such as over the shoulder news transitions, as well as squeezes for credits, news flashes, sports results, and schedules.

You can create and manage DVE sequences using the DVE Editor (available on the Media Conversion Suite CD). Using the DVE editor software, you can upload up to 97 sequences onto the Imagestore 750 for later playback.

The DVE delay is exactly 2 interlaced fields or 2 progressive frames. For 59.94 Hz standards, the delay is 2 / 59.94 s and for 50 Hz, standards the delay is 2 / 50 s. Any non-active picture data in the DVE input stream is also delayed while the video is resized.

Note: It is important for video and audio (including metadata) to maintain a constant and unchanging delay through the Imagestore 750. To compensate for any potential DVE processing, matching delays must be applied to the background video (after the A/B mix), and to the audio/metadata paths defined within the audio engine.

You can set the DVE mode to 'enabled' or 'disabled' for the program and preview buses independently. When the DVE is enabled, DVE picture insertion takes place with the DVE window(s) being keyed at the position defined by the DVE configuration. When the DVE is disabled, DVE picture insertion is taken out of circuit to reveal the background video coming from the A/B mixer. In both cases, a DVE delay is experienced at the Imagestore 750's output.

The DVE configuration menu option of the Imagestore 750's front panel (`Operate > DVE Config`) and the Imagestore 750 Configurator allows the position of the DVE picture insertion within the video path to be one of the following.

- DVE inserted before all keyers

- DVE inserted after keyer 1
- DVE inserted after keyer 2

This diagram illustrates the 3 DVE configuration options:

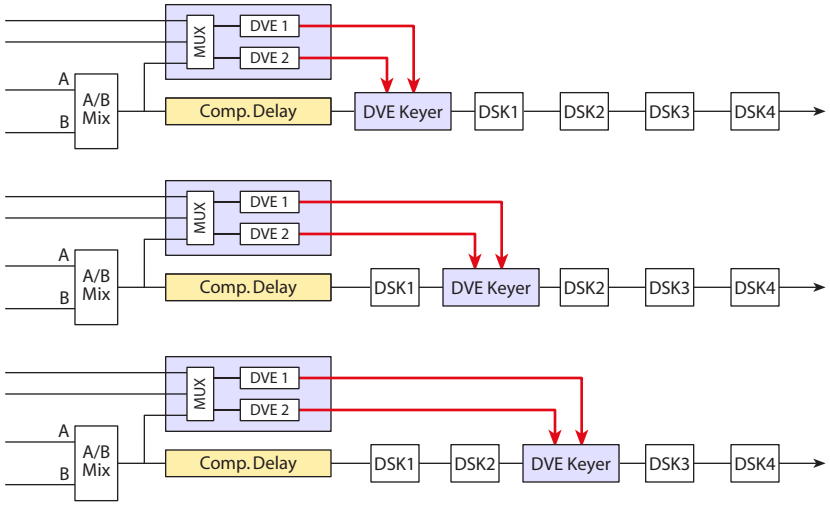


Fig. 4-8: DVE insert positions:- before keyers; after keyer 1; after Keyer 2

Each heavy (red) line represents a fill/key signal from one of the DVE scalers, which is then keyed over the background video at a position that depends on the current DVE configuration.

When DVE mode is enabled, the DVE keyer will often present full-screen video (normally routed from the A/B mixer). Any DSKs that are upstream of the DVE keyer will be lost. However, it is normal to have at least one DSK upstream of the DVE keyer so that full-screen media graphics can be used to hide the background video coming through the compensating delay. These graphics will also be revealed when the DVE squeezes back from full screen.

Note: The relative positioning of DVE1 and DVE2 scalers can also be modified using the DVE sequence editing software.

When DVE mode is disabled, the background video continues to pass through the compensating video delay. The compensating delay must be set to match the delay through the DVE scalers exactly. That way, when DVE mode is re-enabled, there will be no glitch in the video output.

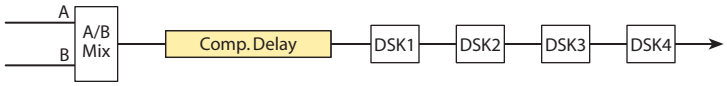


Fig. 4-9: DVE video compensating delay

Video Frame Delays

It is very important for video and audio (including Dolby metadata) to maintain a constant and unchanging delay through the Imagestore 750 system to avoid lip-sync problems. To help achieve this, the Imagestore 750 provides the following video frame delays:

Name	Bus	Position	Compensates For Delays From . . .	Range
Program post-AB mix frame delay	PGM	Post A/B-mix	DVE, in-stream branding insertion, audio modules	0–8
Preview post-AB mix frame delay	PVW	Post A/B-mix	DVE, in-stream branding insertion, audio modules	0–8
Program output frame delay	PGM	Output	Audio modules	0–16
Preview output frame delay	PVW	Output	Audio modules	0–16
Clean feed output frame delay	CLN	Output	Audio modules	0–16

Table 4-10: Imagestore750 Video frame delays

You can configure these delays in the Imagestore 750 Configurator using

`System Settings > Video > Video Frame Delays.`

The 'post A/B-mix' delays are primarily used to compensate for the DVE and any in-stream branding insertion. The 'output' delays are primarily used to compensate for the audio delay through Dolby decode and encode modules.

Other aspects that affect the configuration of system delays are discussed in the following sections:

- DVE delays — DVE (for Program and Preview), page 41
- In-stream branding — In-Stream Branding Insertion, page 18
- Dolby delays and decode / encode modules—Dolby Processing Times on page 117; Dolby Delays on page 146
- Metadata delays—Metadata Delays on page 148
- Up-mix modules—Up-Mix Processing Times on page 136
- Audio delay blocks—Audio Delay Blocks on page 148

Note: There is no video frame delay associated with the monitor output. Such delay is seen at the monitor output only if it is selected to monitor either of the program, preview or clean-feed outputs.

Preview Output

The preview output selection defines the SDI output to be viewed at PVW OUT. It can be set to one of the following values at the front panel menu using `Operate > Preview Output`:

Selection	Description
Preview o/p	Selects default preview output
Program o/p	Selects a copy of PGM OUT as the preview output
PGM AB Mix	Selects output from PGM A/B Mixer as the preview output

Table 4-11: Preview output options

Selection	Description
PGM DVE o/p	Selects output from PGM DVE as the preview output
PGM DSK1 o/p	Selects output from PGM DSK1 as the preview output
PGM DSK2 o/p	Selects output from PGM DSK2 as the preview output
PGM DSK3 o/p	Selects output from PGM DSK3 as the preview output

Table 4-11: Preview output options

The Imagestore 750's default preview output selection is used typically for previewing A/B mixer transitions, keyer graphics transitions, DVE moves, and voice-overs prior to bringing them to air on program output. In the master control environment, you can preview exactly what will happen on the program output when the next transition is taken to air.

The video output that is presented for 'Preview O/P' depends on the following settings:

- A/B mixer sources the from upstream router.
- PGM A/B mixer B input, or PGM A/B mixer position and arm state ('active preview AB mixer').
- DSK sources from internal stores or external fill/key.
- PVW DSK positions, or PGM DSK positions and arm states ('active preview keyers')
- PVW DVE router mode, inputs, sequence and sequence action.
- PGM DVE position and arm state.
- DVE configuration.
- PST voice-over sources from internal Easyplay or external AES.
- PGM voice-over positions and arm states.

Note that the clean-feed and monitor outputs allow additional tap-off points for monitoring and testing, selectable at the front panel using `Operate > Clean Output` and `Operate > Monitor Output`.

Active Preview AB Mixer

When 'Active Preview AB Mixer' is enabled, the preview background video depends on both the position of the program A/B mixer and its arm state. When there is no A/B mix armed, the preview background video follows program. If an A/B mix is then armed, the preview background video shows the transition state that will occur on program after the next "Take" transition.

You can set this option in the Imagestore 750 Configurator using `Video > Preview > Preview > Active Preview AB Mixer`.

When 'Active Preview AB Mixer' is disabled, the preview background video is controlled independently of the program A/B mixer and its arm state. The preview A/B mixer angle is normally configured and remains in the 'B channel' position in the Imagestore 750 Configurator (`Video > Preview > Preview > Preview AB Mixer Angle`).

Active Preview Keyers

When 'Active Preview Keyers' is enabled, preview keyer position depends on both the position of the equivalent program keyer and its arm state. Whenever a keyer is disarmed, the position of

the equivalent preview keyer follows program. If a keyer is then armed, the preview keyer shows the transition state that will occur on program after the next “Take” transition.

Note: Keyers can be armed for cuts or fades from a Miranda iMC panel, an RCP-BR / Xpanel or through Presmaster automation. This table shows how active preview keyers are driven based on the equivalent program keyer position and arm state:

Action on PGM DSK	Program Keyer	Preview Keyer
Disarm	DOWN	DOWN
Arm to cut or fade UP	DOWN	UP
Take	UP	UP
Arm to cut or fade DOWN	UP	DOWN
Take	DOWN	DOWN
Arm to cut or fade UP	DOWN	UP
Disarm	DOWN	DOWN

Table 4-12: Active Preview Keyer behaviour

You can set this option in the Imagestore 750 Configurator using `Video > Preview > Preview Keyer Position > Active Preview Keyers`, or at the front panel (`Setup > Miscellaneous > Active Preview`).

When ‘Active Preview Keyers’ is disabled, the keyers on preview are controlled independently of the program keyers and their arm states. Preview keyers are normally configured and remain in the ‘keyer up’ position in the Imagestore 750 Configurator (`Video > Preview > Preview Keyer Position > DSK x Preview Keyer Position`).

Clean-Feed Output

You can select the video signal to view at the clean-feed output (CLN OUT). Use one of the following values in the front panel menu `Operate > Clean Output`:

Selection	Description
Programo/p	Selects a copy of PGM OUT as the Clean Feed Output
SDI A	Selects a copy of SDI A input as the Clean Feed Output
SDI B	Selects a copy of SDI B input as the Clean Feed Output
SDI C	Selects a copy of SDI C input as the Clean Feed Output
SDI D	Selects a copy of SDI D input as the Clean Feed Output
PGM AB Mix	Selects output from PGM A/B Mixer as the Clean Feed Output
PGM DVE o/p	Selects output from PGM DVE as the Clean Feed Output
PGM DSK1 o/p	Selects output from PGM DSK1 as the Clean Feed Output
PGM DSK2 o/p	Selects output from PGM DSK2 as the Clean Feed Output
PGM DSK3 o/p	Selects output from PGM DSK3 as the Clean Feed Output
Store 1 Fill	Selects outputs from Store 1 Fill as the Clean Feed Output
Store 1 Key	Selects outputs from Store 1 Key as the Clean Feed Output

Table 4-13: Clean Feed output options

Selection	Description
Store 2 Fill	Selects outputs from Store 2 Fill as the Clean Feed Output
Store 2 Key	Selects outputs from Store 2 Key as the Clean Feed Output
Store 3 Fill	Selects outputs from Store 3 Fill as the Clean Feed Output
Store 3 Key	Selects outputs from Store 3 Key as the Clean Feed Output
Store 4 Fill	Selects outputs from Store 4 Fill as the Clean Feed Output
Store 4 Key	Selects outputs from Store 4 Key as the Clean Feed Output
SDI Fill-1	Selects a copy of SDI Fill-1 input as the Clean Feed Output
SDI Key-1	Selects a copy of SDI Key-1 input as the Clean Feed Output
SDI Fill-2	Selects a copy of SDI Fill-2 input as the Clean Feed Output
SDI Key-2	Selects a copy of SDI Key-2 input as the Clean Feed Output

Table 4-13: Clean Feed output options

The Imagestore 750's clean-feed output is used typically for outputting unbranded or partially-branded version of the PGM output, which can then be redirected to other networks. It can also be used for monitoring video at a number of different points within the Imagestore 750, or for taking a copy of PGM OUT with a different audio mix. (See 'Audio Output Cleanfeed Multiplexor' in Audio Mix Blocks on page 165.)

Monitor Output

You can select the video signal to view at the monitor output (MON OUT). Use one of the following values at the front panel menu `Operate > Monitor Output`:

Selection	Description
Program o/p	Selects a copy of PGM OUT as the Monitor Output
Preview o/p	Selects a copy of PVW OUT as the Monitor Output
SDI A	Selects a copy of SDI A input as the Monitor Output
SDI B	Selects a copy of SDI B input as the Monitor Output
SDI C	Selects a copy of SDI C input as the Monitor Output
SDI D	Selects a copy of SDI D input as the Monitor Output
PGM AB Mix	Selects output from PGM A/B Mixer as the Monitor Output
PVW AB Mix	Selects output from PVW A/B Mixer as the Monitor Output
PGM DVE o/p	Selects output from PGM DVE as the Monitor Output
PGM DSK1 o/p	Selects output from PGM DSK1 as the Monitor Output
PGM DSK2 o/p	Selects output from PGM DSK2 as the Monitor Output
PGM DSK3 o/p	Selects output from PGM DSK3 as the Monitor Output
Store 1 Fill	Selects outputs from Store 1 Fill as the Monitor Output
Store 1 Key	Selects outputs from Store 1 Key as the Monitor Output
Store 2 Fill	Selects outputs from Store 2 Fill as the Monitor Output

Table 4-14: Monitor output options

Selection	Description
Store 2 Key	Selects outputs from Store 2 Key as the Monitor Output
Store 3 Fill	Selects outputs from Store 3 Fill as the Monitor Output
Store 3 Key	Selects outputs from Store 3 Key as the Monitor Output
Store 4 Fill	Selects outputs from Store 4 Fill as the Monitor Output
Store 4 Key	Selects outputs from Store 4 Key as the Monitor Output
SDI Fill-1	Selects a copy of SDI Fill-1 input as the Monitor Output
SDI Key-1	Selects a copy of SDI Key-1 input as the Monitor Output
SDI Fill-2	Selects a copy of SDI Fill-2 input as the Monitor Output
SDI Key-2	Selects a copy of SDI Key-2 input as the Monitor Output
Colour 1	Selects a copy of Color Field 1 as the Monitor Output
Colour 2	Selects a copy of Color Field 2 as the Monitor Output
Colour 3	Selects a copy of Color Field 3 as the Monitor Output
Colour 4	Selects a copy of the V-fade color as the Monitor Output
Pattern 1	Selects a copy of Test Pattern 1 as the Monitor Output
Pattern 2	Selects a copy of Test Pattern 2 as the Monitor Output
PGM DVE1	Selects a copy of PGM DVE Input 1 as the Monitor Output
PGM DVE2	Selects a copy of PGM DVE Input 2 as the Monitor Output
PVW DVE1	Selects a copy of PVW DVE Input 1 as the Monitor Output
PVW DVE2	Selects a copy of PVW DVE Input 2 as the Monitor Output

Table 4-14: Monitor output options

The Imagestore 750's monitor output is used typically for monitoring video at a number of different points within the Imagestore 750. The monitor output audio mix can also be changed dynamically using 'Audio Output Monitor Multiplexor'. (See Audio Mix Blocks on page 165.)

General Purpose Interface (GPI)

The ports of the dedicated general-purpose interface (GPI) can be used either to trigger the execution of a series of internal pre-programmed commands (input) or to monitor the status of the Imagestore 750 (output). The Imagestore 750's GPI has 16 input/output ports.

- GPI numbering is zero-based for pinouts, automation, and the front panel. Use GPIs numbered 0–15.

When used as an input, a GPI input is activated as follows:

GPI On — When the GPI pin is connected to 0V.

GPI Off — When a GPI pin is not connected. (The GPI signal pin gets pulled high.)

When used as an output, a GPI output is as follows:

GPI Active(On) — The GPI output pin is internally driven to ground by a Darlington transistor (Active low is represented by +0.7V or less.)

GPI Inactive(Off) — The GPI output pin is internally pulled high.

Lamps or relays attached to a GPI output port can use the GP_+5V fused supply (pin 7) but the maximum current drawn should not exceed 500mA.

Where a GPI output is used to drive a relay coil, you should incorporate reverse voltage protection diodes in the external circuit to protect the Imagestore 750 from voltage transients.

See GPIO / LTC on page 207 for details of the GPI connector pinouts.

The GPI ports can be used as inputs to execute a series of internal pre-programmed commands, or GPI ON/OFF macros. The GPI ports can also be triggered either on or off by a pre-defined transition state defined for the Imagestore 750. See GPI Inputs and Macros on page 48 and GPI Outputs and Events on page 50 for a description of how GPI inputs and outputs are configured.

▲ Because GPI ports are shared between inputs and outputs (bi-directional), it is a common practice to reserve some GPI ports solely as inputs and others solely as outputs. However, GPI input macros can be configured to be driven from GPI output events on the same port if this is required. An example might be to cut up a voice-over automatically through a macro (input) when a DSK starts fading up (output).

GPI macros, described in the following section, are directly associated with the GPI connections and limited to a maximum of 32 macros (fewer when GPI outputs are defined).

▲ Note that GPI macros are difficult to compose and are limited to actions that can be selected from the front panel's 'Operate' menu.

You can find a more versatile, extensible, and friendly way of creating macros in the Imagestore 750 Configurator under 'Macro Mode'. Up to 65,536 macros can be created, each of which can be named to help the iMC control panel meaningfully represent macros to a panel operator.

Macros consist of a list of Oxtel automation commands, with delays being inserted using the 'Xd' automation command. See Macros on page 50 for details. For complete details of the Oxtel automation protocol, see the automation publications listed under Applicable Publications and Tools on page 3.

GPI Inputs and Macros

Any GPI input can have two associated macros:

- One macro associated with the GPI port transitioning on.
- One macro associated with the GPI port transitioning off.

Each macro can contain up to 2048 bytes of Oxtel command data. (That is approximately 200 commands.) When the GPI is triggered, the commands within the macro are executed sequentially. Pauses may be defined within the macro if they are required. The macro associated with a GPI input can also be set to trigger a macro that was defined in the Imagestore 750 Configurator.

See Macros on page 50 for more details.

To create a GPI macro from the Imagestore 750's front panel:

- Select the appropriate GPI input event.
- Select `Setup > GPI > GPI Inputs`. Then choose `GPI In x On` or `GPI In x Off`. Here *"x"* represents the GPI number, from 0 to 15.
- ON macros are triggered when the appropriate GPI input is triggered on.
- OFF macros are triggered when the appropriate GPI input is triggered off.
- Press the joystick down [enter] to enter the macro editor.
- If the GPI is unused, the display shows '> **Empty** <'.

- Press [enter] again to access the sub-menus.
- Use the joystick arrows [◀] and [▶] to locate the first command to be added to the macro and press [enter].
- The front panel display returns to the macro list. One command is listed at this time.

To add a second command to the GPI macro:

1 Press [enter] and select whether to `Insert Before` or `Insert After` the selected command.

2 Press [enter] again to access the **Operate** sub-menus.

3 Use the joystick arrows [◀] and [▶] to locate the next command to be added to the macro and press [enter].

4 The front panel display returns to the macro command list. Now two commands are listed.

To add subsequent commands to the GPI macro:

1 Use the joystick arrows [◀] and [▶] to select the list position to which the next command should be adjacent.

2 Press [enter] and select whether to `Insert Before` or `Insert After` the selected command.

3 Press [enter] again to access the **Operate** sub-menus.

4 Use the joystick arrows [◀] and [▶] to locate the next command to be added to the macro and press [enter].

5 The front panel display returns to the macro list.

Repeat this process until the required macro is completely defined. You can add delays using the menu `Miscellaneous > GPI Delay`. The delays are defined in terms of fields (interlaced) or frames (progressive).

To delete a command from a GPI macro:

1 Select the appropriate GPI input event.

2 Select `Setup > GPI > GPI Inputs`. Then choose `GPI In x On` or `GPI In x Off`, where "*x*" represents the GPI number from 0 to 15.

3 Use the joystick arrows [◀] and [▶] to select the command to delete.

4 Press [enter] and then select **Delete**.

5 Press [enter] again to return to the macro command list. The command selected will have been removed from the list.

The appropriate macro is activated either when the connection is made (GPI On), or when it is switched off (GPI Off) relative to the ground pin on the GPI connector.

To trigger a macro associated with GPI In 1 *On* (for example), make an electrical connection between pins GPI 1 and GPI GND. To trigger a macro associated with GPI In 1 *Off*, break the electrical connection between pins GPI 1 and GPI GND.

See GPIO / LTC on page 207 for the connector pinout.

The GPI input macros defined for an Imagestore 750 are stored in `/home/params/gpi.xml`.

GPI Outputs and Events

A GPI output port can be used as an output to signal any external device according to the occurrence of an event within the Imagestore 750. The active status (on) is defined by the output being internally pulled to ground.

To configure the events that trigger GPI outputs on or off, use the Imagestore 750's front panel:

1 Select the GPI Output (ON or OFF) to configure:

2 Select `Setup > GPI > GPI Outputs`. Then choose `GPI Out x On` or `GPI Out x Off`, where "*x*" represents the GPI number from 0 to 15.

3 If the GPI is unused, the display shows '**> None <**'.

4 Use the joystick arrows [◀] and [▶] to select the event to control the GPI output port.

Events triggers can be set to a number of different good and bad states relating to:

- External reference signal.
- SDI video inputs.
- Temperature.
- Voltages.
- Power supplies.
- Fans.
- Slave connection.
- Router connection (if IS-750-Master-Control option is enabled).
- Network interface.
- Disk usage.
- A/B mixer.
- DSK fader position and fade-to-black position.
- DSK timers.
- Store loading.
- DVE modes, playing or stopped.
- EAS running or stopped.
- Audio mixing, fade to silence, voice-overs, and follow FTB setting.
- Audio loss or type change (embedded or external AES).

▲ **Note:** Appendix B presents a full list of event types.

You can also set GPI outputs on or off using the `Operate > GPI Output` front panel menu. Automation can set GPI outputs too.

The GPI output events defined for the Imagestore 750 are stored in `/home/params/gpi.xml`.

Macros

The GPI macros, introduced in General Purpose Interface (GPI) on page 47, are directly associated with the GPI connections and limited to a maximum of 32 macros (or fewer, when GPI outputs are defined).

GPI macros are also difficult to compose and are limited to actions that can be selected from the front panel's 'Operate' menu. You can find a more versatile, extensible, and user-friendly way of

creating macros in the Imagestore 750 Configurator under 'Macro Mode'. Up to 65,536 macros can be created, each of which can be named to help the iMC control panel represent macros meaningfully to a panel operator. Macros consist of a list of Oxtel automation commands, with delays being inserted using 'Xd' automation commands.

▲ For details of the Oxtel automation protocol, see the automation publications listed under Applicable Publications and Tools on page 3.

Adding Macros

Go to the drop-down list at the top right corner of the Imagestore 750 Configurator and select 'Macro Mode' to view, edit, or create a macro.

Choose `File > New` or `File > Open` to create or edit a macro file. Right-click the panel on the left side of the Imagestore 750 Configurator below the list of macros:

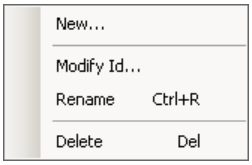


Fig. 4-10: Configurator - Macro commands

The commands are as follows:

New...	Create a new macro. A prompt will request a name for this macro.
Modify ID	Change a macro's unique ID.
Rename	Rename a macro.
Delete	Remove a macro from the list.

You can also modify the macro name and ID in the right-hand panel of the Imagestore 750 Configurator. A macro ID must be a unique integer from **0x0** to **0xFFFF**.

To edit a macro, select the macro you wish to edit from the list on the left-hand side of the Imagestore 750 Configurator. Right-click over the central (grey) panel:

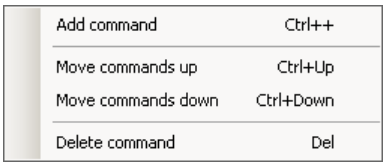


Fig. 4-11: Configurator - Macro edit commands

Choose one of the following commands.

- Add command.
- Move commands up — available only when one or more commands are selected.
- Move commands down — available only when one or more commands are selected.
- Delete command — available only when one or more commands are selected.

Add Oxtel automation commands in the "command" column. You can add descriptive comments to the "comments" column. Comments do not affect operation.

After all required macros have been created, save the file to the Imagestore 750. Use the command

`File > Save As > To Device...`

and specify the file name (`<macro preset filename>.xml`).

Next, adjust the Imagestore 750's active configuration to make use of the newly created macro preset file. In the drop-down list at the top right corner of the Imagestore 750 Configurator, select 'Configuration Mode'. Re-load the active configuration if required (`File > Open > From Device... > Active Configuration`). Under the 'System Settings' tab, choose:

`Miscellaneous > Macro`

Select the newly created macro preset file name from the 'macro preset file' list box and then save and apply the updated configuration file (File > Save and Apply Configuration). After the Imagestore 750 has restarted, all macros within the selected macro preset file will be available for use.

Triggering Macros

You can trigger macros directly in these ways:

- At the front panel using `Operate > Trigger Macro`.
- Setting a GPI input to trigger a macro. (See GPI Inputs and Macros on page 48.)
- Through automation.
- Through an iMC control panel (if the Imagestore 750 has the master control option).

Graphics Co-Processors

The Imagestore 750 can be configured for use with Miranda's *Intuition XG* (a single-channel advanced HD/SD graphics co-processor).

The Intuition XG can be regarded as a co-processor. It can generate complex output incorporating multiple objects (animations, clips, images, and text) on numerous "virtual" keying layers. These scenes can then be composited into one signal that is fed into the Imagestore 750 through the fill and key inputs and keyed as a 'Load Live' signal on any of the available keying layers. When this signal includes embedded audio, it can provide background audio or voice-over input to the Imagestore 750.

An Imagestore 750 with an Intuition XG co-processor is often called a "channel" or "channel processor" because it collectively manages all of the video signals, effects, graphics and audio processing that are output from the Imagestore 750.

When such a "channel" is being driven by Oxtel-protocol automation, it is generally recommended that the Imagestore 750 and Intuition XG co-processor to be controlled from independent serial automation links. However, the Imagestore 750 can also be placed in a mode where it receives all commands on a single automation link and then forwards selected layer-based commands to the Intuition XG co-processor over a serial or network link. This is described in more detail under Oxtel Command Forwarding to a Co-Processor, following.

When such a "channel" is being driven by Presmaster-protocol automation, there is only one serial link from automation to the Imagestore 750. Any automation commands intended for the Intuition XG co-processor are sent as "pass-through" commands.

Oxtel Command Forwarding to a Co-Processor

Refer to Serial Connection to Intuition XG on page 207 for information on connecting the Imagestore 750 and Intuition XG for command forwarding over a serial connection.

The keying layer parameter in the Oxtel automation protocol is always represented by a single zero-based ASCII character in hexadecimal. The character can range from **0x0** to **0xF**. The numbers for the four keying layers are reserved. The higher numbers are then used to address layers on the associated graphics co-processor according to the following table:

Layer Number	Co-Processor
0x0 (DSK 1)	
0x1 (DSK 2)	
0x2 (DSK 3)	
0x3 (DSK 4)	
0x4	**0x0**
0x5	**0x1**
0x6	**0x2**
0x7	**0x3**

Layer Number	Co-Processor
0x8	**0x4**
0x9	**0x5**
0xA	**0x6**
0xB	**0x7**
0xC	unused
0xD	unused
0xE	unused
0xF	unused

Table 4-15: Oxtel Command Keying layer forwarding to a Co-Processor

For example, if an Imagestore 750 receives a command to load a graphic into layer **0x4**, it will forward this command to the co-processor to load the graphic into the first keying layer. To do this the Imagestore 750 subtracts 4 from the layer value before relaying the command.

Commands forwarded by the Imagestore 750 can potentially address up to 12 keying layers on the co-processor. However, the usable range is **0x0** to **0xB** because Intuition XG supports a maximum of 8 keying layers.

Command forwarding is supported for the following Oxtel automation commands:

Cmd	Description
0	Fade To/From Black
1	Fade Keyer Up/Down
2	Cut To/From Black
3	Cut Keyer Up/Down
@	Set Fader Angle
B	Set Transition Duration
8	Load Image From Library
A	Erase Store
O	Enquire Loaded Image Status
F	Set Clip Gain Transparency
R0	Load Image
R1	Save Image

Cmd	Description
Z2	Change Text Font and Color
Z3	Render Box
Z4	Change Image
Z5	Run Strap
Z6	Set Text Background to Matte
Z7	Set Text Background to Gradient
Z8	Set Text Background to Clear
Z9	Set Text Drop Shadow
ZA	Set Transparency
ZB	Set Text Tracking
ZC	Set Strap Speed
ZD	Set Template Background

Table 4-16: Oxtel Commands supported by Command Forwarding

Cmd	Description
R3	Enquire File Information
Rm	Image Load Mode
RA	Validate template
S0	Start Animation
S1	Stop Animation
S2	Select Animation Frame
S4	Restart Animation
Y6	Enable Video Tallies
Z0	Update Text Field
Z1	Change Box Size and Position

Cmd	Description
ZE	Set Text Alignment
ZF	Set Text Wrapping
Zd	Text Box Update
Ze	Image Update
Zg	Pause/Restart Animation
m0	Set Global Datasource Value
m1	Delete Global Datasource
m2	Set Layer-Specific Datasource Value
m3	Delete Layer-Specific Datasource
m8	Delete All Datasources

Table 4-16: Oxtel Commands supported by Command Forwarding

▲ **Note:** Some of the commands listed above are not supported by the Intuition XG, but are included to support alternative (legacy) slave devices.

To configure an Imagestore 750 to forward commands onto a graphics co-processor, connect a serial link between the Imagestore 750 and the co-processor. Set the protocol and Baud rate for the serial port as follows:

- `Setup > Serial Comms > Serial Ports > COM x > Protocol > Oxtel Slave`
- `Setup > Serial Comms > Serial Ports > COM x > Baud Rate > 19200` (e.g., for Intuition-XG).

For the Imagestore 750 to know what is on the Intuition XG's program and cue, the Imagestore 750 must be set to get the "correct" tallies from the Intuition XG. To do this, configure:

`Setup > Slave > Slave Type > Int-XG`

Note that the Imagestore 750 also has the ability to control a co-processor over a network. This can be set up in the 'slave' section of the Imagestore 750 Configurator or using the Imagestore 750's front panel **Setup** menu.

Automatic Keyer Management

Automatic keyer management options can be used in conjunction with command forwarding to simplify the control of Imagestore 750 and graphics co-processor keying layers.

Whenever the Imagestore 750 receives a command from automation to cut up a layer on the co-processor, the automatic keyer management options permit a 'Load Live' to occur with the associated keying layer on the Imagestore 750 being cut up automatically. Also, if automation cuts down all co-processor layers, the Imagestore 750 can cut down the associated keying layer and turn off 'Load Live'.

Set up the automatic keyer management options in the Imagestore 750 Configurator or using the following front panel menu options:

- `Setup > Slave > Keyer Assign`

  Assigns automatic keyer management to one keying layer of the Imagestore 750.
- `Setup > Slave > Keyer Follow Up`

Defines whether the assigned keyer of the Imagestore 750 is cut up automatically when there is some keyer activity on the co-processor layers.

- `Setup > Slave > Keyer Follow Down`

  Defines whether the assigned keyer of the Imagestore 750 is cut down automatically when there is no keyer activity on the co-processor layers.

- `Setup > Slave > Fill&Key Input`

  Determines which external fill and key pair is routed to the assigned keyer for automatic keyer management.

The status of the co-processor layers controlled by command forwarding can be monitored from the `Setup > Slave > Keyer Status` front panel menu.

▲ **Note:** Automatic keyer management works correctly only when used in conjunction with command forwarding. This is because the Imagestore 750 maintains the layer status (including keyer arm states) of the graphics co-processor based on the automation commands it forwards to the co-processor and the tallies that it receives from the co-processor as the status of its layers changes. The Imagestore 750 always uses tallies from the co-processor to determine exactly when slave layers cut down because they often contain out-transitions of indeterminate duration.

In the master control environment, we recommend that 'Keyer Follow Up' be disabled so that Intuition XG graphics can be previewed by iMC panel users without automatically appearing on-air. Automation then must be responsible for cutting up the appropriate assigned DSK with Intuition XG layers.

Example

Following is an example of automation cutting up two layers on a graphics co-processor by using command forwarding through an Imagestore 750 with the following settings:

Default Keyer Assign	DSK 1 (which is initially cut down)
Keyer Follow Up	Enabled
Keyer Follow Down	Enabled
Fill & Key Input	Fill-1/Key-1

1 Cut up one co-processor layer '34 1'.

The Imagestore 750 maps the command '34 1' to '30 1' and forwards it to the co-processor.

The co-processor cuts up its first layer.

The Imagestore 750 performs 'Load Live' on DSK 1 using Fill-1/Key-1.

The Imagestore 750 cuts up its own DSK 1.

The co-processor output is now visible.

2 Cut up another co-processor layer '36 1'.

The Imagestore 750 maps the command '36 1' to '32 1' and forwards it to the co-processor.

The co-processor cuts up its third layer.

The Imagestore 750 does nothing with its own keying layers.

3 Cut down one of the co-processor layers '34 0'.

The Imagestore 750 maps the command '34 0' to '30 0' and forwards it to the co-processor.

The co-processor completes any out-transitions and then cuts down its first layer.

The Imagestore 750 receives a '30 0' tally command from the co-processor, but does nothing with its own keying layers because there is still one co-processor layer active.

4 Cut down the final visible layer of the co-processor '36 0'.

The Imagestore 750 maps the command '6 0' to '32 0' and forwards it to the co-processor.

The co-processor completes any out-transitions and then cuts down its third layer.

The Imagestore 750 receives a '32 0' tally command from the co-processor, and then cuts down DSK 1 because there are no co-processor layers active.

Note that 'Default Keyer Assign' can be cut down (or up) at any point to override the automatic keyer management.

- In the master control environment, we recommend that 'Keyer Follow Up' be disabled so that Intuition XG graphics can be previewed by iMC panel users without automatically appearing on-air. Automation then must be responsible for cutting up the assigned DSK with Intuition XG layers.

Closed Captions

Closed caption information is usually passed through the Imagestore 750 regardless of what the closed caption option is. The reason for the option is that when the standard is set as NTSC (525), closed caption information is found within the active picture (lines 20 and 21), and it will be destroyed when graphics are keyed over these lines.

When the closed caption option is enabled (`Setup > Miscellaneous > Closed Cap` at the front panel menu), the Imagestore 750 ensures that the close caption information is preserved regardless of keyed graphics being present on lines 20 and 21. Disabling the option instructs the keyers and mixers to treat these lines as part of the active picture so that they may be mixed with the key.

For HD, closed caption information is contained in vertical ancillary data (VANC) on line 9, which is outside the active picture. Because this information is never processed by the keyers, the closed caption information is preserved, regardless of the option selected.

Please note that when an SDI picture is routed to a DVE, the closed caption information might be visible at the top of the DVE window. To avoid this problem, we recommend that all DVE sequences be cropped by 2.5% at the top to remove this undesirable effect.

Timecode

The following timecode formats are supported by the Imagestore 750:

- Linear (or longitudinal) timecode (LTC).

  Received on the GPI/LTC port (or its 44-pin terminal block adaptor). (See GPIO / LTC on page 207.)

  Supports dropframe and non-dropframe.

  Supports forward and backward directions.

- Vertical interval timecode (VITC).

  Received from the external reference.

  Supports dropframe and non-dropframe.

When it is physically connected and activated, the LTC or VITC timecode source is used to adjust the internal clock once per minute. When a timecode source is not connected, an NTP server can be used to update the system clock periodically. Alternatively, the internal clock will free run.

Timecode source, timecode status, and clock time can be viewed using the `Setup > Timecode` front panel menu.

Message Logging

The Imagestore 750 generates message logs to record warnings and errors during operation, and (optionally) to record commands received from automation. The message log file can help diagnose a range of different issues, from invalid parameters in automation commands to hardware faults.

The Imagestore 750 maintains two message log files:

- The file **messages** records log messages since the Imagestore 750 was powered on.
- The file **messages.old** records log messages for the previous powered session, in case the Imagestore 750 was restarted after a failure.

Message logs can be downloaded from the Imagestore 750 web page as described in System Information on page 179.

Logging Level

Set the logging level using `Setup > Logging > Logging Level` at the front panel menu. The possible options are:

Logging Level	Description
Errors Only	Reports errors, including automation commands that were invalid when received. No valid automation commands are logged in this mode.
Media/Keying	Records all valid media and keying activity (in addition to errors). This provides a full audit of graphics that have appeared on-air.
Verbose	Provides a full record of all automation commands received by the Imagestore 750, whether valid or not.
Verbose+OxSox	Provides a full record of all Oxtel automation and OxSox commands received by the Imagestore 750, whether valid or not.

Table 4-17: Imagestore 750 Logging Levels

External Logging

Set the IP address of an external logging server using `Setup > Logging > Logging Server` at the front panel menu. This allows a remote syslog[2] server to be set up, permitting log files to be logged externally.

Setting up a syslog server is well-documented on the Internet; however Miranda Customer Support can also provide details.

2. "Syslog" is a standard for forwarding log messages in an IP network.

Local Logging

You can enable or disable local logging to the hard disk or solid-state data storage using `Setup > Logging > Local Logging` at the front panel menu. Disabling local logging writes the message log to a (volatile) RAM disk thereby reducing wear to the internal hard disk or solid-state storage. When the Imagestore 750 is restarted or shut down safely from the front panel, the volatile message log is automatically copied into physical storage for future reference.

Note: When local logging is disabled, the message log will be lost if you restart the Imagestore 750 by pulling out the power cable.

System Configuration

- See Chapter 8 for complete details regarding the Imagestore 750 Configurator.

Different Imagestore 750 system configurations can be created for different applications. For example, the Imagestore 750 can be switched between different video standards if you create two configurations and then import the appropriate configuration file when a change is required. You can use the Imagestore 750 Configurator, or the front panel's 'User Presets' menu to do this.

- **Note:** A device restart is required after a new configuration is imported, so updates cannot be made while on-air.

System configurations may also be transferred between Imagestore 750's during commissioning to ensure consistency of state between them. This is most easily achieved using the Imagestore 750 Configurator. After an import, all settings within the selected configuration file are validated against the capabilities of the new Imagestore 750 to ensure that differences in hardware or options are handled correctly.

Please refer to the following sections for more information on the main system configuration:

Configuration Mode page 156
Saving a Configuration page 175
Importing a Configuration page 175

Video Bypass

In the event of power loss to the Imagestore 750, or failure of both internal power supplies, the mechanical video relay bypass routes 'A In' (as a background signal) directly to the program output (PGM OUT) and routes 'C In' to preview output (PVW OUT).

(The relays switch to the bypass position when powered off.)

This feature is an emergency failsafe and is completely non-synchronous in operation. During boot-up, the bypass is maintained until the Imagestore 750 is fully operational. At switch-over, a glitch in the video is to be expected. (A jump in video and audio might also occur if delays are applied under normal operation.)

5 Master Control

Chapter 5 presents information regarding the Imagestore 750's master control option.

Topics

Overview

Miranda's iMC master control system has many modular parts and provides many options. You can order a master control system that is optimal for your facility. It can change with your needs.

The Imagestore 750's master control option (**IS-750-Master-Control**) gives you a powerful master control switching and branding system designed specifically for automated, multi-channel environments. The Imagestore 750 controls upstream router switching through a Miranda NV9000 router control system, and interfaces with Miranda's iMC control panels which allow manual preview and override of channels.

At the heart of a master control system are transition processors: MCEs and Imagestore 750s. MCEs reside in NV5100MC frames; the Imagestore 750 stands by itself as a 1RU processor. The iMC system can be composed 3 ways:

1 Imagestore 750s transition processors (a.k.a. "channel branding processors"), an NV9000 router control system, and iMC control panels.

   The Imagestore 750s can be used with Intuition XG graphics processors for advanced graphics effects.

2 MCEs (master control engines) residing in NV5100MC frames, control panels, and optionally an NV9000 router control system.

   The MCEs can also be used with Intuition XG graphics processors for advanced graphics effects.

3 A combination of 1 and 2.

Each channel processor provides the output for a single broadcast channel (or backup channel) by taking video (with embedded audio) signals from an upstream router, mixing signals and superimposing graphics that brand the channel.

Imagestore 750s always control the upstream router sources through an NV9000 router control system and the router(s) in turn provides the video and audio inputs to the Imagestore 750s.

Panel users can acquire and control both Imagestore 750s or MCEs with an iMC control panel. Existing broadcast facilities equipped with MCEs can be expanded by adding Imagestore 750s to create a hybrid master control system.

The following iMC control panels support Imagestore 750s and MCEs:

- iMC-Panel-300

  A large panel with a large touchscreen, function buttons, control knobs and joystick.

  Its main function buttons rows have 24 buttons.

- iMC-Panel-200

  A medium-size panel with a large touchscreen, function buttons, control knobs and joystick.

  Its main function buttons rows have 16 buttons.

- iMC-Panel-100 (supported in later IS-750 software version)

  A two-part panel with large touchscreen, function buttons, and control knobs.

  One part is a slim, light-weight, 3RU rack-mountable button panel. The other part is a VGA monitor. The VGA monitor can be a touchscreen. If it is not, it is operated with a mouse.

  Its function buttons rows are 16 buttons wide.

- iMC-Panel-GUI

  A software panel (i.e., GUI) with large menu area, function buttons, and other controls.

  It emulates the iMC-Panel-200.

For more information, please refer to any of the iMC panel user's guides listed under Applicable Publications and Tools on page 3.

▲ **Note:** MCE-based channel processors are outside the scope of this manual. Please refer to the MCE publications Applicable Publications and Tools on page 3 for details of the MCE features, configuration and operation.

Devices

Without further consideration of MCEs, these are the components of a master control system that incorporates Imagestore 750s. Here, the NV9000 system is a requirement:

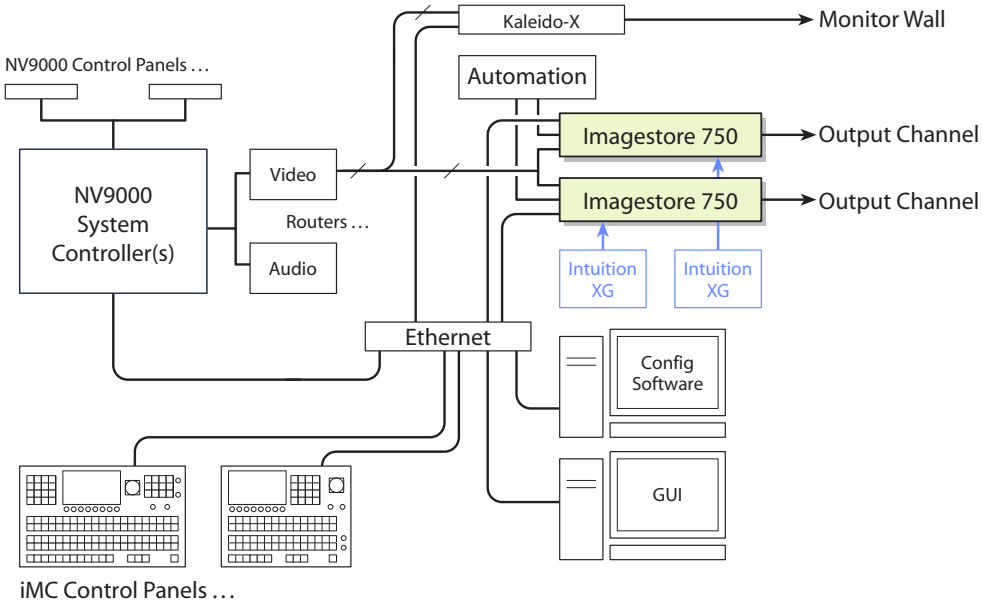


Fig. 5-1: Master Control Devices diagram

he Imagestore 750s communicate with the following devices:

- Miranda iMC master control panels over an Ethernet LAN.
- Miranda NV9000 router controller over an Ethernet LAN.
- Automation.

  The automation connection can use Miranda's Presmaster serial protocol or it can use Miranda's Oxtel protocol serially or over Ethernet.
- Miranda Intuition XG serially or over Ethernet.

Features

A master control system includes:

- Router control system.

  An NV9000 router control system that switches a router as required by the Imagestore 750.

  Configuration of router sources, source groups and salvos for each channel.

  Automatic retrieval of source names from the NV9000 system with channel-specific source name overrides.

  Selectable router sources for program, preset and aux buses.
- Transition processor(s).

  Switching and mixing of input sources to contribute to the broadcast channel's output.

  Hot-cut transitions on the program bus for video source, keyers, DVE moves, voice-overs and macros.

Armable transitions for A/B mixing, keyer cuts/fades, DVE moves, voice-overs and macros.

Arm and take capability for synchronizing an overall transition, with preview of the upcoming video and audio on preset (a.k.a. preview) output.

Configurable wide-audio shuffles with individual channel gains saved for each source.

- Channel branding.

  Full integration with Intuition XG to provide advanced graphics effects.

  Internal graphics generation on four keying layers for still images, animations, text "straps" and clocks.

  Single- or dual-window 2D DVEs for squeeze-and-reveal and picture-in-picture effects.

  Independent control of graphics keying and DVE moves on program and preview.

- Control panels.

  iMC control panels that allow manual preview and override of channels with an acquisition time of under 3 seconds.

  Support for multiple panel users using a mixture of hardware and software control panels.

  Configurable channel acquisition privileges (permissions) for different panel users.

  Panels that control channel settings including automation on/off, source selection (on the program, preset, and aux buses), hot-cuts, and arm/take transitions.

  Browsing of graphics and audio files using thumbnail proxies, editing of source groups and audio configuration.

  Option to show the current source at all times (even when the source selection is not in the active source group).

  Globally active source group shared between panels.

- Monitoring.

  Audio level metering.

  Selectable video and audio outputs on preview, clean-feed, and monitor outputs.

  Dynamic monitor wall updates on channel changes for viewing all channel inputs and outputs.

- Automation.

  Support for Presmaster automation protocol.

  Support for Oxtel automation protocol.

Imagestore 750 Configuration Overview

The Imagestore 750's master control option adds additional capabilities to the Imagestore 750's software architecture which must be configured correctly if all of the devices in the master control system are to communicate with one another successfully.

These are the aspects of Imagestore 750 configuration that relate specifically to master control:

- NV9000's IP address.
- Channel sources
- Source groups.
- Router salvos

- Router destinations
- Router sources.
- Intuition XG graphics co-processor providing fill and key signals.
- Channel acquisition and ownership.
- Monitor wall (optional).

Version 1.5, or later, of the Imagestore 750 Configurator is required if you are to support these features.

Configuration of the Imagestore 750's master control option is described in the following sections and partially involves other components of the iMC master control system (e.g., the NV9000 router control system and the iMC panels). These other components are mentioned where they are part of the steps of Imagestore 750 configuration.

NV9000's IP Address

The IP address of the NV9000 router control system is an essential part of the Imagestore 750 configuration. Without it, the software cannot configure the sources, destinations and salvos for the router and the Imagestore 750 cannot function in the master control system. The IP address may be a physical IP address (if you have a stand-alone NV9000 system controller), or a "virtual" IP address (when you have a redundant pair of NV9000s).

Note: This document does not address the configuration of the NV9000 router control system. Please refer to the NV9000 documentation, specifically the *NV9000-SE Utilities Users Guide,* listed under Applicable Publications and Tools on page 3.

Channel Sources

Routers come in many different sizes, from a very few to thousands of sources and destinations.

A channel processor might require access to video signals from all of the available router sources, or (for large routers) a subset of them. The Imagestore 750's master control configuration allows the required router sources to be included in a list known as the *channel sources*. These sources are made available for the channel processor to use.

The names (e.g., VTR 23) of channel sources are automatically retrieved from the NV9000 router control system. The NV9000's source name can be overridden (mapped) in the Imagestore 750 master control configuration by locally defined names. These source names allow iMC control panels to represent router sources in human-readable form on button legends.

▲ The names of channel sources must be ASCII.

Within the master control configuration, you can define audio gain and audio shuffle presets for each channel source. These allow each source to be independently gain-adjusted or shuffle-adjusted to compensate for any upstream audio faults or peculiarities.

Channel sources are updated dynamically following any changes to the router sources in the NV9000 router control system. When the name of a router source changes in the NV9000, the equivalent channel source name is automatically updated on an iMC panel (assuming it was not overridden with a locally defined name). When a router source is deleted from the NV9000, it is still visible on the iMC panel but can no longer be selected. If new router sources are added to the NV9000, they will not be seen at the iMC panel because they are not available in one of the pre-defined source groups.

Source Groups

A source group is a set of sources chosen from all of the available channel sources. They allow iMC panel operators to select between different groups of sources using 'Group Select' buttons. When a source group button is pressed, the sources included in that group are mapped onto the program, preset, and aux buttons of the panel.

The Imagestore 750's master control configuration allows the definition of any number of source groups. The number of entries in each source group is generally chosen to equal the number of panel buttons allocated for sources on the iMC control panel. When a broadcast facility has a mixture of different panel sizes, you can configure source groups of different sizes for use with the appropriate panels. (A source group can have up to 24 entries because the maximum number of source buttons on any panel is 24.)

Sources can be included multiple times within a source group, and the same source can also be used in multiple source groups. For example, the main network feeds can be placed on the left-most 2 buttons of every source group to make them easier to select in an emergency. There can also be gaps within source groups. Where a source group has gaps in it, the source buttons on the iMC panel are disabled and darkened. Pressing a disabled source button does nothing.

- The names of source groups must be ASCII.

Router Salvos

A salvo is a sequence of router control commands — defined in the NV9000 router control system — that will execute, in order, when the salvo is invoked either by a button press or a channel change at a panel. Salvos can be used by iMC panels during a channel acquisition to route the Imagestore 750's outputs to a monitor wall, or to perform other custom monitoring tasks when the user presses a 'Salvo' button on the iMC panel.

Note: Salvos must be defined in the NV9000 configuration software, which is outside the scope of this document. Please refer to the NV9000 documentation, specifically the *NV9000-SE Utilities Users Guide,* listed under Applicable Publications and Tools on page 3.

Router Destinations (Feeding Program and Preset Inputs)

In the iMC master control system, a **router destination** is synonymous with an output (from the router) and a **router source** is synonymous with an input (to the router).

Router destinations and sources are set up during configuration of the NV9000 Router Controller and each may comprise one or more feeds.

A router's function is to connect its sources to its destinations.

The Imagestore 750's settings for router destinations identify the NV9000's router destinations that feed its program and preset inputs. The program bus receives input at the A IN connector. The preset (a.k.a. preview) bus receives input at the B IN connector. The settings represent physical connections between the router and the Imagestore 750.

As a panel operator selects a video source on the program or preset bus of the panel, the Imagestore 750 issues commands to the NV9000 system controller to perform appropriate source switches. Pressing a program source button performs a "hot-cut" of the video source on the channel processor's program bus. Pressing a preset source button changes the video source on the channel processor's preset bus showing the source to which the A/B mixer will next transition. All source switches in the router are tallied back to all iMC control panels that own the channel.

Router Destination (Feeding AUX)

This is a setting that identifies the NV9000 router destination that feeds an auxiliary device such as a waveform monitor. The setting represents a physical connection between the router and the auxiliary device.

As a panel operator selects a video source on the aux bus, the Imagestore 750 issues commands to the NV9000 system controller to perform appropriate auxiliary source switches. In that way, the panel operator controlling an Imagestore 750 has an "extra" set of controls (i.e., the aux buttons) with which to view sources on a monitor, or to route sources to some other device for another purpose. All source switches are tallied back to all iMC control panels that own the channel.

Router Sources (Fed by PGM, PST, CLN, and MON Outputs)

▲ **Note:** See the definitions of router sources and definitions under Router Destinations (Feeding Program and Preset Inputs) above.

These settings identify the NV9000 router sources that are fed by the Imagestore 750's program, preview, clean-feed, and monitor outputs. Connections to these sources allow the NV9000 system to route the Imagestore 750's outputs to a local monitor wall.

These settings represent physical connections between the Imagestore 750 and router. Consequently unique sets of sources must be defined for every Imagestore 750 within the Master Control system.

Router Source (Fed by BLACK/SILENCE)

This setting identifies the NV9000 router source that corresponds to black/silence in a video standard that is appropriate for this channel processor. The source allows the NV9000 system to route black/silence to the local monitor wall when gaps appear within the current source group.

Router Source (Fed by USER 1-20)

These 20 settings identify the NV9000 router sources corresponding to custom-defined sources for this Imagestore 750. Such sources can be used to route outputs from a backup channel processor to the local monitor wall, or to view "mirrored" HD/SD channel processors in parallel.

Graphics Co-Processor Feeding Fill and Key

The Intuition XG co-processor (also known as the "slave" device) provides advanced graphics to the Imagestore 750 using one of the 3 available external fill and key inputs. The graphics are then keyed onto the video background signal using any of the 4 available keyers (DSKs). The fill provides the graphics signal, and the key provides the transparency.

You can use the Imagestore 750 configurator to identify which external fill and key inputs receive signals from the Intuition XG. The configuration also specifies to which DSK layer external graphics are assigned and specifies the automatic keying behavior of the assigned DSK as Intuition XG layers cut up and down.

You should also configure the system to allow slave layer states and other system information to be communicated between the Imagestore 750 and the Intuition XG. This can be done over an RS-232 serial connection or over Ethernet.

Channel Acquisition and Ownership

A typical broadcast environment will include multiple channel processors and multiple iMC panels.

Sometimes each channel processor has a dedicated control panel, perhaps with a “super-user” panel operator who is able to take over control of channels in emergencies. Alternatively, panel operators may be responsible for monitoring and controlling several different channels. Flexible arbitration of channel ownership between different panels is therefore provided for master control environments.

The iMC panels have 4 channel acquisition methods (grab, drop, kick, share) to establish ownership of Imagestore 750 channel processors:

- “Grab” — acquire ownership of a channel. A grab can succeed only if the channel is not already owned by another panel or shared by other panels.
- “Drop” — release ownership of a channel. This method places the panel in a “no channel” state.
- “Kick” — force the current channel owner(s) to drop a channel. The success of this command depends on relative panel permissions and the ‘allow kick’ setting of the owning panel.
- “Share” — acquire *joint* ownership of a channel that is already owned by one or more panels. The success of this command depends on the ‘allows sharing’ settings of the panels.

Channels can be owned by one panel, or shared by multiple panels if channel sharing is enabled. When a panel already has ownership of a channel, other panels can attempt to kick-off the owning panel to gain sole ownership for themselves. Alternatively, they can attempt to share ownership with the current owner.

A flexible set of panel and channel ownership privileges and permissions allow for the many possible permutations of panel setups at different broadcast facilities.

Each iMC panel is configured with (1) an ownership permission level, (2) rules for being kicked and (3) rules for allowing channel sharing with other panels. Imagestore 750s can also impose kick and share behavior on panels that want to control them based on relative permission levels. This gives a flexible mixture of channel ownership models for different users.

Please see Panel Permissions Configuration on page 91 for further details on channel ownership permissions and other settings.

Monitor Wall

Usually there is a dedicated monitor wall for every iMC panel. This monitor wall is used to view the sources and the channel outputs that are relevant to the local panel.

When a panel acquires a channel, it causes the NV9000 system to make the appropriate router switches so that its local monitor wall shows the appropriate Imagestore 750 outputs (program, preset, clean-feed, and monitor), the current aux bus selection, and all of the sources within the panel’s currently selected source group. This gives the panel operator a complete view of the on-air channel output, any upcoming transitions, and all alternative sources.

Use the *MCS Panel Configuration Editor* to identify the router destinations that feed the local monitor wall. The router destinations physically connected to the monitor wall.

Monitoring of the channel outputs (program, preset, clean-feed, and monitor) can be achieved in two different ways:

- When a panel acquires a channel, it causes the NV9000 system to make appropriate router switches from the sources being fed by the channel outputs to the monitor wall destinations.

  This is the preferred method despite its requiring configuration of both the Imagestore 750 and iMC panel(s). (See Router Sources on page 85 and Monitor Wall Configuration on page 95.)
- When a panel acquires a channel, it can fire a "channel acquisition salvo" for the channel/panel combination to make the appropriate router switches for the monitor wall. The disadvantage with using salvos is that every existing panel configuration must be updated when new channels are added to the broadcast facility.

See Applicable Publications and Tools on page 3 for information about software tools.

Hardware Connections

Installing the Imagestore 750 and configuring it to operate with an NV9000 system and iMC control panels is relatively simple if you complete a few specific (and simple) tasks.

Cable Connections

Installing the Imagestore 750 master control system involves making cable connections and describing those connections in NV9000-SE Utilities, in the Imagestore 750 Configurator, and in various iMC control panel configurations. These are the basic connections:

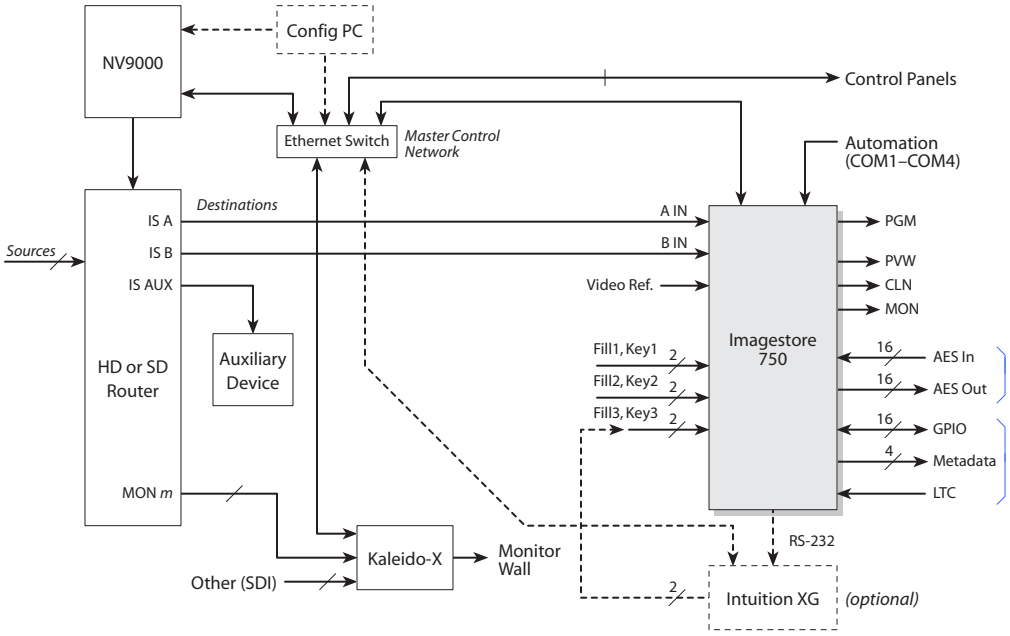


Fig. 5-2: Master Control System - Cable Connections

The NV9000 system controls an NVISION series digital video router (such as an NV8576 or CR3232-HD). The router provides signals that are controlled by the Imagestore 750. The Imagestore 750 receives commands from automation and master control panels and relays those

commands to the NV9000 whereupon the NV9000 switches sources to the destinations of interest.

Two of the router destinations must connect directly to the Imagestore 750. The other destinations related to the Imagestore 750 connect to other equipment.

Cable connections are required for each of the following system components:

- Digital video router (with support for embedded audio).
- NV9000 router control system.
- Imagestore 750 with optional Intuition XG graphics co-processor.
- Automation.
- iMC panel(s).
- Monitor wall(s).
- Configuration PC.

Note: When you are cabling a channel, please refer to individual documentation for these system components.

Video Connections

Note: the Imagestore 750's video connectors are 75W BNCs.

The following video connections must be made when configuring a master control system:

- Connect two of the router's destinations directly to the Imagestore 750, one to the A input and one to the B input. A third router destination connects to an auxiliary device.

  It is possible to connect the router's aux destination directly to the Imagestore 750's C input which is directed internally to the Imagestore 750's clean feed or monitor output, if extra audio processing is required. However, doing this prevents multiple Imagestore 750s from sharing an auxiliary device.
- If multiple Imagestore 750s are to share a monitor wall, feed the Imagestore 750's program, preset, clean-feed, and monitor outputs into the router, as sources, so that they can be used by the monitor wall.
- Make video connections between the router and monitor wall(s). The number of connections depends on your system monitoring requirements, the number of monitor walls, and the number of control panels. There will normally be 4 for the outputs of each Imagestore 750, plus the a number of connections equal to the size of the largest source group for all panels. An additional connection would be required if you want aux output to appear on the monitor wall.

  It is typical for a master control system to have one monitor wall for each control panel. That is not a requirement. In any case, the number of connections to any single monitor wall remains fixed no matter how many channels or panels are present in the system.
- If your Imagestore 750 uses an Intuition XG co-processor, connect the Intuition XG's fill and key outputs to one of the fill/key input pairs of the Imagestore 750.

Network Connections

Follow these steps to make network connections:

NV9000

1 Using the NV9000's *master control* network port, connect the NV9000 to the master control network switch. Assign an IP address to the NV9000's master control network port. (See Applicable Publications and Tools on page 3.)

The default IP address is 192.168.7.201 for the primary NV9000's master control network and 192.168.7.202 for the secondary's.

If you prefer not to change the NV9000's master control address, make all other IP addresses on the master control network part of the 192.168.7.xxx subnet.

▲ Your NV9000 might have been defined with a virtual IP address. It is preferable to use the virtual IP address if it has one.

Imagestore 750

2 Connect the Imagestore 750 to master control's Ethernet switch using Ethernet cable. You can use either of the two LAN ports on the Imagestore 750.

3 Assign an IP address to the Imagestore 750.

Use the front panel menu (`Setup > Network > IP Address`).

The IP address must belong to the master control subnet. If necessary assign a gateway address using the front panel menu (`Setup > Network > Gateway Add`).

4 Repeat steps 2 to 4 for additional Imagestore 750s.

Intuition XG

5 Connect the Intuition XG to the master control Ethernet switch using Ethernet cable.

Assign an IP address to the Intuition XG. (Refer to the Intuition XG publications listed under Applicable Publications and Tools on page 3.)

The IP address must belong to the master control subnet. If necessary, assign a gateway address.

Repeat this step for additional Intuition XG co-processors, always selecting unique IP addresses.

iMC Panels

6 Connect the iMC panel to the master control Ethernet switch using Ethernet cable.

Assign an IP address to the iMC panel using its touch screen (`Panel Settings > IP Setup > Change IP`). The IP address must belong to the master control subnet. If necessary, assign a gateway address.

Repeat this step for additional iMC panels, always selecting unique IP addresses.

Configuration PC

7 Connect a configuration PC to the master control switch and give it an appropriate IP address on the master control subnet. Also connect a configuration PC to the NV9000 at its house network port (again with an appropriate IP address). You can use the same PC for both networks.

At this point, if you have the requisite configuration software installed, it is possible to configure the Imagestore 750(s), the NV9000, and your control panels.

There are various network-related settings that must be configured for master control. These are covered in following sections.

Serial Connections

Note: It is important for serial port settings to be correct at both ends of a serial connection.

Serial Connection to Automation

The Imagestore 750 connects to automation (Presmaster protocol) using an RS-422 serial cable. The Imagestore 750 requires an RJ45 connector at its chosen serial port (COM1– COM4). The following serial port settings are normally recommended between automation and the Imagestore 750:

Baud rate	57600
Serial protocol	Presmaster automation
Serial standard	RS-422
Serial port parity	True

Please refer to the automation system's installation guide for information about configuring its serial ports. See Applicable Publications and Tools on page 3.

Serial Connection to Intuition XG

Imagestore 750 normally controls the Intuition XG graphics co-processor using an RS-232 serial cable (although Ethernet control can be used if there are no available serial ports). The following serial port settings are normally recommended between the Imagestore 750 and Intuition XG for command forwarding:

Baud rate	19200
Serial protocol	Oxtel slave
Serial standard	RS-232

Note: Refer to Serial Connection to Intuition XG on page 207 for details of how to connect RS-232 serial between Imagestore 750 and Intuition XG. Note: Please refer to Applicable Publications and Tools on page 3 for information on how to configure the Intuition XG serial port

Software Configuration

- The **IS-750-Master-Control** licence option must be enabled for the Imagestore 750 to operate in the iMC master control system.
- The master control software configuration described in this section should be carried out in the order presented.
- Imagestore 750 configuration settings should be applied using the Imagestore 750 Configurator, unless otherwise stated. All changes made within the Imagestore 750 Configurator must be applied by selecting `File > Save and Apply Configuration...`.

  The Imagestore 750 must be restarted before your settings take effect. See Managing Configurations on page 175 for how to restart the Imagestore 750.

Software Versions

The following software versions are required for the hardware devices:

Hardware Device	Software Version
Imagestore 750	4.4.0
NV9000	6.0.9
iMC panels	7.2.0.0

Table 5-1: Master Control - Hardware Devices Software Versions

The following software versions are required for the configuration applications:

Application	Software Version
Imagestore 750 Configurator	1.5
NV9000-SE Utilities	6.0.9
MCS Panel Configuration Editor	7.1.0.0

Table 5-2: Master Control - Configuration Applications

The Imagestore 750 configuration steps in the following sections refer to the respective hardware device's configuration applications, as required.

Router Connections

Please see Imagestore 750 Configuration Overview on page 62 for an introduction.

First, an NV9000 router controller must already have been set up with valid sources and destinations appropriate for your master control system. Please refer to the *NV9000-SE Utilities Guide* and to the *iMC Master Control Installation Guide*. (See Applicable Publications and Tools on page 3.)

Next, establish a network connection to the NV9000 using the Imagestore 750 Configurator.

Open the Imagestore 750 Configurator, and either create a new configuration or open an existing configuration as described in Configuration Mode on page 156.

Choose 'Configuration Mode' in the top right drop-down menu. Then, choose the 'System Settings' tab and open the 'Master Control' branch of the navigation tree at the left:

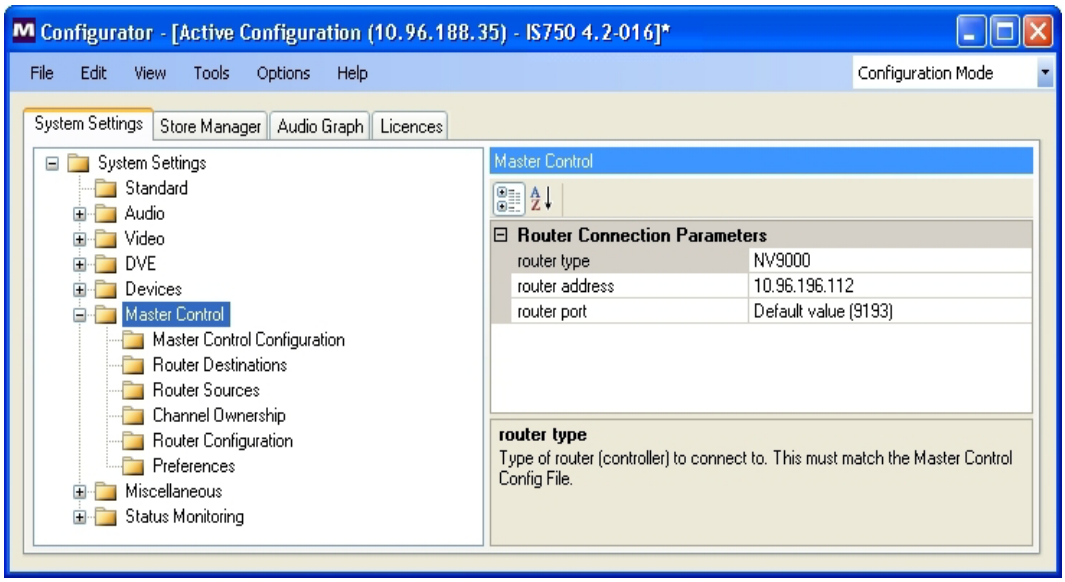


Fig. 5-3: Imagestore Configurator - Master Control section

1 Specify the router type as NV9000.

2 Enter the IP address on the 'router address' field.

This can be a physical IP address (if you have a stand-alone NV9000 system), or a "virtual" IP address (when you have a redundant NV9000 system). Refer to the *NV9000-SE Utilities Users Guide*.

3 Leave the 'router port' field as its default.

4 Save and apply the configuration, and wait for the Imagestore 750 to restart.

5 During restart, the Imagestore 750 reads pertinent configuration data from the NV9000.

6 Choose `File > Open` and select the Imagestore 750 by its IP address.

7 From the list of all Imagestore 750 configurations, select 'Active Configuration' and click OK.

8 Master Control system settings (from the NV9000) are now available to the Imagestore 750 Configurator

It is important to complete these steps before proceeding with other configuration tasks. The configurator cannot perform certain functions without knowing the NV9000's IP address.

Master Control Configuration

- Please see Channel Sources on page 63 and Source Groups on page 64 for an overview.
- Before a master control configuration file can be created, router sources must have been defined on the NV9000. Please refer to the *NV9000-SE Utilities Users Guide*. (See Applicable Publications and Tools on page 3.)

The master control configuration file defines channel sources and source groups that the channel processor will be able to control and the owning iMC panel(s) will be able to represent

on the PGM, PST and AUX buses. The file is stored on the Imagestore 750 separately to the main Imagestore 750 configuration, but is referenced by it.

The following sections describe how to create and edit a master control configuration. You can reopen existing master control configurations to revise them at any time using 'File > Open > From Device…'.

Note: The master control configuration file can be shared between different Imagestore 750 devices if the same sources and source groups are common to each channel processor.

Channel Sources Configuration

Choose 'Master Control Mode' in the top right drop-down menu:

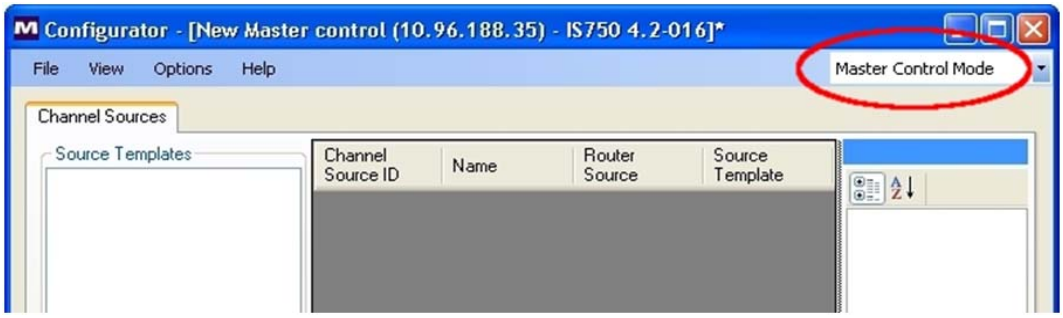


Fig. 5-4: Imagestore Configurator - Master Control Mode

Then choose 'New' from the 'File' menu. Specify the IP address of the Imagestore 750:

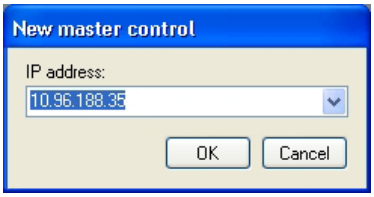


Fig. 5-5: Imagestore Configurator - Specify IP address

When you have done so, a list of NV9000 sources appears:

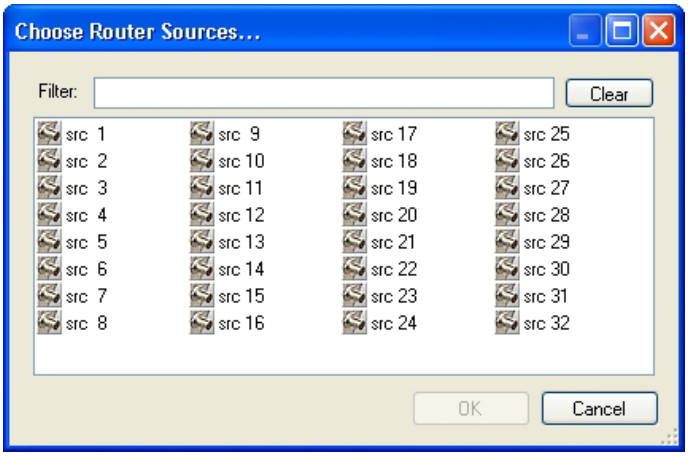


Fig. 5-6: Imagestore Configurator - Available NV9000 sources

Select some or all of the sources that apply to this Imagestore 750. You can revise the list at any later time.

Save the configuration using the 'Save' or 'Save As' command from the 'File' menu.

The chosen sources now appear in the 'Channel Sources' view:

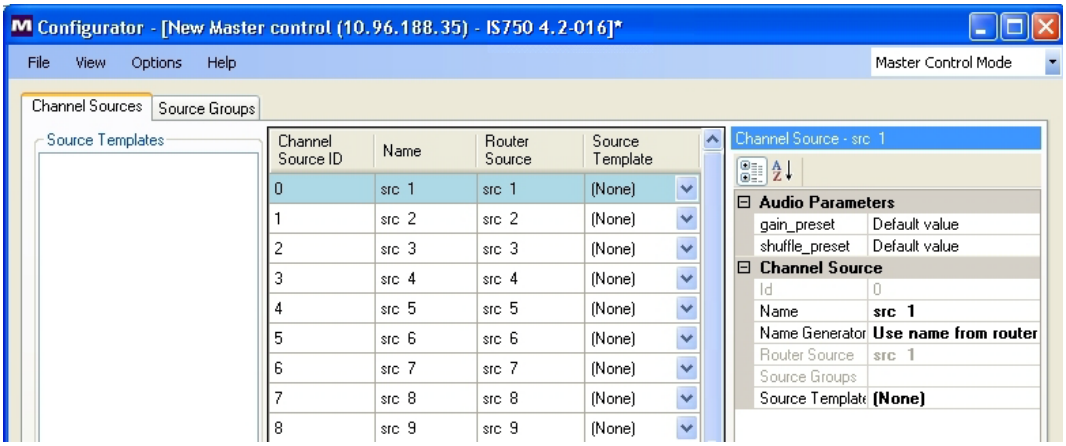


Fig. 5-7: Imagestore Configurator - Channel Sources view

Source names allow iMC panels to represent the router sources in human-readable form on their LCD buttons. Initially, the name of each source is automatically retrieved from the NV9000 router control system, but you can override names as required:

1 Select the channel source ID to modify.

2 In the right-hand panel, type the source name that you want in the 'Name' field.

3 The 'Name Generator' field should automatically change from 'Use name from router' to 'User defined name'.

You can select audio gain and audio shuffle presets for each channel source. (See Gain Mode on page 170 and Shuffle Mode on page 171.) They allow each source to be gain-adjusted or shuffle-adjusted independently to compensate for any upstream audio faults or peculiarities.

Once you have completed all changes needed for the master control configuration, save it onto the Imagestore 750 using the 'Save As > To Device…' in the 'File' menu.

Channel Source Templates

When you want to apply audio gain and shuffle presets repeatedly to different sources, you can simplify repetitive channel source configuration by using channel source templates.

Begin by choosing non-default gain and shuffle presets (as you require) in one of the channel sources. In the following example, the source is attenuated by -3dB, and a stereo swap shuffle is applied.

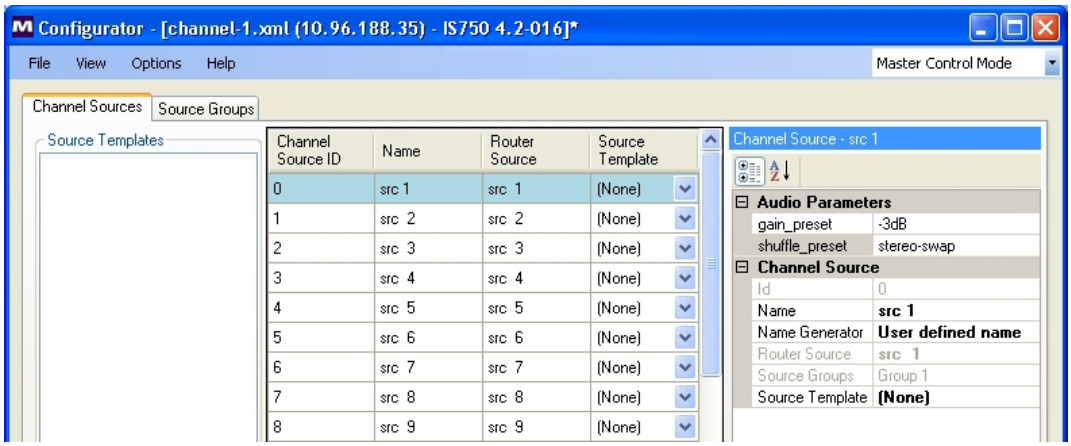


Fig. 5-8: Imagestore Configurator - Channel Soure template

Right-click on the modified source (highlighted, in the center pane) and choose 'Copy settings to source template…':

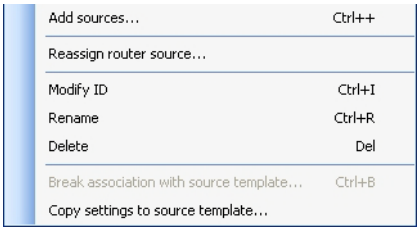


Fig. 5-9: Imagestore Configurator - Copy Settings

Name the source template accordingly:

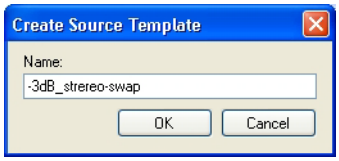


Fig. 5-10: Imagestore Configurator - Naming Source Template

This new source template now appears in the 'Source Templates' list in the left-hand panel. The template's audio parameters, name, and color scheme can be adjusted in the right-hand panel:

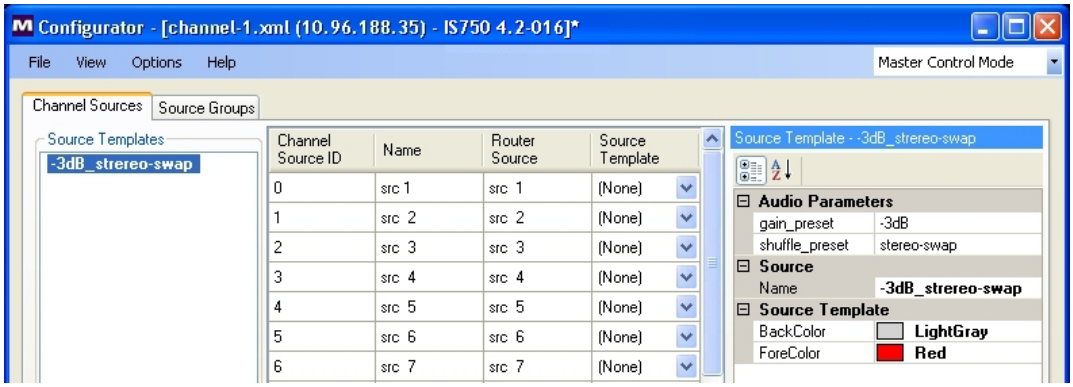


Fig. 5-11: Imagestore Configurator - Source Templates

Select the sources to which you want to apply this template, then right-click a source and choose 'Assign source template':

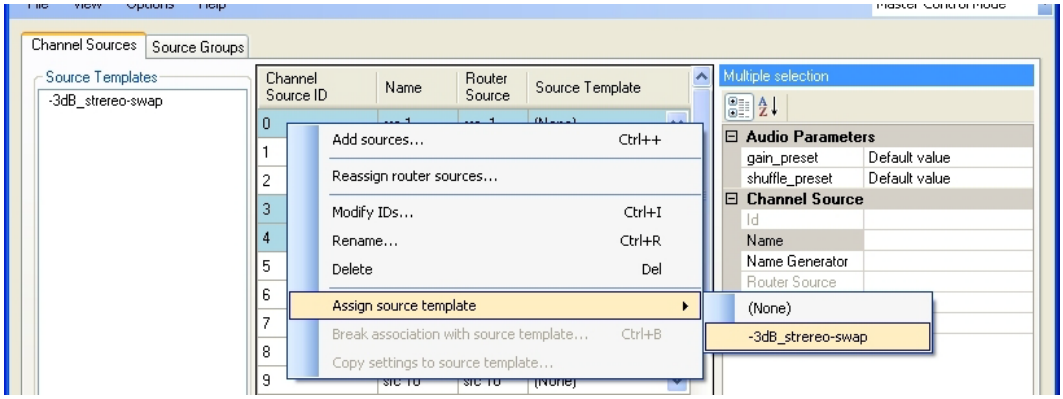


Fig. 5-12: Imagestore Configurator - Apply Source Template

The sources selected above now shows the template name in the 'Source Template' column, and the template color scheme also helps identification. Notice that the audio parameters are greyed out because they follow the source template:

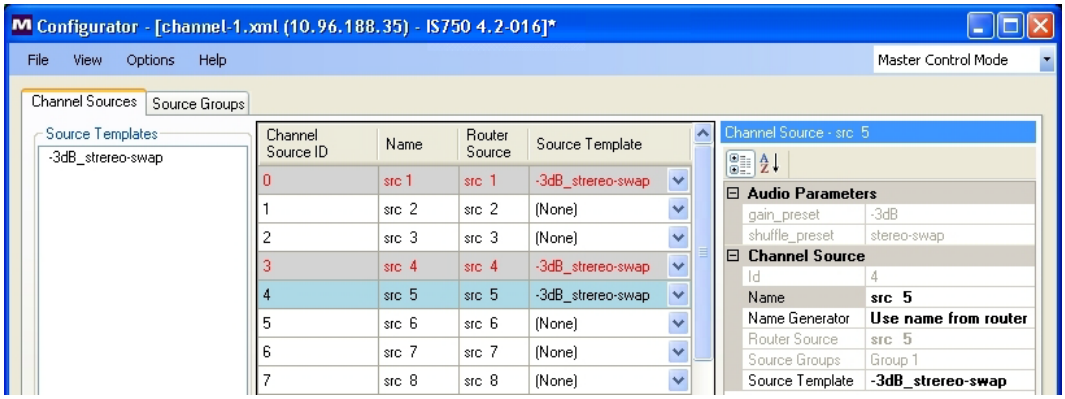


Fig. 5-13: Audio parameters greyed out, follow Source Template

When the source template is adjusted later, all channel sources using the template will be updated to match. This can be very useful if hundreds of sources require the same audio adjustment.

To revert to prior audio parameters, select the channel source(s), right-click a source, and select 'Break association with source template…':

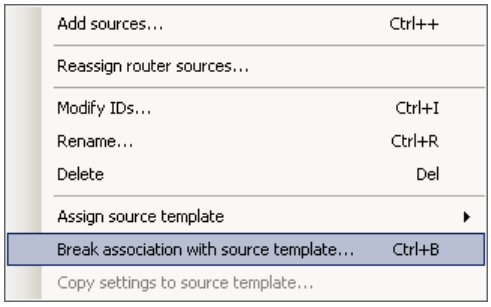


Fig. 5-14: Imagestore Configurator - Break Association with Source Template

A confirmation dialog appears:

Fig. 5-15: Imagestore Configurator - Break Association with Source Template - Confirmation dialog

Click 'Yes' to confirm a break in association with the source template, or 'No' to keep the template association.

Source Groups Configuration

Although source groups are defined in the Imagestore 750 configuration, they are for the use of iMC panels.

Create source groups by right-clicking within the 'Source Groups' tab in the left-hand panel under 'Master Control Mode'. There are two options; 'New…' and 'Auto assign…':

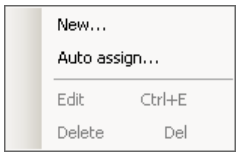


Fig. 5-16: Imagestore Configurator - Create New Source Group

The 'New…' option asks you to enter a name and the number of entries for the new source group:

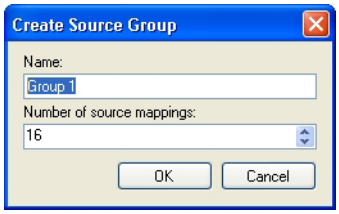


Fig. 5-17: Imagestore Configurator - Source Group Name (ASCII)

When the group is created, you will see a list of sources and "slots" for sources at the bottom of the window. The slots correspond to iMC panel source buttons.

To assign sources to the buttons, click-and-drag sources from the list to the slots. You can drag multiple sources into contiguous slots:

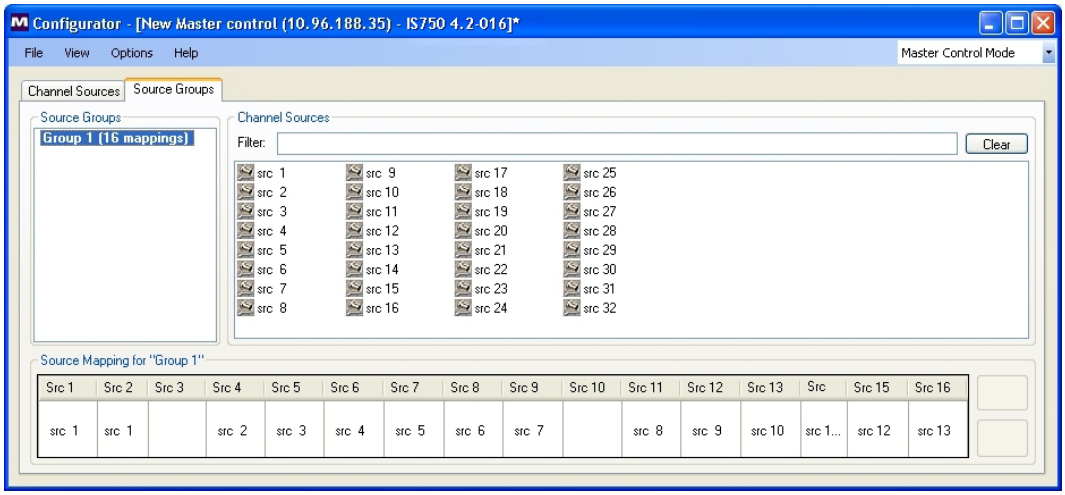


Fig. 5-18: Imagestore Configurator - Source Groups

It is acceptable to leave some slots unassigned, creating gaps. It is also acceptable to have the same source in more than one slot.

The 'Auto Assign…' option generates a series of sources groups that cover all available sources. When you choose this option, a dialog asks you to enter a name *prefix* and the number of sources in the source groups that will be generated:

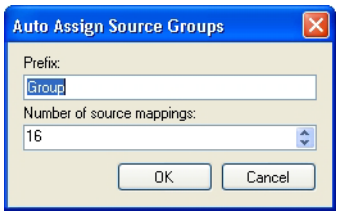


Fig. 5-19: Imagestore Configurator - Source Groups Prefix

You will then be informed how many source groups will be generated. This is a sample:

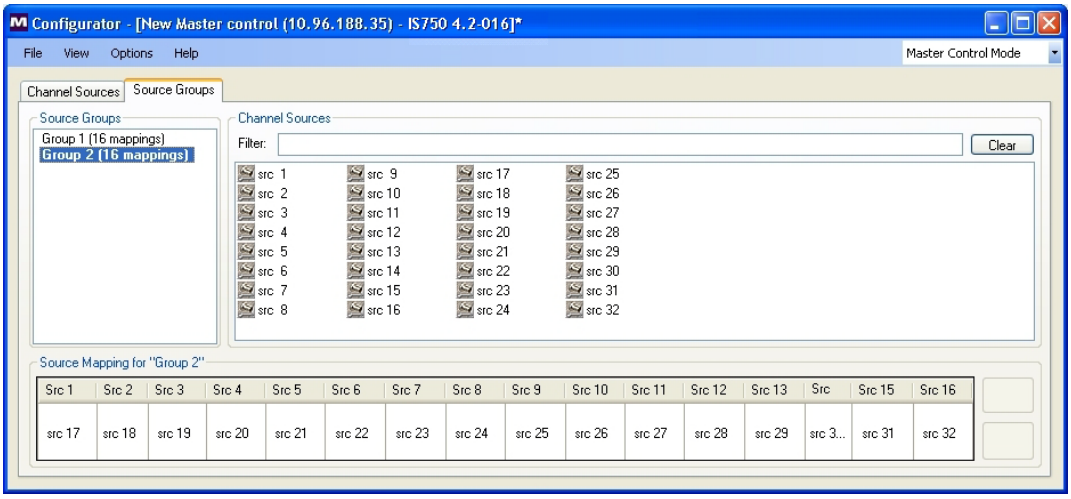


Fig. 5-20: Imagestore Configurator - Source Groups Created

In the example above, two source groups (Group 1and Group 2) were automatically created using sources 1–16 and 17–19. The source group mappings can then be modified.

Source group dependencies between the Imagestore 750 configuration and the iMC panel configurations must be considered. When panels that have different numbers of source buttons are to be supported by the same channel, a mixture of source group sizes can be defined accordingly.

For example, 32 sources might require 6 source groups when an iMC-Panel-300 and an iMC-Panel-200 are used to control the same channel:

Two 16-entry source groups (1–16, 17–32) for the (larger) iMC-Panel-300.

Four 10-entry source groups (1–10, 11–20, 21–30, 31–32) for the (smaller) iMC-Panel-200.

Panels then must be configured to use the appropriate sized source groups.

After you have completed all changes needed for the master control configuration, save the configuration in the Imagestore 750 using the `File > Save As > To Device...`.

Master Control Configuration Cross-Reference

To use a master control configuration, the main Imagestore 750 configuration must make reference to it.

Choose 'Configuration Mode' in the top right drop-down menu. From the 'System Settings' tab, select `Master Control > Master Control Configuration`:

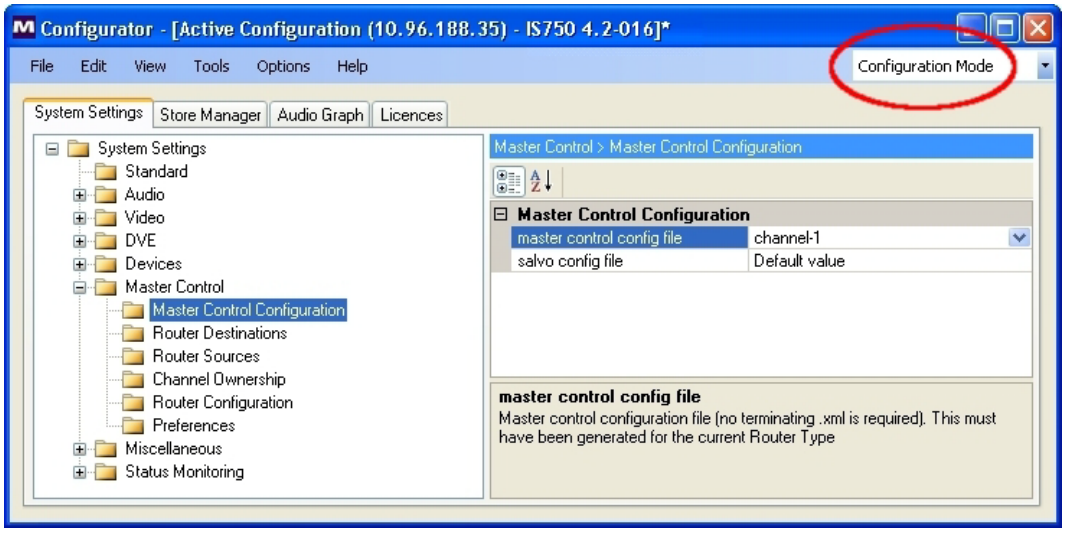


Fig. 5-21: Imagestore Configurator - Configuration Mode

Then select the required master control configuration file from the drop-down list at the right.

Save and apply the configuration, and wait for the Imagestore 750 to restart. The channel sources and source groups will now be available for the channel processor to use.

Salvo Configuration

Please see Router Salvos on page 64 for an introduction.

- ▲ Before a salvo configuration file can be created, at least one system salvo must have been defined in the NV9000 configuration. Please refer to the *NV9000-SE Utilities Users Guide*. (See Applicable Publications and Tools on page 3.)

A salvo configuration file identifies the router salvos that the Imagestore 750 can use. The salvo configuration file is stored in the Imagestore 750 separately from the main configuration, which references it.

The following sections describe how to create and edit the Imagestore 750's salvo configuration.

The salvo configuration file can be shared among different Imagestore 750s.

Choose 'Salvo Mode' in the top right drop-down menu:

Fig. 5-22: Imagestore Configurator - Salvo Mode

Then choose 'New' from the 'File' menu. Specify the IP address of the Imagestore 750:

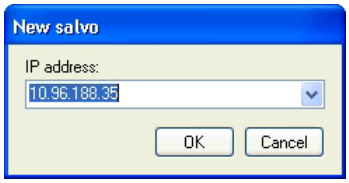


Fig. 5-23: Specify Imagestore 750 IP Address

After doing so, a list of NV9000 salvos appears:

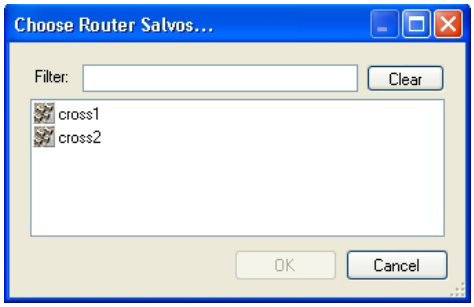


Fig. 5-24: Imagestore Configurator - Available NV9000 Salvos

Select some or all that apply to this Imagestore 750. You can revise the list at any later time.

Save the configuration using the 'Save' or 'Save As' command from the 'File' menu.

The selected salvos now appear in the 'Router Salvos' view.

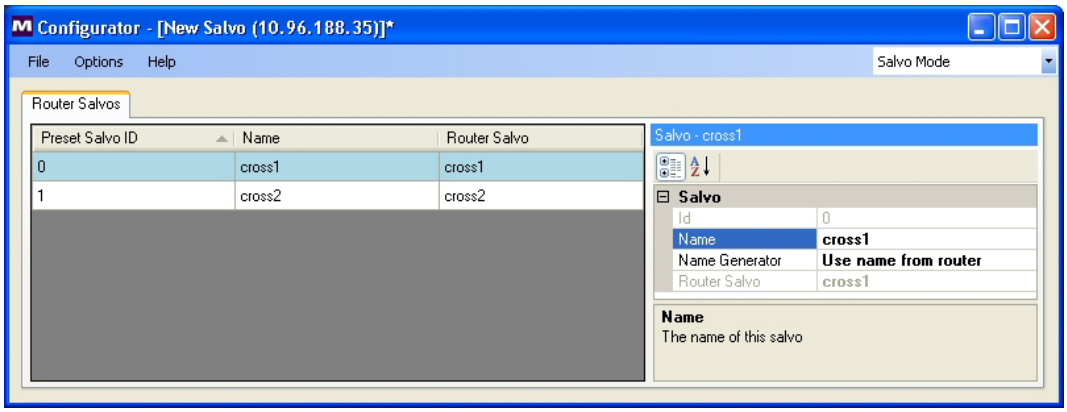


Fig. 5-25: Imagestore Configurator - Selected Salvos

Salvo names allow iMC panels to represent the router salvos in human-readable form on LCD buttons. The name of each salvo is initially retrieved from the NV9000 router control system, but you can override names as required:

1 Select the salvo to modify.

2 In the right-hand panel, type the salvo name that you want in the 'Name' field.

3 The 'Name Generator' field should automatically change from 'Use name from router' to 'User defined name'.

Performing a right-click on the left pane allows you to perform the following actions:

Add salvo(s)	Add one or more salvos from the salvo list in the connected NV9000 router control system.
Reassign router salvo(s)	This allows you to reassign the selected Imagestore 750 salvo ID(s) to a different router salvo(s).
Modify ID(s)	This allows you to change the IDs of the selected salvo(s), as used by automation.
Rename	This allows you to rename the salvo(s). Multiple salvos can be renamed with a number appended to differentiate them. You can choose the router salvo name or generate names of your own choosing.
Delete	This allows you to delete salvo(s).

Once you have completed all changes needed for the salvo configuration, save it onto the Imagestore 750 using '`Save As > To Device`...' in the 'File' menu.

Salvo Configuration Cross-Reference

To use a salvo configuration, the main Imagestore 750 configuration must make reference to it.

Choose 'Configuration Mode' in the top right drop-down menu. From System Settings, select 'Master Control > Master Control Configuration':

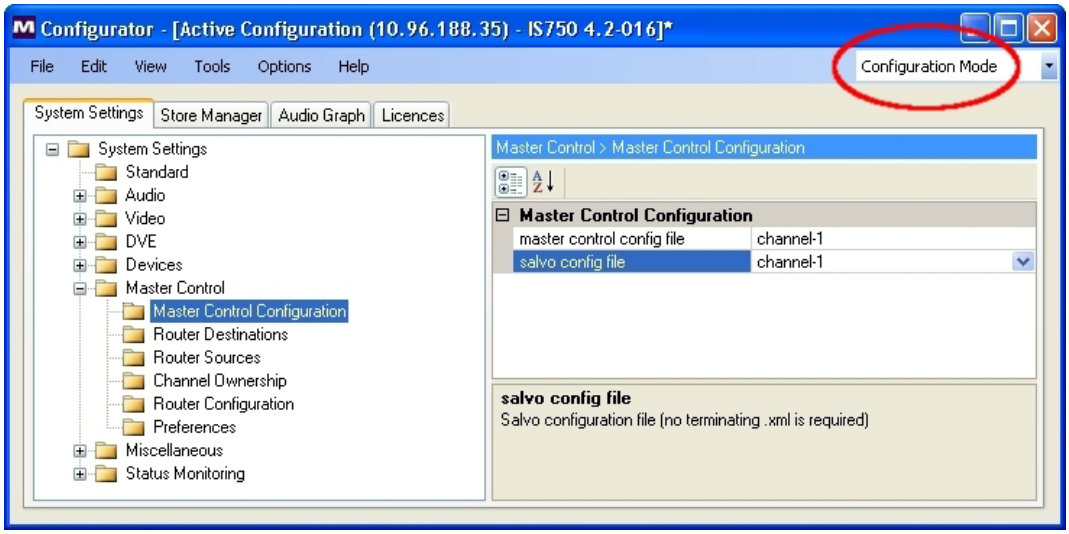


Fig. 5-26: Imagestore Configurator - Configuration Mode, Master Control Configuration

Then select the required salvo configuration file from the drop-down list at the right.,

Save and apply the configuration, and wait for the Imagestore 750 to restart. The salvos will now be available for the Imagestore 750 to use.

You can reopen existing salvo configuration files to revise them at any time using `File > Open > From Device`... under 'Salvo Mode'.

Router Destinations

▲ Please see Router Destinations (Feeding Program and Preset Inputs) on page 64 and Router Destination (Feeding AUX) on page 65 for an overview.

In the Imagestore 750 Configurator, select the router destinations that feed:

- Program bus (the A Input)
- Preset (a.k.a. preview) bus (the B Input)
- Aux bus (auxiliary monitoring device)

In the Imagestore 750 Configurator, choose the 'System Settings' tab under 'Configuration Mode' and open the 'Master Control > Router Destinations' branch of the navigation tree at the left.

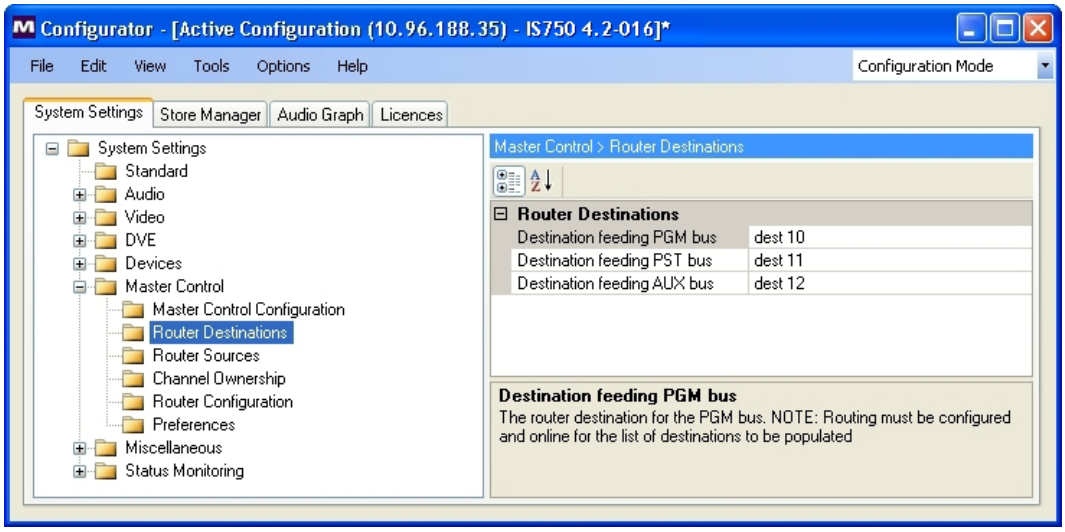


Fig. 5-27: Imagestore Configurator - Master Control, Router Destinations

Choose a router destination from the field at the right of each of these 3 entries.

- 'Destination feeding PGM bus' corresponds to the A input of the Imagestore 750.
- 'Destination feeding PST bus' corresponds to the B input of the Imagestore 750.
- 'Destination feeding AUX bus' corresponds to an auxiliary monitoring device.

When you click the field to make an entry, a list of NV9000 destinations appears:

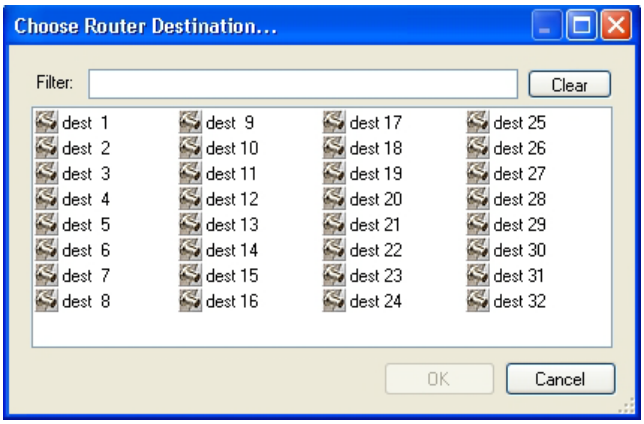


Fig. 5-28: Imagestore Configurator - NV9000 destinations

Choose one and click 'OK'.

Do the same for all 3 destinations.

These settings represent a physical video connection between the router and Imagestore 750 and between the router and an auxiliary monitoring device.

Not every Imagestore 750 needs to control an aux device. If you leave the aux destination field blank, the Imagestore 750 will not control any aux device and the aux source buttons of iMC control panels will be disabled when they are controlling these Imagestore 750s..

Note: When iMC panels have dedicated monitor walls, it is unlikely that auxiliary video monitors will be used to display their channels' aux source selections. Despite this, it is necessary to define unique 'Destination feeding AUX bus' entries for every channel so that aux source switches can be tallied back to the controlling panel(s). These destinations must differ from any iMC panel 'monitor wall AUX destination' entries to avoid router conflicts as panels change ownership between different channel processors.

Router Sources

Please see

Router Sources (Fed by PGM, PST, CLN, and MON Outputs) page 65
Router Source (Fed by BLACK/SILENCE) page 65
Router Source (Fed by USER 1-20) page 65

for additional information.

- These settings are somewhat related to the MCS Panel Configuration Editor's monitor wall settings. (See Monitor Wall on page 66.)

In the Imagestore 750 Configurator, select the router sources that are fed by:

- Program output
- Preset (a.k.a. preview) output
- Clean-feed output
- Monitor output
- Black/silence
- User sources 1–20

In the Imagestore 750 Configurator, choose the 'System Settings' tab under 'Configuration Mode' and open the 'Master Control > Router Sources' branch of the navigation tree at the left.

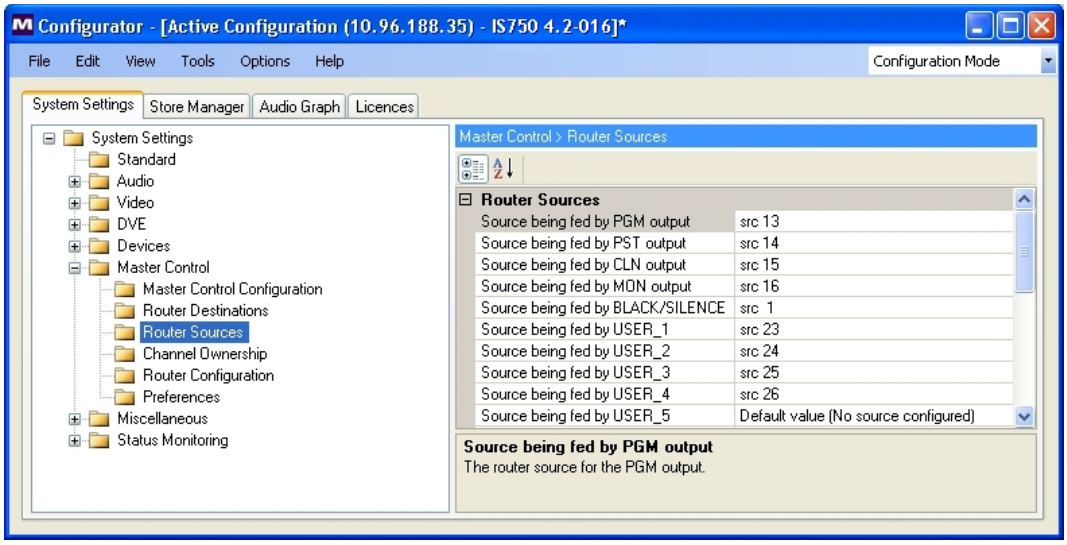


Fig. 5-29: Imagestore Configurator - Master Control, Router Sources

Choose a router source from the field at the right of each of these entries. When you click the field to make an entry, a list of NV9000 sources appears:

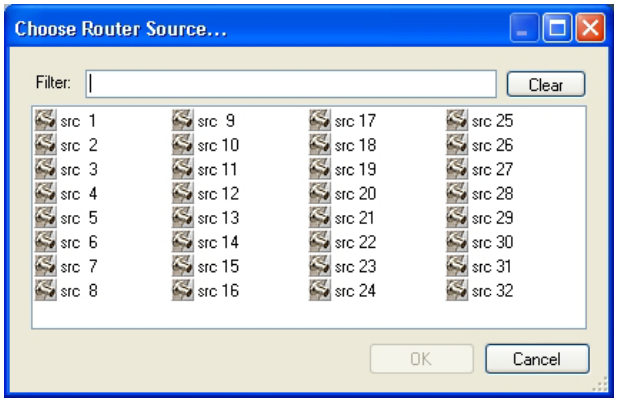


Fig. 5-30: Imagestore Configurator - NV9000 Sources

Choose one and click 'OK'.

Do the same for the other sources you want to configure.

These settings represent a physical video connection into the router from (1) the Imagestore 750's outputs, (2) a black/silence generator, and (3) other related devices (perhaps a backup channel or HD/SD mirror channel).

Each Imagestore 750 feeding the router must have its own distinct set of sources. Other sources may be shared between different channels.

Note: Be careful to modify these settings correctly for every device when sharing an Imagestore 750 configuration between multiple devices.

Graphics Co-Processor Configuration

Slave Settings

Please see Graphics Co-Processor Feeding Fill and Key on page 65 for an introduction.

This section describes how to configure the Imagestore 750 to use a graphics co-processor (i.e., the Intuition XG) with the Imagestore 750.

- Intuition XG configuration is outside the scope of this document. Please refer to the Intuition XG publications listed under Applicable Publications and Tools on page 3.

  Example: Do ***not*** use XPlay to control the Intuition XG when it is being used in this master control environment.

In the Imagestore 750 Configurator, choose the 'System Settings' tab under 'Configuration Mode' and open the 'Devices > Slave' branch of the navigation tree at the left.

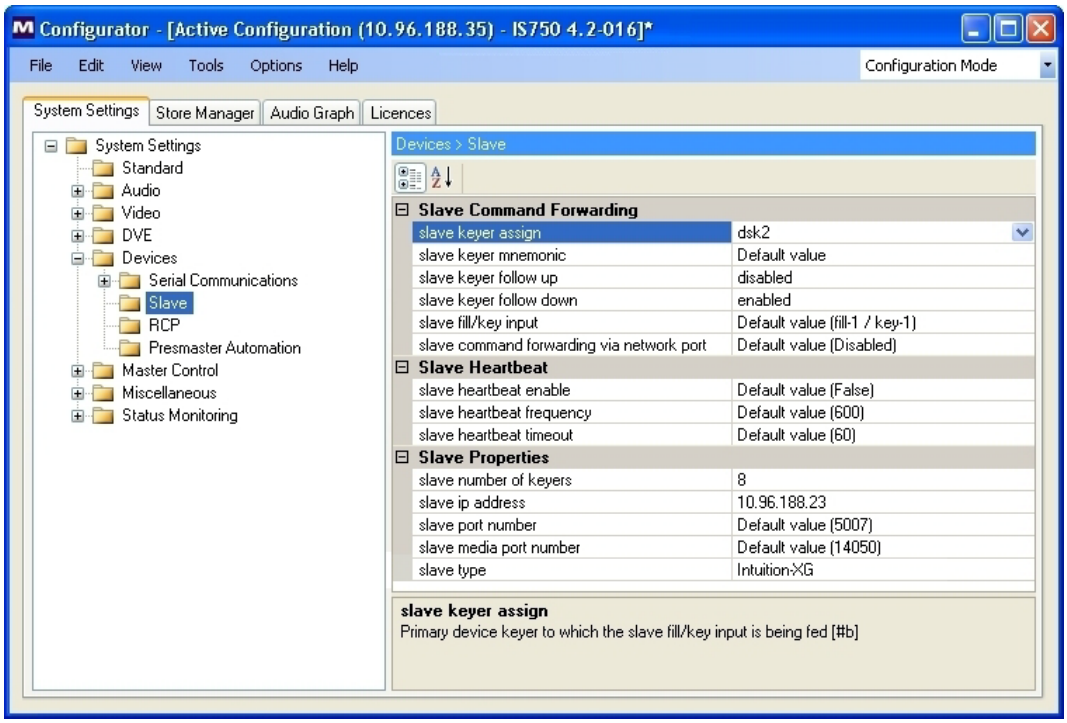


Fig. 5-31: Imagestore Configurator - Slave Devices, Configuration Mode

Configure the following settings relating to slave device command forwarding and media thumbnail transfers. (Here the primary device refers to the Imagestore 750 and the slave device is the Intuition XG).

- Slave keyer assign.

  The primary keyer (DSK) to which the slave's fill/key input is fed.

- Slave keyer follow up.

  When this option is enabled, a primary keyer cut-up follows the overall slave layers, so that the assigned keyer is cut up when one or more slave layers have been cut/faded up.

  ▲ If a panel is fading up an Intuition XG layer independently of the "command forwarding" mechanism, the primary keyer (DSK) will cut up only at the end of the slave layer fade.

  When this option is disabled, the assigned keyer position remains unchanged regardless of the slave layer positions.

  ▲ If you want to use an iMC panel to preview Intuition XG graphics on a preset DSK without its appearing on program, then set this parameter to 'disabled'.

- Slave keyer follow down.

  When this option is enabled, a primary keyer cut-down follows the overall slave layers, so that the assigned keyer is cut down when all slave layers have been cut/faded down. This is particularly useful when there are out-transitions of indeterminate length coming from the Intuition XG.

  When this option is disabled, the assigned keyer position remains unchanged regardless of the slave layer positions.

- Slave fill/key input.

  The fill and key port pair on which the slave graphics are received.

- Slave number of keyers.

  The number of slave layers that are supported and that return thumbnails to the iMC panel.

  By default, the Intuition XG supports 8 layers.

- Slave IP address.

  The slave's IP address, used for sending media thumbnails to the iMC panel

  The slave's IP address is also used for command forwarding if network control is preferred to serial control.

- Slave type.

  Set this field to 'Intuition XG' to tell the Imagestore 750 how the slave's load and cue information should be interpreted.

  ▲ To avoid conflicts in slave load and cue states, you must ***not*** use XPlay to control the Intuition XG when it is used in the master control environment.

External Fill/Key Settings

In the Imagestore 750 Configurator, choose the 'System Settings' tab under 'Configuration Mode' and open the 'Video > External Fill/Key > Fill-*x*/Key-*x*' branch of the navigation tree at the left.

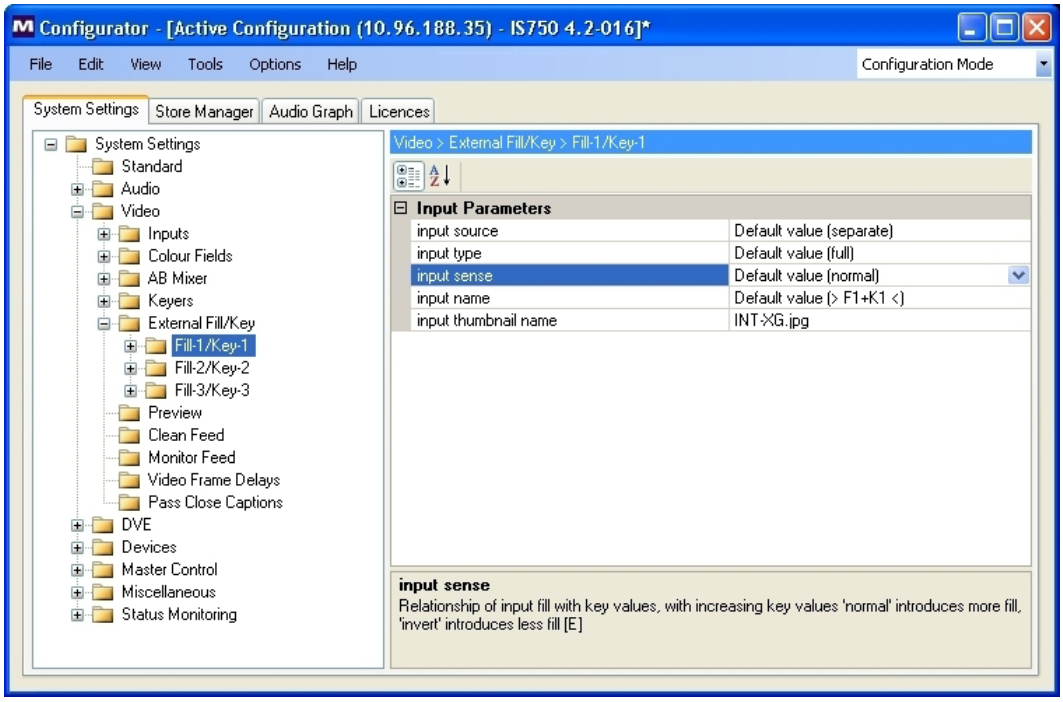


Fig. 5-32: Imagestore Configurator - System Settings

Please refer to Keying Parameters on page 39 for more information about the fields on this page.

Configure the following settings relating to the Intuition XG's fill and key output format, and media management preferences:

- Input source.

  This describes the keyer's input signal. The choices are 'separate', 'self', and 'none'.

- Input type.

  This describes the keyer's mixing method. The choices are 'full' and 'linear'.

- Input sense.

  This specifies whether the key signal is to be inverted. The choices are 'normal' and 'inverted'.

- Input name.

  The name of this input as used by OxSox and the 'R0' (load image) Oxtel command.

  In a master control system, this name is the mnemonic used on control panels to identify the fill/key input pair. For each fill/key pair, you have a choice of using the default name or a name of your choosing. For example, you can select "**> INT-XG <** for the fill/key that is fed by an Intuition XG. Always avoid names that have the potential to conflict with media names.

- Input thumbnail name.

  This is the name of a built-in graphic file that can be assigned to an external fill/key pair to give a thumbnail representation of it on a control panel.

  There are 4 choices: **F1+K1.jpg**, **F2+K2.jpg**, **F3+K3.jpg**, and **INT-XG.jpg**.

  For each fill/key pair, you have a choice of using the default file (e.g., **F1+K1.jpg**) or the **INT-XG.jpg** file. To use INT-XG for the Intuition XG's fill/key pair, choose 'User Value' rather than 'Default Value' and select **INT-XG.jpg.**

  The thumbnails identify the fill/key source as shown in this sample from the iMC GUI:

Fig. 5-33: Example of thumbnails for Fill/Key sources

  The names appear below the thumbnails. It is beneficial to have the name and the thumbnail match, although that is not enforced.

After you have completed all changes for the graphics co-processor configuration, save it onto the Imagestore 750 using '`Save As > To Device...`' in the 'File' menu.

Channel Acquisition and Ownership Configuration

Please see Channel Acquisition and Ownership on page 66 for an introduction.

Channel ownership and acquisition configuration is carried out mainly in the MCS Panel Configuration Editor. A brief overview of the iMC panel configurations is given here. Please refer to iMC panel publications listed under Applicable Publications and Tools on page 3 for complete detail.

Channel Selection Configuration

First, decide which Imagestore 750 channel processors are to be controlled by which iMC panels at your broadcast facility. Then, for each iMC panel, configure an appropriate set of 'channel selection' buttons using the MCS Panel Configuration Editor. Follow these steps:

1 Open the MCS Panel Configuration Editor.

2 Select the iMC panel to configure.

3 Don't forget to click the 'Imagestore 750' radio button in the 'General' tab.

4 Select the 'Channel Selection List' page:

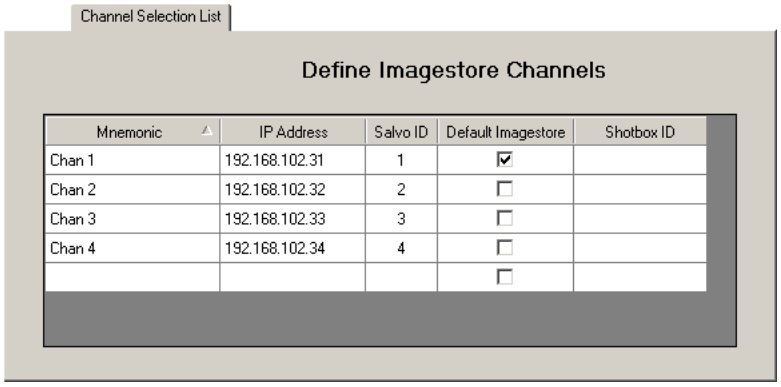


Fig. 5-34: iMC-Panel Configuration tool - Channel Selection list

Define the channels that are to be controlled by this panel by entering an IP address and mnemonic. The mnemonic will appear on panel buttons that are related to the channel.

In the MCS Panel Configuration Editor, select the 'User Buttons Layout' page (or any of the other customer-configurable button pages):

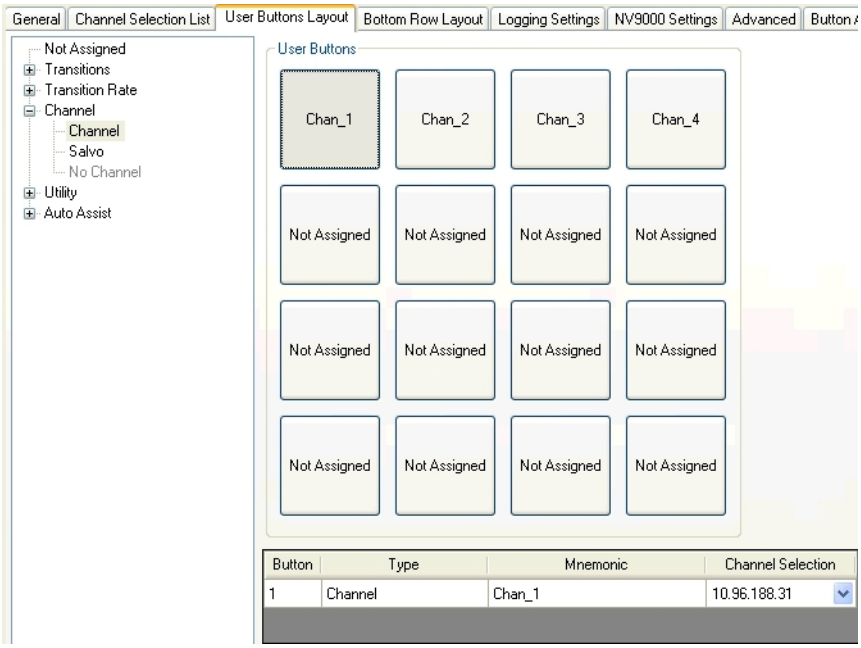


Fig. 5-35: iMC-Panel Configuration tool - User Buttons Layout

To define a channel selection button, click on a button proxy, select 'Channel' from the "Channel' category at the left, and select an IP address from the 'Channel Selection' drop-down list that appears in the button description fields at the bottom of the window. Repeat this for all channel selection buttons you want on the panel.

- Channel selection buttons are not required (although they are convenient). Panel operators can also select any channel through the channel menu.

To create a 'No Channel' button, click on a button proxy and select 'No Channel' from the "Channel' category at the left. The 'No Channel' button lets the panel operator drop any channel it had previously acquired.

Panel Permissions Configuration

In the MCS Panel Configuration Editor, go to the 'Advanced' page and find the 'Channel Acquisition Settings':

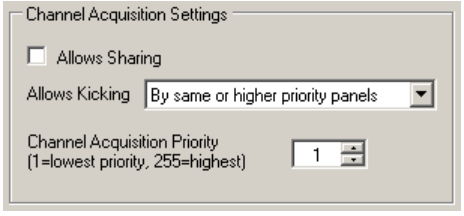


Fig. 5-36: iMC-Panel Configuration tool - Advanced tab, Channel Acquisition Settings

For each panel, configure following parameters:

- Channel acquisition priority:

  The panel's priority (i.e., permission level) is an integer number from 1 to 255, where higher numbers represent higher authority. Panels with higher priority may preempt panels with lesser priority. Priority levels apply only to the 'Allows kick' setting.

- Allows kicking:

  The panel's 'Allows Kicking' parameter determines how other panels are allowed to take ownership away from this panel when it has ownership of a channel.

  There are 4 levels you can select:

  Never

  By higher priority panels only

  By same or higher priority panels

  Always

  A common scenario is where most panels are "normal" and are set to the same priority level with 'Allows Kicking' from higher priority panels only. Thus, normal panel operators cannot take channel ownership from one another, but a supervisor with a higher priority panel can acquire ownership of any channel.

- Allow sharing:

  The panel's 'Allow Sharing' flag determines whether this panel is allowed to share channels with other panels. Imagestore 750s will allow sharing only when all acquiring panels have the 'allows sharing' flag set on. If the owning panel does not allow sharing, then no other panel will be able to share the channel, whatever its priority.

  ▲ Imagestore 750s can enforce 'Allows Kicking' and 'Allow Sharing' settings on panels of lower priority. That is discussed in Channel Permissions Configuration, next.

Channel Permissions Configuration

In the Imagestore 750 Configurator, choose 'Configuration Mode' in the top right drop-down menu. From System Settings, select 'Master Control > Channel Ownership':

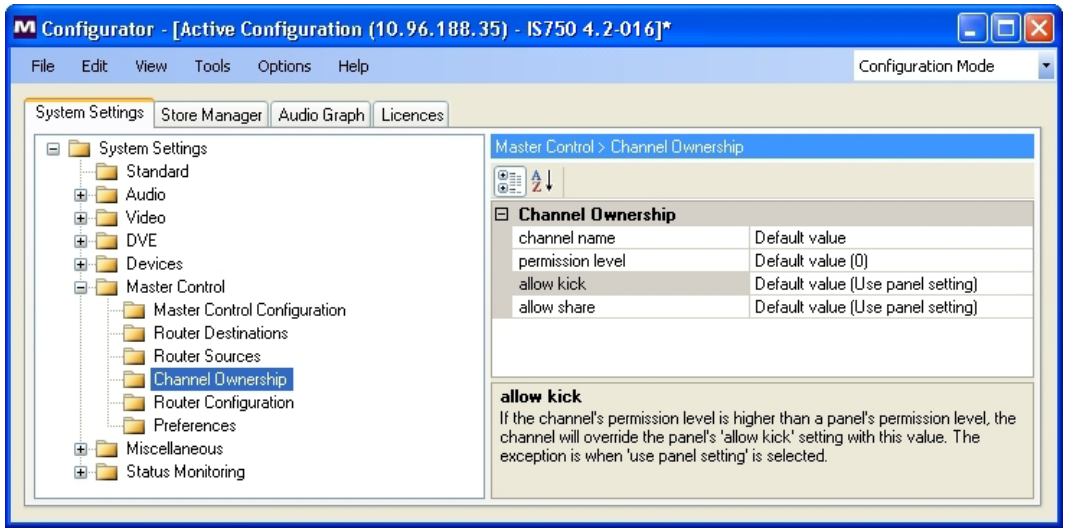


Fig. 5-37: Imagestore Configurator - Channel Permissions Configuration

Configure the following parameters:

- Channel name. (This is intended to override the panel's mnemonic, but is not currently used).
- Permission level.

  Set the permission level to 0 to allow panels to use their own 'allow kick' and 'allow share' settings.

  Set the permission level in the range 1–255, otherwise.
- Allow kick.

  As for iMC control panels, there are 4 levels of this parameter:

  Never

  By higher priority panels only

  By same or higher priority panels

  Always

  You can also set this parameter to 'Use panel setting'. This is the default.
- Allow share:

  As for iMC control panels, this setting is either enabled or disabled.

  You can also set this parameter to 'Use panel setting'. This is the default.

Note: If the channel's permission level is higher than a panel's permission level, the channel will override the panel's 'Allows Kicking' and 'Allow Sharing' settings. This allows a channel to enforce a consistency of settings between connected panels, but still allow a supervisor's panel to override these standard settings and take control of a channel whenever necessary.

Monitor Wall Configuration

Please see Monitor Wall on page 66 for an overview.

Because monitor wall switching is initiated by the iMC panel, monitor wall configuration belongs mostly within the MCS Panel Configuration Editor.

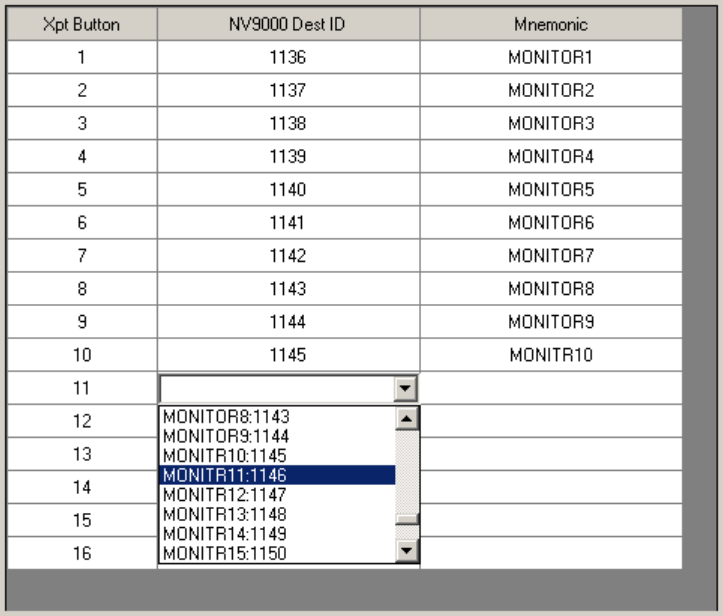
A brief summary of iMC panel configuration is given here, but please refer to the iMC panel publications listed under Applicable Publications and Tools on page 3 for more detail.

- Modify these settings carefully for every iMC panel. If your system has more than one monitor wall, each one has a distinct set of router destinations.

Monitor Wall Source Group Configuration

A monitor wall typically displays all of the sources from a panel's current source group.

Open the MCS Panel Configuration Editor, choose a panel, and then go to the 'Monitor Wall' page:



Typically, the monitor wall displays all sources from the current source group for the Imagestore 750 that is currently owned by the panel. The router destinations configured here are used for this purpose.

Fig. 5-38: iMC-Panel Configuration tool - Xpt buttons, Destination IDs

Assign NV9000 destination IDs for each source button (labeled "XPT buttons" here) for which you want the source to appear on the monitor.

- All the NV9000 destinations (i.e., router outputs) you choose here must, of course, be physically connected to the same monitor wall.
- It is easier to make these assignments when the MCS Panel Configuration Editor is "attached" to the NV9000 system. Check the box on the 'NV9000 Settings' page.

For example, the largest source group for an iMC-Panel-300 might have 16 sources, so you would assign 16 destination IDs. (Remember that there must also be 16 physical connections.) Whenever the panel operator changes to another source group, the panel causes appropriate router switches to these destinations so that the monitor wall follows the source group selection.

- **Note:** For any "holes" within the currently selected source group, the monitor wall will receive the black/silence source defined in the Imagestore 750's 'router sources' configuration. See Router Sources on page 85 for details.

Monitor Wall Configuration

As an iMC panel acquires an Imagestore 750, the following can be displayed on the panel's monitor wall:

- Program output.
- Preset (a.k.a. preview) output.
- Clean-feed output.
- Monitor output.
- Aux output.
- User 1–20.

in addition to the sources in the current source group.

Open the MCS Panel Configuration Editor, choose a panel, and then go to the 'Monitor Wall' page. Use the channel output list. The first 5 entries in the list represent Imagestore 750 outputs:

Channel Output	NV9000 Dest ID	Mnemonic
Program	1148	MONITR13
Preset	1149	MONITR14
Cleanfeed	1150	MONITR15
Monitor		
Aux	1151	MONITR16

Fig. 5-39: IiMC-Panel Configuration tool - Monitor Wall Channels, Imagestore 750 outputs

The remaining entries — when you scroll down — represent the sources identified as User-1 through User-20:

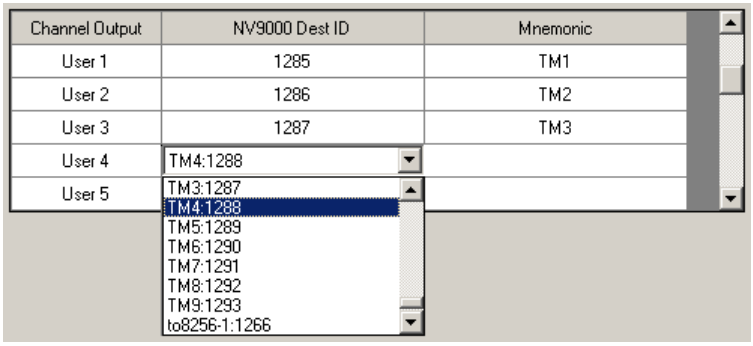


Fig. 5-40: IiMC-Panel Configuration tool - Monitor Wall Channels, User outputs

Typically, the monitor wall displays outputs from the Imagestore 750 that is currently owned by the panel, and can also display custom outputs such as a backup channel. The router destinations configured here are used for these purposes.

Assign NV9000 destination IDs for each channel output that you want to appear on this panel's monitor wall.

- ▲ All the NV9000 destinations (i.e., router outputs) you choose here must, of course, be physically connected to the same monitor wall.
- ▲ It is easier to make these assignments when the MCS Panel Configuration Editor is "attached" to the NV9000 system. Check the appropriate box on the 'NV9000 Settings' page.

When the panel operator acquires a new channel, the panel causes appropriate router switches so that the monitor wall shows the channel outputs, the aux output, and any user-defined sources you have selected. The router sources associated with the Imagestore 750's outputs and the router sources labeled User-1 through User-20 must also have been configured for each Imagestore 750 this panel will control. Please see Router Sources on page 85 for details.

Channel Acquisition Salvos

Another method for configuring the monitoring of channel processor outputs uses *channel acquisition salvos*.

Open the MCS Panel Configuration Editor, choose a panel, and then go to the 'Channel Selection List' page:

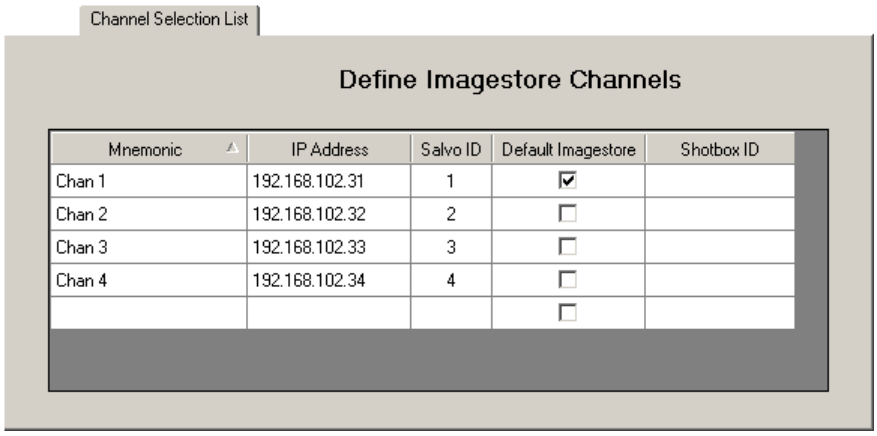


Fig. 5-41: IiMC-Panel Configuration tool - Channel Acquisition Salvos

For every Imagestore 750 that this panel can acquire, select the channel and specify an appropriate Imagestore 750 salvo ID. The ID must be defined in the configuration of the selected channel.

- Imagestore 750 salvo IDs are numbers starting at 0. The Imagestore 750 salvo IDs map to NV9000 salvo IDs and it is the NV9000 that executes salvos. The mapping allows a degree of flexibility.

Each salvo executes a sequence of NV9000 commands. The salvo is responsible for routing outputs from the acquired Imagestore 750 to the local monitor wall. Typically there is one salvo for every channel processor at every iMC panel. IF there are 6 Imagestore 750s and 8 panels, there would be 48 salvos defined.

The main disadvantage of this method is that all existing panel configurations must be updated whenever a new channel is added to the broadcast facility. It is easier and more scalable to configure channel outputs in the 'Monitor Wall' page.

Miscellaneous Router Configuration

In the Imagestore 750 Configurator, choose 'Configuration Mode' in the top right drop-down menu. From System Settings, select 'Master Control > Router Configuration':

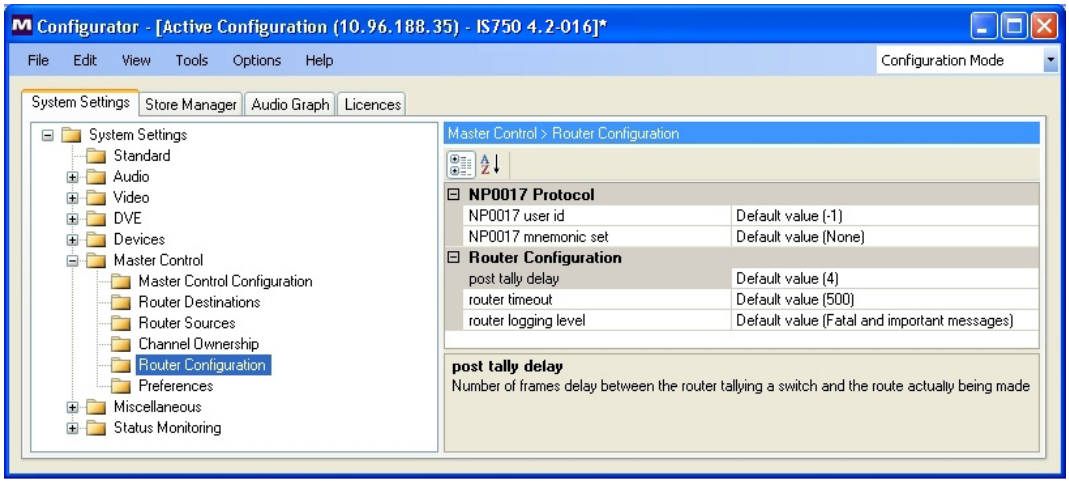


Fig. 5-42: Imagestore Configurator - Miscellaneous Router Configuration

▲ Just for your understanding, "NP0017" is the part number of the document that describes the NVISION Ethernet protocol (NVEP). It has no real meaning in the master control control system.

Configure the following parameters:

- NP0017 user ID.

  ▲ The default value should be used because the Imagestore 750 does not support the lock, protect, and release functions of NVISION router crosspoints.

  In future software releases, this setting may be used by the NV9000 to track and diagnose the Imagestore 750's lock, protect, release activity on router crosspoints.

- NP0017 mnemonic set.

  Up to 10 alternative name sets for sources and destinations can be defined in the NV9000 configuration, using NV9000-SE Utilities.

  Note: name sets must be standard ASCII.

  This setting selects which name set is combined with the main name set when you create a new master control configuration (before any channel-specific naming overrides).

- Post-tally delay.

  When the Imagestore 750 instructs the NV9000 router control system to perform a router switch, the NV9000 sends the switch command to the router and tallies back to the Imagestore 750 at the same time.

  The router still must complete a physical switch which takes a small but significant amount of time depending on the physical characteristics of the router.

  The value entered into the 'post tally delay' field is the worst-case router switching delay. The value is expressed in frames. The Imagestore 750 uses this value to ensure the integrity of A/B mixer output during transitions.

Note: If this value is too small, a flash will be seen on-air as the A/B mixer cuts back to the A input before the physical switch is made.

- Router timeout.

  This parameter is used predominantly for monitoring and logging NV9000 communications.

  We recommend that you leave this at the default value of 500 ms

- Router logging level.

  This parameter allows you to control the granularity of router logs.

  Note: If you are experiencing problems relating to router switching, set the router logging level to 'Everything (very verbose)' before retrieving message logs. After the fault has been diagnosed, return to the default setting 'Fatal and important messages' to avoid excessive message log activity.

Channel Transitions

When an operator is performing complex transitions (i.e. A/B mixing with keyer fades), it is important that the durations of different parts of the transition relate to one another correctly.

You can control this using a global transition mode (automation, slow, medium, fast) which applies to A/B mixing, keyer fades, keyer fades-to-black, and voice-overs. To give added flexibility, each A/B mixer profile and each keyer has its own duration overrides.

▲ **Note:** Transitions started by automation will always use automation rates. Slow, medium and fast apply only to transitions started at panels.

Transition Parameters

Choose 'Configuration Mode' in the top right drop-down menu. From 'System Settings', select 'Miscellaneous > Channel Transitions':

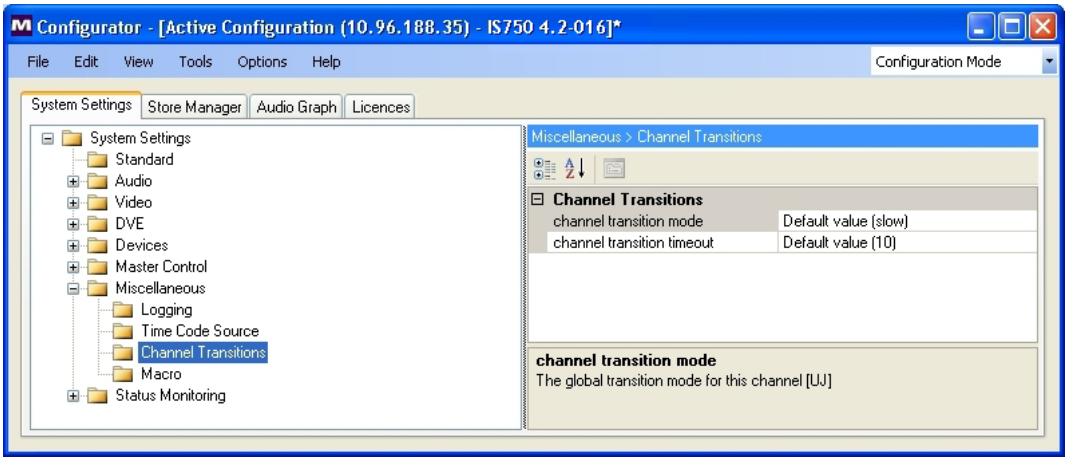


Fig. 5-43: Imagestore Configurator - Channel Transition Configuration

Configure the following parameters:

- Channel transition mode — sets the global transition mode for this channel to:

  Automation.

  Slow.

Medium.

Fast.

Transition Rates

Each global transition mode has its own rate for A/B mixing: From 'System Settings', select '`Video > AB Mixer`':

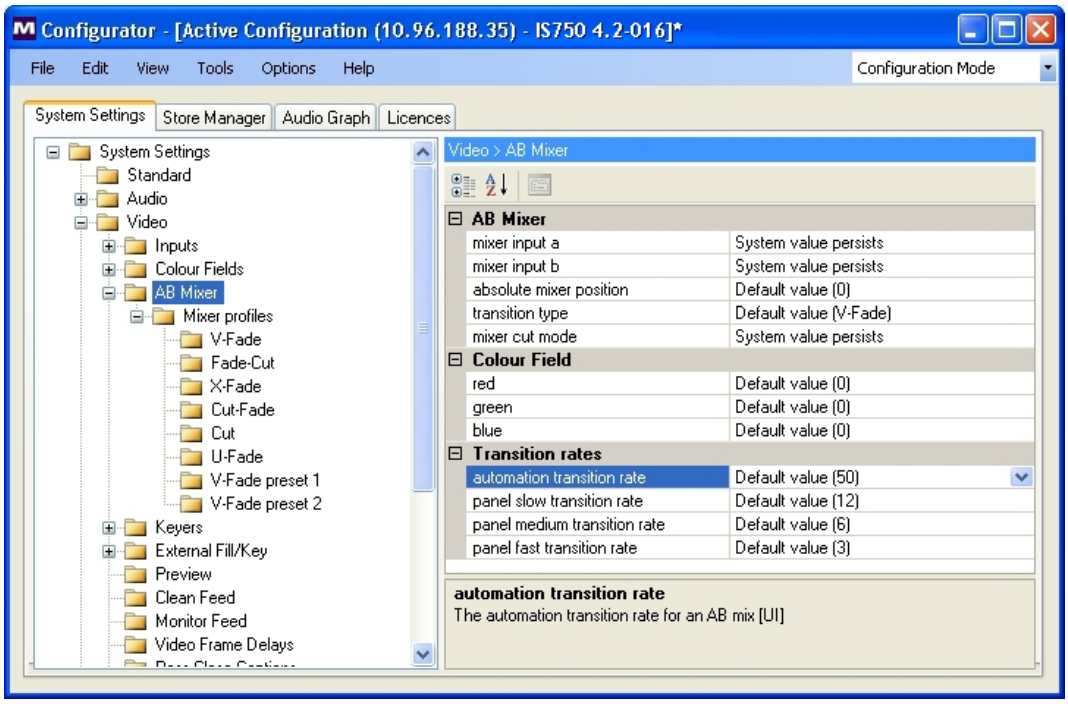


Fig. 5-44: Imagestore Configurator - Transition A/B Mixing

Configure the following parameters:

- Automation transition rate.
- Panel slow transition rate.
- Panel medium transition rate.
- Panel fast transition rate.

Transition Type Profiles

Each A/B mixer type has an adjustable mixer profile. From 'System Settings', select 'Video > AB Mixer > Mixer Profiles':

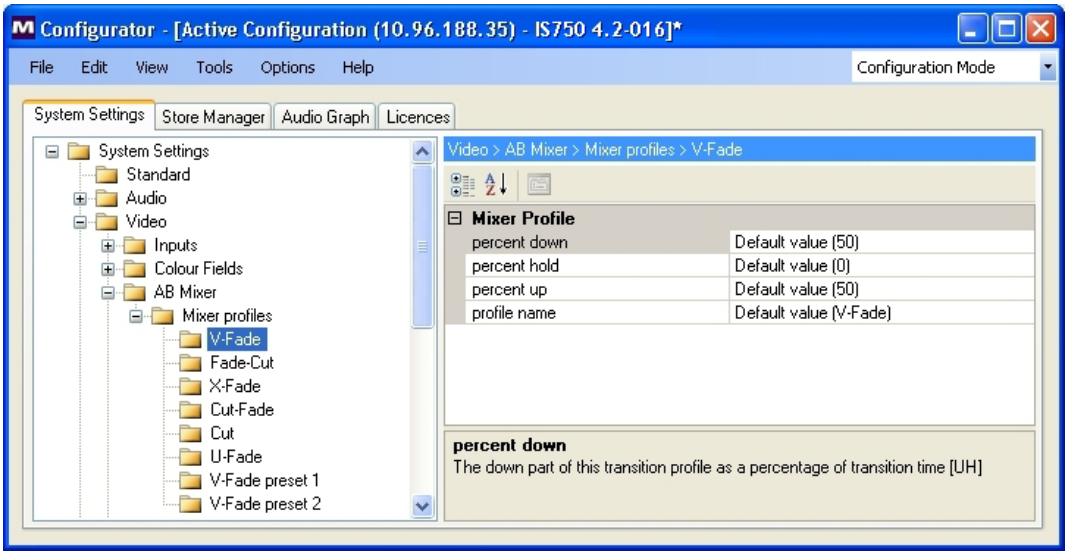


Fig. 5-45: Imagestore Configurator - Transition AB Mixer profile

Configure the following parameters for each fade type:

- Percent down.
- Percent hold.
- Percent up.
- These percentages define how much time is assigned to the 3 parts of the A/B mix transition. Normally the hold period is a black color field, but for X-fades it is a 50% mix of A and B sources.
- The following table shows the default mixer profiles.

Mixer Profile	Percent Down	Percent Hold[a]	Percent Up
V-Fade	50	0	50
Fade-Cut	100	0	0
X-Fade	50	0	50
Cut-Fade	0	0	100
Cut	0	0	0
U-Fade	33	34 [a]	33
V-Fade Preset 1	50	0	50
V-Fade Preset 2	50	0	50

Table 5-3: Default Transition AB Mixer profiles

a. Percent hold is only used by U-fades to hold the profile at black for a short time

Except for A/B cuts, the default percentages for mixer profiles always total 100%. However, you can adjust a profile's percentages to make its actual transition time longer or shorter than the current A/B mixer transition rate. For example, to make a fade-cut half the duration of other transitions, set its percentages to 50-0-0.

You can also create asymmetric V-fades (i.e. 35-0-65) using one of the V-fade presets.

Transition Rate for DSKs

Each DSK has its own transition rates for slow, medium, fast and automation. From System Settings, select 'Video > Keyers > DSK n > Keyer Fader Operations':

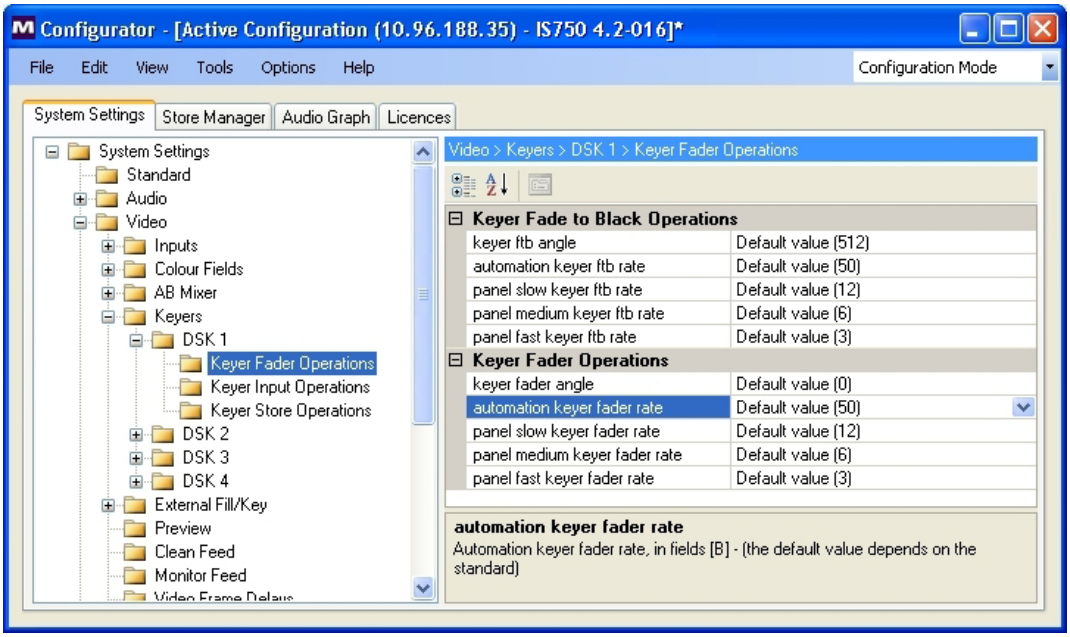


Fig. 5-46: Imagestore Configurator - Transition DSK rates

Configure the following:

- Automation keyer fader rate.
- Panel slow keyer fader rate.
- Panel medium keyer fader rate.
- Panel fast keyer fader rate.

Note: The fader rates for each keyer are independent of one another.

Transition Rate for Voice-Overs

Each voice-over has its own transition rates for slow, medium, fast and automation. From the 'Audio Graph' tab, click on a voice-over block:

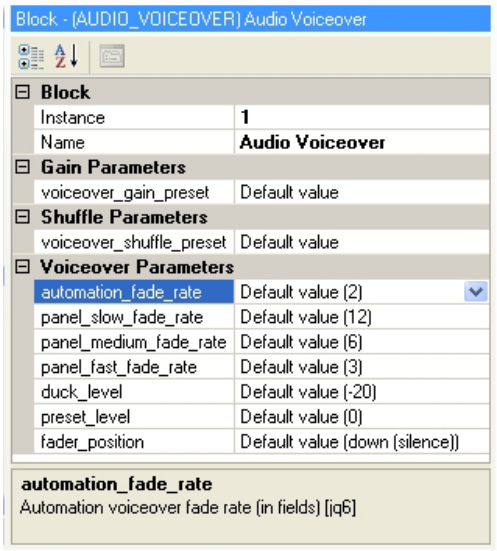


Fig. 5-47: Imagestore Configurator - Voice-over parameters

In the right-hand panel configure the following parameters:

- Automation fade rate.
- Panel slow fade rate.
- Panel medium fade rate.
- Panel fast fade rate.

Note: The default automation rate for voice-overs is much faster than for the A/B mixer and keying layers. This is because voice-overs should normally fade up very rapidly as soon as audio is present.

Panel Behavior Configuration

When you are controlling a channel processor with an iMC panel, there are some actions the channel can take to make panel operation more efficient.

In the Imagestore 750 Configurator, select 'System Settings > Master Control > Preferences':

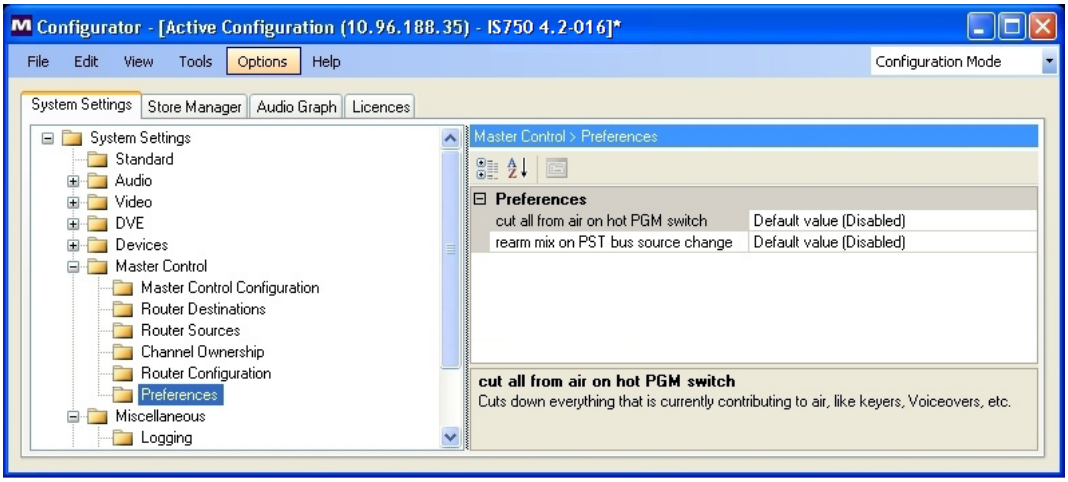


Fig. 5-48: Imagestore Configurator - Master Control Preferences

Configure the following settings:

- 'Cut all from air on hot PGM switch'.

  This option cuts down everything that currently contributes to air — (keyers, voice-overs, etc.) — when the program source is hot-switched.

  The rationale for this behavior is that none of the graphics will apply to the new source on program.

- 'Rearm mix on preset bus source change'.

  When the preset source changes to a source different from program, the last used A/B mix type will be armed.

6 Advanced Audio

Chapter 6 describes the advanced audio features of the Imagestore 750.

Topics

Dolby

This section presents the Imagestore 750's Dolby processing options:

- Integral decoding of Dolby E.[1]
- Integral encoding of Dolby E or Dolby Digital (AC-3).

Introduction

The Dolby audio modules provide the following features:

- Dolby encoders and decoders.
- Dolby input from SDI video with embedded audio or AES.
- Metadata handling.
- Metadata RS-485 serial ports.
- Audio input status monitoring.
- Integral video delays.
- Integration in the 1RU chassis.
- Control with Oxtel automation command extensions.
- 'Audio Graph' page in the Imagestore 750 Configurator. (See Chapter 8)

▲ Note: The Imagestore 750 can accommodate a total of 4 Dolby decode, Dolby encode and up-mix modules.

1. Decoding of Dolby Digital (AC-3) is also supported, but not recommended.

Dolby Data Types

Dolby Digital (AC-3)

Dolby Digital is a mechanism that carries multi-channel audio in a stereo audio signal. It is sometimes called "AC-3," after the coding technology used. The high-quality compression achieved takes advantage of human hearing. The resulting decoded audio is not meant for re-encoding, rather for listening; hence its use in transmission. The Dolby Digital bitstream is a transmission bitstream, intended for delivery to the consumer at home.

Dolby E

Dolby E is a high quality, video-frame-synchronized audio compression coding scheme that enables broadcasters to distribute surround sound and multi-lingual audio using an existing stereo infrastructure. Up to 8 audio channels plus metadata can be carried on a stereo channel. Dolby E can tolerate the multiple encoding and decoding cycles encountered during broadcast contribution, post-production, and distribution stages. Dolby E encoders and decoders convert to and from compressed audio.

Dolby Metadata

A Dolby data stream contains information about the Dolby-encoded audio bit stream itself. This information is called metadata. Metadata is different for Dolby Digital and Dolby E. It is used to control aspects of the audio decoding and reproduction.

Dolby E metadata contains Dolby Digital metadata for every audio program carried in the Dolby data stream, plus information about the transport stream. Dolby Digital metadata contains data to be used by consumer electronics.

The metadata comprises of a set of parameters, for example:

Audio coding mode	Describes a program's associated audio channels.
Dynamic range	Used to compress audio dynamic range at the consumer equipment.
Dialog normalization	Adjusts consumer equipment audio output for consistent viewer loudness; for example, across commercials, films, local news.

Dolby Handling on Legacy Systems

An Imagestore 750 without Dolby modules can pass and switch between Dolby E data-streams. However it can only pass, not switch, Dolby Digital data.

Audio processing is always carried out in parallel with the video processing. The diagram below shows the basic engine:

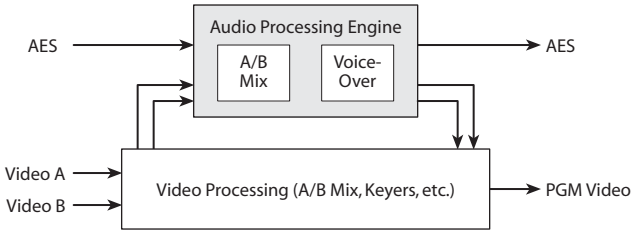


Fig. 6-1: Basic Audio Engine

As the Dolby data passes through the audio engine, it is treated as pure data and left untouched. No decompression or re-compression is performed. Dolby E data streams can be switched cleanly, and the cut point is configured to synchronize with one of the following positions of the audio A/B mixer:

- Transition start.•Fully at A
- Transition mid-point (default).•Fully at B
- Transition end.

Any metadata in the data stream is also switched at this point.

Because all Dolby data remains compressed throughout the system, it is not possible to apply audio A/B-mixing or voice-overs on systems having no Dolby modules. To do this requires Dolby decode option(s) to be installed.

The following diagram shows an Imagestore 750 without any Dolby options installed. Embedded audio from the sources consists of a mixture of PCM and Dolby E, for example, stereo 2.0 PCM on channels 1 and 2 and Dolby E on channels 3 and 4. The PCM channels are A/B-mixed and a voice-over is applied; but only A/B-switching is performed on the Dolby E channels. The two stems are then recombined so the embedded output matches the source format:

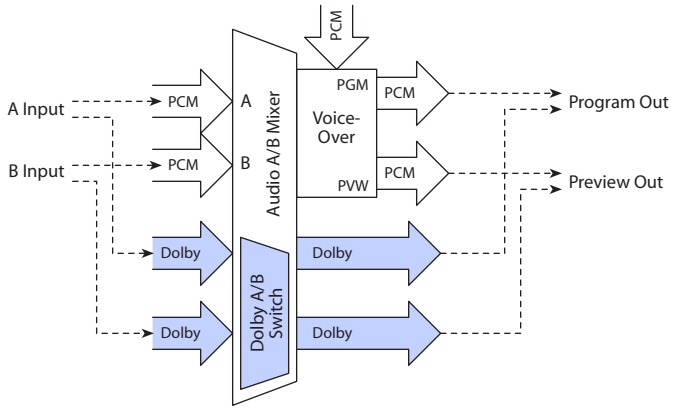


Fig. 6-2: Basic Audio Engine - A/B switching Dolby E Audio

For other Dolby applications, the respective Dolby hardware and software options are required. These are described in the following sections.

Installing Dolby Options

The Imagestore 750's Dolby options provide additional integrated Dolby decoding and encoding capability.

The Dolby decoding and encoding option add the ability to decode and encode Dolby according to the following diagram:

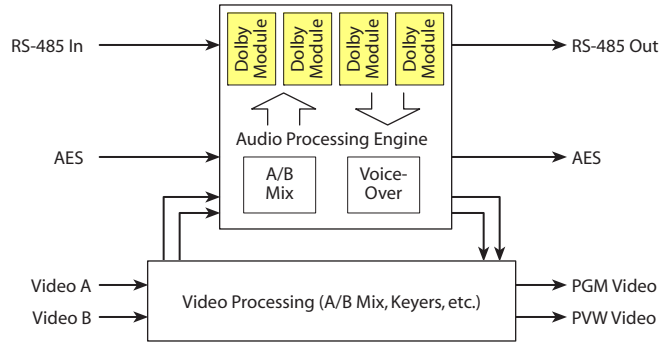


Fig. 6-3: Audio Engine and audio processing Dolby modules

Note: The Imagestore 750 can accommodate a total of 4 advanced audio modules (a combination of Dolby decode, Dolby encode, and up-mix modules).

Dolby Overview

The Imagestore 750 Dolby decoding and encoding options provide an integrated, compact and flexible "Dolby decode-/encode-capable" 1RU channel branding processor. With Dolby decodes and encodes being performed within the Imagestore 750, it is possible to mix and cross-fade between Dolby inputs and apply PCM voice-overs before encoding back to Dolby audio.

The Imagestore 750's Dolby options provide the following principal features:

- Up to 4 modular Dolby decoders and encoders.
- Dolby data from:

  Audio embedded in SDI video.

  AES stereo pair(s).
- PCM (baseband, uncompressed) audio to Dolby data conversion.
- Metadata handling:

  Metadata A/B switching synchronously with audio A/B mix.

  Four RS-485 serial metadata I/O connections.

  Custom-defined metadata presets.

  Internal configurable metadata sources.
- Audio input status, reporting on the front panel or through SNMP.

  PCM, Dolby E, or Dolby Digital.
- Audio type status bits in AES and embedded SDI audio.

  'Audio' or 'Non-Audio'.
- Integral video delays provide video delay compensation.
- No additional video reference is required. The existing bi-level or tri-level reference signal is used.
- The Imagestore 750's GPIs are available for control.
- Automation commands are available for control.

- 1RU overall video/audio solution.
- 'Audio Graph' page, for setting audio configurations, in the Imagestore 750 Configurator.

Note: When Dolby E or Dolby Digital (AC-3) is fed into the **AES** inputs, the signal is reported as 'Non-Audio'. This is because Imagestore 750 is unable to detect Dolby E or Dolby Digital (AC-3) on its **AES** inputs and so treats it as non-PCM.

Decode and Encode Combinations

The Imagestore 750 accepts up to 4 Dolby decoder/encoder modules. The modules provide decoding of Dolby E, and encoding of Dolby E or Dolby Digital.

The Dolby option's product codes cover various cases by allowing combinations to be built. (See Product Codes on page 111.)

The table below summarizes some of the possible decode/encode use-case combinations:

ID	Decode / Encode Combination	Dolby E Decoders	Dolby E Encoders	Dolby Digital Encoders
1	Dolby E encode		1, 2, 3 or 4	
2	Dolby Digital encode			1, 2, 3 or 4
3	Dolby E decode	2 or 4		
4	Dolby E decode + Dolby E encode	2	1 or 2	
5	Dolby E decode + Dolby Digital encode	2		1 or 2

Table 6-1: Dolby module Encode/Decode Combinations

The following diagrams depict possible Dolby decode/encode combinations from lines 1 and 2 of Table 6-1:

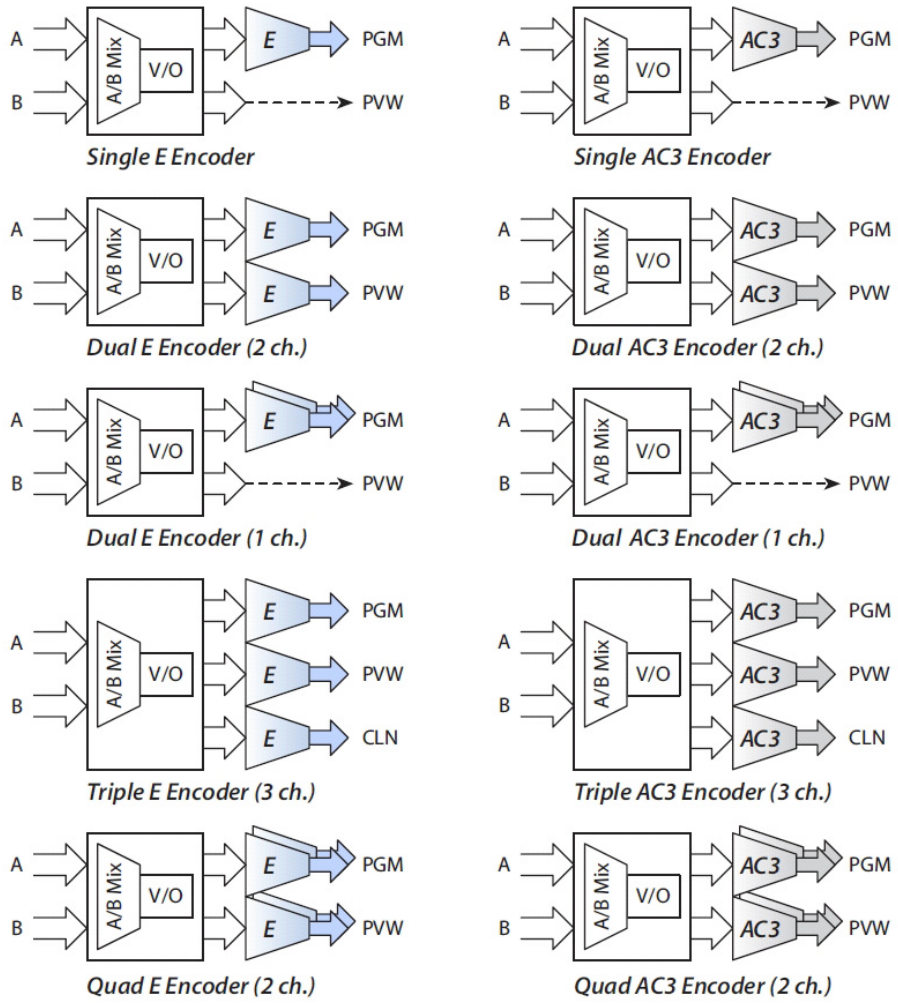


Fig. 6-4: Dolby Encode Combinations

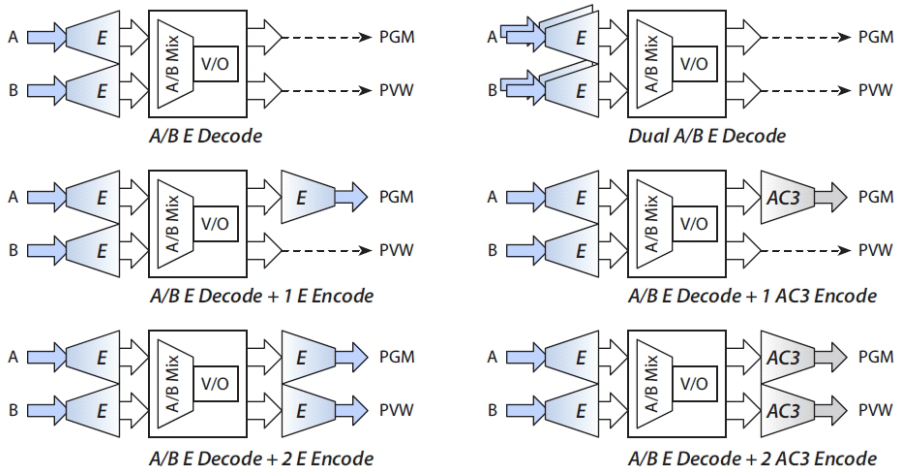


Fig. 6-5: Dolby Encode - Decode Combinations

In the example shown in Figure 6-6, the Imagestore 750 performs audio processing on both baseband audio (PCM) and on Dolby audio (using Dolby decoder and encoder modules).

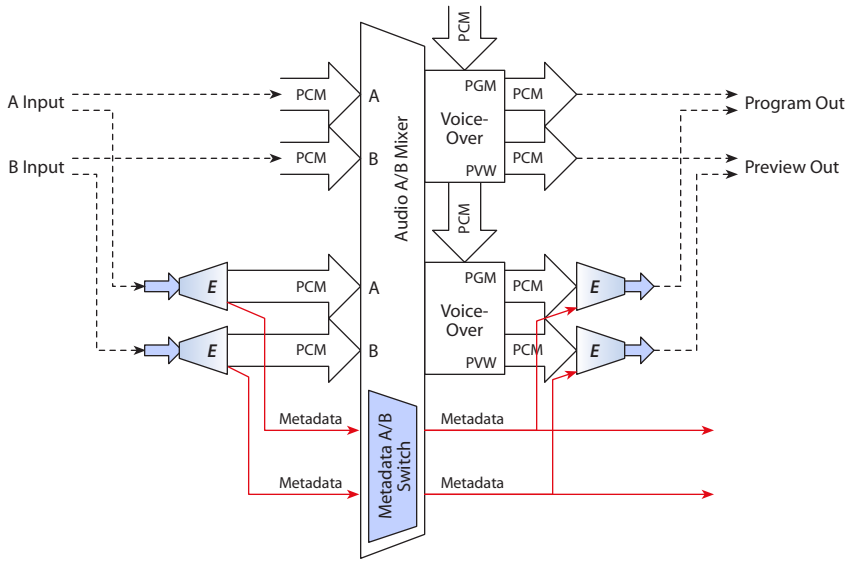


Fig. 6-6: Imagestore 750 example - A/B Mixing PCM and decoded Dolby audio

It is now possible to A/B-mix decoded Dolby from the input sources and to apply voice-overs prior to re-encoding.

Additionally, it A/B-switches incoming input Dolby metadata and uses the metadata to re-encode the output. (The switched metadata are also available in a serial form).

Product Codes

The Imagestore 750's Dolby product codes are listed here.

The complete set of Imagestore 750 product codes is listed in Chapter 11.

- Dolby carrier board.

The Dolby carrier board product code is **IS-750-DOLBY-CARRIER-BOARD.**

Purchase this option to make an Imagestore 750 "Dolby-ready". No Dolby modules are included with this product code.

- ▲ It is preferable to have the audio modules factory-fitted whenever possible because you will not have to open the unit.
- ▲ The carrier board option also makes the Imagestore 750 ready for other Imagestore 750 audio processing options such as the up-mix option.

- Dolby kits.

  The Dolby kit product codes are:

IS-750-DOLBY-ENCE	1 Dolby E encoder + carrier board.
IS-750-DOLBY-ENCD	1 Dolby Digital encoder + carrier board.
IS-750-DOLBY-DEC	1 Dolby E decoder + carrier board.
IS-750-DOLBY-DEC2	2 Dolby E decoders + carrier board.
IS-750-DOLBY-DEC2-ENCE	2 Dolby E decoders + 1 Dolby E encoders + carrier board.
IS-750-DOLBY-DEC2-ENCD	2 Dolby E decoders + 1 Dolby Digital (AC-3) encoder + carrier board.

  The Dolby kit codes apply to new factory-built Imagestore 750s. They provide:

  - A Dolby carrier board installed in the Imagestore 750. The Imagestore 750 can fit up to 4 Dolby modules.
  - A special I/O card variant with RS-485.
  - Up to 4 RS-485 ports, configured "In" or "Out", for serial metadata.
  - Dolby decode and encode modules installed according to the kit option.

  Please contact Miranda Customer Support to determine whether existing Imagestore 750s can have Dolby added retrospectively.

- Dolby upgrade.

  The Dolby upgrade product codes are:

IS-750-DOLBY-DEC-UPG	Single Dolby E decoder.
IS-750-DOLBY-ENCE-UPG	Single Dolby E encoder.
IS-750-DOLBY-ENCD-UPG	Single Dolby Digital (AC-3) encoder.

  Upgrades add decoders or encoders that extend the Dolby decoder/encoder kit combination, up to a maximum of 4 modules.

  Upgrades or extensions are purchased either:

  - With a Dolby kit at the original Imagestore 750 purchase. (The options are assembled in the factory.)
  - As an upgrade to an Imagestore 750 that already includes a Dolby kit.

  In most cases, Dolby upgrades can be installed in the field. Please contact Miranda Customer Support for advice.

- Examples

The figures below depict basic Dolby decoder/encoder use cases:

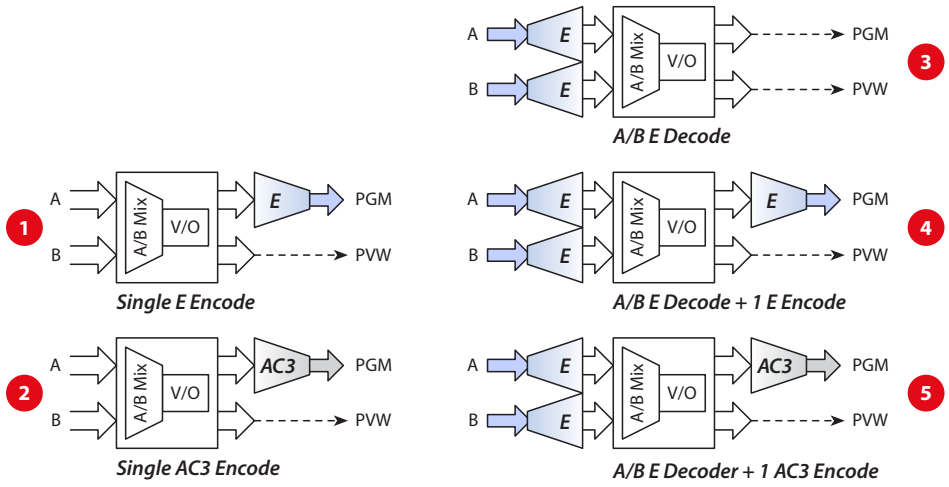


Fig. 6-7: Imagestore 750 Example - Dolby Decode and Encode use cases

These cases are covered by the following kits:

1: **IS-750-DOLBY-ENCE**
2: **IS-750-DOLBY-ENCD**
3: **IS-750-DOLBY-DEC2**
4: **IS-750-DOLBY-DEC2-ENCE**
5: **IS-750-DOLBY-DEC2-ENCD**

The **IS-750-DOLBY-DEC2-ENCE** product code includes:

- Dolby carrier board.
- RS-485 serial I/O ports.
- Two decoder modules.
- One Dolby E encoder module. This leaves space for one further audio module to be fitted at a later date. The **IS-750-DOLBY-ENCE-UPG** could be purchased to add a second Dolby E encoder module.

Technical Specifications

Inside an Imagestore 750 that is equipped with a Dolby kit, there is a Dolby carrier card which has 4 slots available for Dolby or upmix modules. There are no specific slots for decoder or encoder modules because the Imagestore 750 detects the modules' presence and type automatically.

The Dolby modules used in the Imagestore 750 are as follows:

- Dolby decoder module.
- Dolby E encoder module.
- Dolby Digital encoder module.

Dolby Decode Module

(The part number is CAT552.)

This module can decode both Dolby E and Dolby Digital. The Imagestore 750 decoder application shown here is for Dolby E contribution audio only. The module accepts a stereo pair of Dolby data and up to 8 channels of backup PCM (not shown in the left figure) plus a backup metadata stream (not shown). The module outputs eight PCM audio channels, two PCM down-mix audio channels (not shown) and a metadata stream. The delay through the module is 1 frame, and an appropriate video delay should be applied to compensate for this.

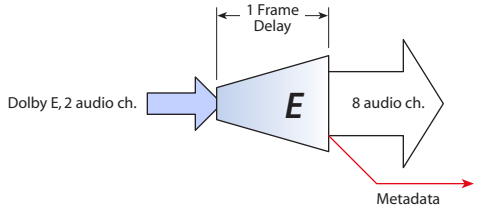


Fig. 6-8: Dolby CAT552 module Input/Output

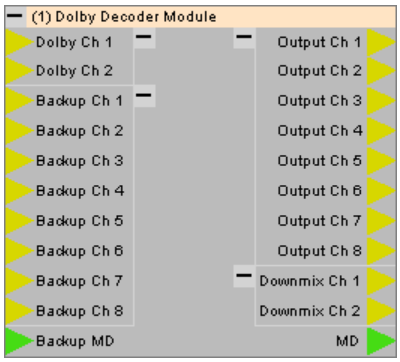


Fig. 6-9: Imagestore 750 Configurator - Audio Graph representation of Dolby Decoder

Oxtel automation commands exist for controlling the module's decoding mode. (See Automation Control on page 119.)

The following decode modes are supported:

Automatic	Decodes any compatible input type. When Dolby data is missing, the decoder uses backup PCM.
Dolby E	Decodes only valid Dolby E and mutes any other type.
Dolby Digital	Decodes only valid Dolby Digital (AC-3) and mutes any other type. It uses the stream type defined.
Mute	Mutes regardless of the input type.
Force backup	Forces the use of backup audio regardless of the input type.

A metadata revision preset file can also be defined. This file is used by the decoder module when there is no available metadata source from either the Dolby input or backup metadata stream.

The decoder's down-mix outputs provide an alternative stereo-only output based on the surround output. The down-mix mode parameter may be set to Lo/Ro (default), mono, or mute. The down-mix program select parameter indicates which program in the Dolby E bitstream is desired for down-mix.

Down-Mix Options

Lo/Ro (Left-only/Right-only) is a down-mixed stereo signal created from 5.1 audio signals that is fully stereo and mono compatible with very few side effects, but loses front-rear audio information.

Lt/Rt (Left-total/Right-total) is a down-mixed stereo audio signal created from 5.1 audio signals that keeps some front-rear audio information.

(See also 'Modes & Levels' Tab on page 127 and Features Tab on page 131.)

▲ **Note:** Lt/Rt down-mix is not available for Dolby decoding because this mode is broken in the module's firmware.

Dolby E Encoder Module

(The part number is CAT559E.)

This module provides Dolby E encoding. The module accepts up to 8 channels of audio, as well as a metadata bitstream. The module outputs a stereo pair containing either encoded Dolby E, or PCM when it is in pass-through mode:

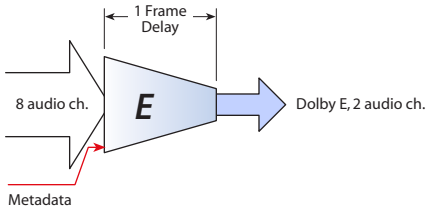


Fig. 6-10: Dolby CAT559E Encoder module Input/Output

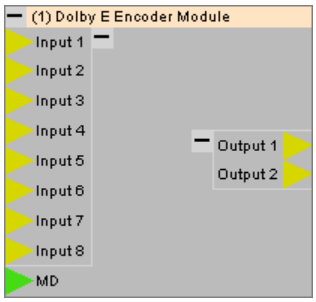


Fig. 6-11: Imagestore 750 Configurator - Audio Graph Dolby Encoder representation

The delay through the module is 1 frame. You should apply an appropriate video delay to compensate for it.

Oxtel automation commands exist for controlling the module's encoding modes. (See Automation Control on page 119.)

The following encode modes are supported:

Encode	Audio is encoded.
Pass-through	Audio is passed through the module.
Follow decoder	The encoder follows a decoder's decode status. (When it decodes, the encoder will encode.)

The audio latency for pass-through mode can be set either to match the encoding latency or to the minimum. The latency reduction parameter sets the number of sample periods (at 48 kHz) by which the encoding delay is reduced from the maximum value of 1 frame.

The encoding bit depth parameter can be set to 20 bits (8-channel Dolby E) or 16 bits (6-channel Dolby E).

Dolby Digital Encoder Module

(The part number is CAT559D.)

The Dolby CAT559D module provides Dolby Digital (AC-3) encoding. The module accepts up to 6 channels of audio, as well as a metadata bitstream. The module outputs a stereo pair containing either encoded Dolby Digital, or PCM when in pass-through mode:

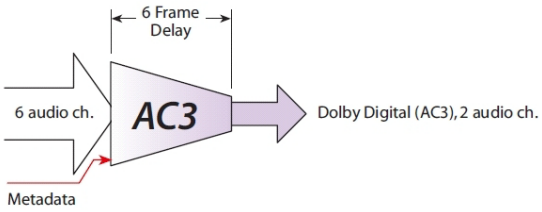


Fig. 6-12: Dolby CAT555D module Input/Output

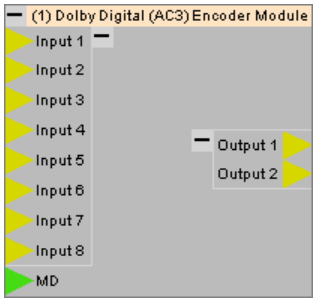


Fig. 6-13: Imagestore 750 Configurator - Audio Graph Dolby Encoder representation

The delay through the module is 6 frames. You should apply an appropriate video delay to compensate for this.:

Oxtel automation commands exist for controlling the module's encoding modes. (See Automation Control on page 119.)

The following encode modes are supported:

Encode	Audio is encoded.
Pass-through	Audio is passed through the module.
Follow decoder	The encoder follows a decoder's decode status. (When it decodes, the encoder will encode.)

The audio latency for pass-through mode can be set either to match the encoding latency or to the minimum. The encoder latency can be set between 187 ms (default) and 450 ms.

The encoder supports the following bitstream formats:

- Dolby Digital 32 bit.
- Dolby Digital 16 bit channel 1.
- Dolby Digital 16 bit channel 2.

The encoder supports these automatic data rate modes:

- Auto 384
- Auto 448

The data rate is adapted to the channel coding (1/0, 2/0, . . . , 3/2) where 384 kbps and 448 kbps are the maximum rates. This is the recommended mode.

▲ Note: The standard data rate for ATSC transmission in the USA is 384 kbps.

The Dolby Digital (AC-3) encoder's data rate may be set to any one of the following:

56 kbps 64 kbps 80 kbps 96 kbps 112 kbps 128 kbps
160 kbps 192 kbps 224 kbps 256 kbps 320 kbps 384 kbps
448 kbps 512 kbps 576 kbps 640 kbps

The channel modes (stereo, 5.1, etc.) determine the best data rate. This table summarizes the modes:

Table 6-2: Channel Mode Data Rates

Channel Mode	Data Rate
1/0 C	From 56 kbps, usually 96 kbps (mono)
2/0 L,R	From 112 kbps, usually 192 kbps (stereo)
3/0 L,C,R	From 256 kbps
2/1 L,R,S	From 256 kbps
3/1 L,C,R,S	From 320 kbps
2/2 L,R,Ls,Rs	From 320 kbps
3/2 L,C,R,Ls,Lr	From 384 kbps, often 448 kbps

Dolby Processing Times

The Imagestore 750 takes one or more video frames to perform Dolby decoding and encoding:

Table 6-3: Dolby Processing Times

Type	Direction	Video Frames
Dolby E	Decode	1
Dolby Digital	Decode	1
Dolby E	Encode	1
Dolby Digital	Encode	6

Note: The Imagestore 750 has built-in video delays that allow you to compensate for these delays. (See Video Frame Delays on page 43 and Audio Delays on page 146.)

Upgrading Dolby Module Firmware

Firmware for the Dolby modules is included within the Imagestore 750 software. A module's firmware will be upgraded automatically during a software update, but only when an update is required.

Note: Each Dolby module firmware upgrade can take 3–4 minutes to complete. Therefore the overall software upgrade time could be extended by up to 16 minutes. Please monitor progress on Imagestore 750's front panel and do not power down the Imagestore 750 too early. Doing so may render the Imagestore 750 inoperable.

Throughout the software upgrade, progress is reflected on the Imagestore 750's front panel. The panel indicates which software/firmware file is being loaded. For Dolby modules, the filenames start with the Dolby module's model number (for example, "**Load cat552**" or "**Load cat559**").

Dolby Front Panel Display Items

The following information relating to Dolby options is available at the front panel:

- Internal metadata sources.

  The user-defined metadata preset to be loaded into the internal metadata sources can be set at the front panel. Choose `Operate > Audio > MD Preset > Processor x`, where *x* is 1, 2, 3, or 4.

- Audio module status and type.

  Use the front panel menu `Status > Audio Mod Stat` to view the status and type of the optional audio modules installed. The status of the audio module can be one of the following:

Module Error	The module has an error
Module OK	There are no errors for the module
Not Fitted	No module is installed
Unknown	The module type is unknown

  The module type shows whether an installed module is a Dolby decoder, a Dolby Digital encoder, a Dolby E encoder, or an up-mix module.

- Input audio type.

  The input status for all 16 channels of the 4 audio feeds and all 16 pairs of the AES inputs is available from the front panel. (See Inputs on page 164 for how these are configured.)

  ```
  Status > Input Status > Audio Feed x > Channel y
  Status > Input Status > AES > Pair n (L and R)
  ```

  The front panel shows whether an input is carrying PCM, Dolby E, Dolby Digital, or non-PCM and whether the input is unlocked. It shows "**Unknown**" if the signal is locked but unrecognized.

Configuring Dolby

In versions of the Imagestore 750 software prior to v2.0.1, audio configuration was performed through hand-crafted text-based "mix files." Although this is still possible, the graphical 'Audio Graph' page of the Imagestore 750 Configurator now makes designing and maintaining audio configurations much simpler, and is essential for configuring advanced audio modules such as

Dolby. Delays through audio modules can also be calculated automatically. The Imagestore 750 Configurator is available from the Miranda Conversion Software CD.

Note: If you are upgrading to newer software, you might prefer to retain your previous audio mix file if you are not using advanced audio modules. However, you will not benefit from the Imagestore 750 Configurator's advanced audio features.

The Imagestore 750 Configurator (and its 'Audio Graph' page) is described in Chapter 8. The Imagestore 750 Configurator also provides a 'Metadata Mode' which is covered in Dolby Metadata on page 120.

Automation Control

Automation commands can be used to control some aspects of the audio modules.

Note: For details of the Oxtel automation protocol, see the documents listed under Applicable Publications and Tools on page 3.

Dolby Decoder Modules

Note: This applies only to the CAT552 decoder module.

The Dolby decoder function can be set to one of the following modes using the 'q3' automation command:

0 = Automatic.

1 = Dolby E.

2 = Dolby Digital.

3 = Mute.

4 = Force backup.

Please see Dolby Decode Module on page 113 for a description of each mode.

Dolby E Encoder Modules

Note: This applies only to the CAT559E encoder module.

The Dolby E encoder function can be set to one of the following modes using the 'q1' automation command:

0 = Encode.

1 = Pass-through.

2 = From decoder status.

Please see Dolby E Encoder Module on page 115 for a description of each mode.

Dolby Digital Encoder Modules

Note: This applies only to the CAT559D encoder module.

The Dolby Digital encoder function can be set to one of the following modes using the 'q2' automation command:

0 = Encode.

1 = Pass-through.

2 = From decoder status.

Please see Dolby Digital Encoder Module on page 116 for a description of each mode.

Dolby Metadata

Dolby metadata contains information about the audio bit-stream. It is different for Dolby Digital and Dolby E.

- Dolby E metadata contains a copy of the Dolby Digital metadata for every program carried in the transport stream, as well as parameters specific to the transport stream such as what audio configuration of programs is being carried, for example 5.1 + 2.
- Dolby Digital metadata contains data to be used by consumer electronics, such as mix levels for down-mixing surround sound into stereo.

  Metadata can accompany the audio input into an Imagestore 750 and be routed though to output, or it can be supplied separately for use directly at the audio outputs. Metadata is routed through the Imagestore 750, connected between various metadata sources and destinations. Metadata may be carried with the audio within an SDI or AES transport or separately on a RS-485 serial connection.

The Imagestore 750's metadata handling includes:

- A/B switching of metadata synchronously with the audio A/B-mixer.
- RS-485 serial metadata connections, flexible inputs and outputs.[2]
- Custom-defined metadata presets.
- Internal metadata generation from selectable custom-defined presets.
- Changing internally-generated metadata through automation.
- Flexible routing of metadata internally.

Program Configuration

Each Dolby decoder and encoder processes up to 8 mono audio channels. A "program configuration" contains a set of audio "programs," each of which contains a number of audio "channels." For example, the program configuration "5.1 + 2" comprises two audio programs, 5.1 surround and stereo, with a total of eight audio channels.

2. Please refer to Rear Panel and Connections on page 200 for details of the RS-485 ports.

The composition of these eight channels is what Dolby metadata terms "program configuration," and metadata handling within the Imagestore 750 includes the following program configurations for Dolby E:

Table 6-4: Dolby E Program Configuration - Main Output Channel Assignment Program Count, Channel Count

Dolby E Program Configuration	Main Output Channel Assignment								Program Count	Channel Count
	1	2	3	4	5	6	7	8		
5.1 + 2	1L	1R	1C	1LFE	1Ls	1Rs	2L	2R	2	8
5.1 + 1 + 1	1L	1R	1C	1LFE	1Ls	1Rs	2C	3C	3	8
4 + 4	1L	1R	1C	1S	2C	2S	2L	2R	2	8
4 + 2 + 2	1L	1R	1C	1S	3L	3R	2L	2R	3	8
4 + 2 + 1 + 1	1L	1R	1C	1S	3C	4C	2L	2R	4	8
4 + 1 + 1 + 1 + 1	1L	1R	1C	1S	4C	5C	2C	3C	5	8
2 + 2 + 2 + 2	1L	1R	3L	3R	4L	4R	2L	2R	4	8
2 + 2 + 2 + 1 + 1	1L	1R	3L	3R	4C	5C	2L	2R	5	8
2 + 2 + 1 + 1 + 1 + 1	1L	1R	3C	4C	5C	6C	2L	2R	6	8
2 + 1 + 1 + 1 + 1 + 1 + 1	1L	1R	4C	5C	6C	7C	2C	3C	7	8
1 + 1 + 1 + 1 + 1 + 1 + 1 + 1	1C	2C	3C	4C	5C	6C	7C	8C	8	8
5.1	1L	1R	1C	1LFE	1Ls	1Rs	—	—	1	6
4 + 2	1L	1R	1C	1S	—	—	2L	2R	2	6
4 + 1 + 1	1L	1R	1C	1S	—	—	2C	3C	3	6
2 + 2 + 2	1L	1R	3L	3R	—	—	2L	2R	3	6
2 + 2 + 1 + 1	1L	1R	3C	4C	—	—	2L	2R	4	6
2 + 1 + 1 + 1 + 1	1L	1R	4C	5C	—	—	2C	3C	5	6
1 + 1 + 1 + 1 + 1 + 1	1C	2C	3C	4C	5C	6C	—	—	6	6
4	1L	1R	1C	1S	—	—	—	—	1	4
2 + 2	1L	1R	—	—	—	—	2L	2R	2	4
2 + 1 + 1	1L	1R	—	—	—	—	2C	3C	3	4
1 + 1 + 1 + 1	1C	2C	3C	4C	—	—	—	—	4	4
7.1	1L	1C	1Ls	1Lb	1R	1LFE	1Rs	1Rb	1	8
7.1 Screen	1L	1C	1Ls	1Lc	1R	1LFE	1Rs	1Rc	1	8

Notation:

L	Left channel (front)	Rs	Right surround channel (rear, right)
R	Right channel (front)	Lb	Left back channel
C	Center channel (front)	Rb	Right back channel
S	Surround channel (center rear)	Lc	Left center channel
Ls	Left surround channel (rear, left)	Rc	Right center channel
LFE	Low frequency effects channel		

Notation "5.1" reflects the number of full-range channels, where ".1" reflects the limited range of the LFE channel.

Metadata Sources

Metadata can be obtained from any of the following inputs:

- External RS-485 ports (4).
- Internal Dolby decoder module (4).
- Internal metadata A/B switch.
- Internally-stored custom-defined preset (4).
- Internal blank source.

Metadata Destinations

Metadata passing through the Imagestore 750 can be supplied to a number of possible destinations:

- External RS-485 Ports (4).
- Dolby encoder module (4).
- Internal metadata A/B switch.

Metadata Routing

All audio configurations that use Dolby and metadata have an accompanying metadata configuration.

Metadata may be connected from any available “source” to any available “destination”. Metadata typically feeds an internal Dolby encoder to be embedded within the Dolby PGM output, or is output from the Imagestore 750 on an RS-485 port.

Use the ‘Audio Graph’ page under ‘Configuration Mode’ in the Imagestore 750 Configurator to configure metadata. Use ‘Metadata Mode’ to configure metadata presets. The following diagrams illustrate how to configure some simple metadata cases.

Embedded SDI A/B Mixing (No Metadata)

Figure 6-14 shows a simple 5.1 channel A/B mix, with SDI inputs and SDI output within the Imagestore 750 Configurator's 'Audio Graph' page.

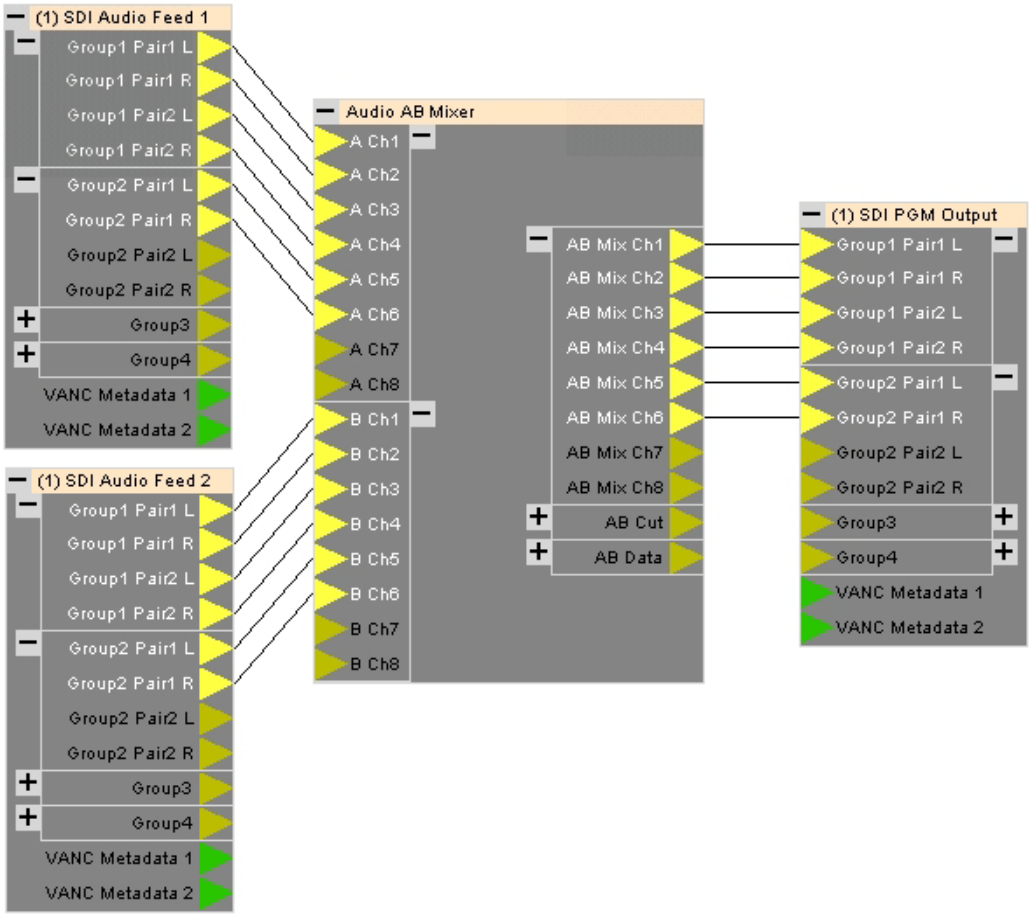


Fig. 6-14: Audio graph - A/B Mixing Embedded PCM

Metadata Direct Routing

Building on the sample of Figure 6-14, we next insert metadata at the output. In this case, a Dolby E encoder is added to the configuration. It is fed by external metadata from a serial RS-485 communication port. However, the metadata could equally have come from any other metadata source.

The metadata is then included within the Dolby E output via the PGM SDI stream.

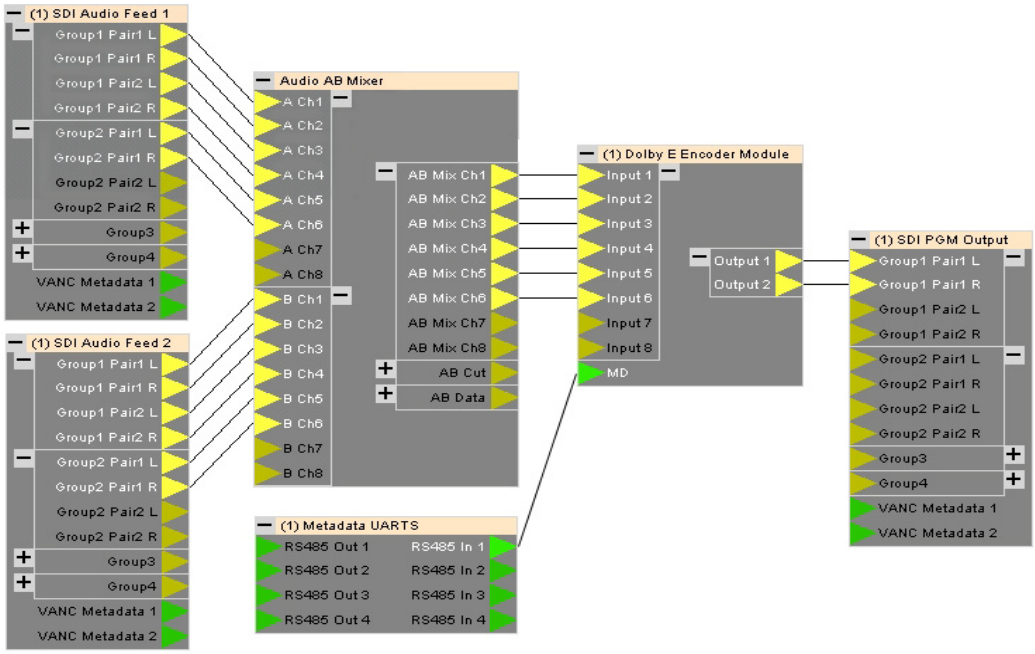


Fig. 6-15: Audio graph - Metadata Direct routing

Metadata Indirect A/B-Switched Routing

Next, metadata is sourced from one of two RS-485 inputs, depending on the position of the audio A/B mixer. The metadata sources are cut at the half-way point of an audio A/B mix.

The metadata is then included within the Dolby E output via the PGM SDI stream.

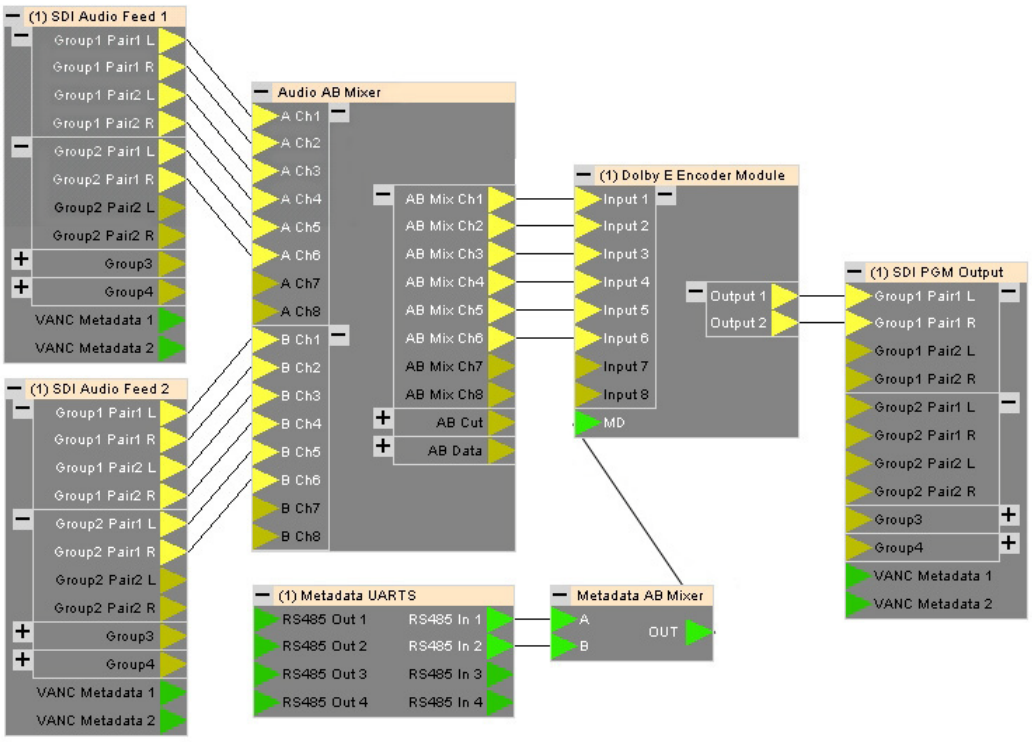


Fig. 6-16: Audio graph - Metadata Indirect A/B Switched routing

▲ Note: Metadata generated internally by the Imagestore 750 is configured under 'Metadata Mode' within the Imagestore 750 Configurator.

Custom-Defined Metadata Presets

There are 4 custom-defined metadata presets available in the Imagestore 750. The metadata presets form a complete list of all metadata parameters.

There are 4 internal metadata sources, called "banks" or "processors." Custom-defined preset parameters can be loaded into these metadata banks.

The preset parameters for metadata are defined in the Imagestore 750 Configurator and transferred to the Imagestore 750 in a configuration file. After the configuration file is transferred, individual custom-defined preset files can then be loaded into the internal metadata banks through automation.

After a custom-defined preset is loaded into an internal bank, its values can be over-ridden by subsequent automation commands. This does not affect the original custom-defined preset, just the values currently in use.

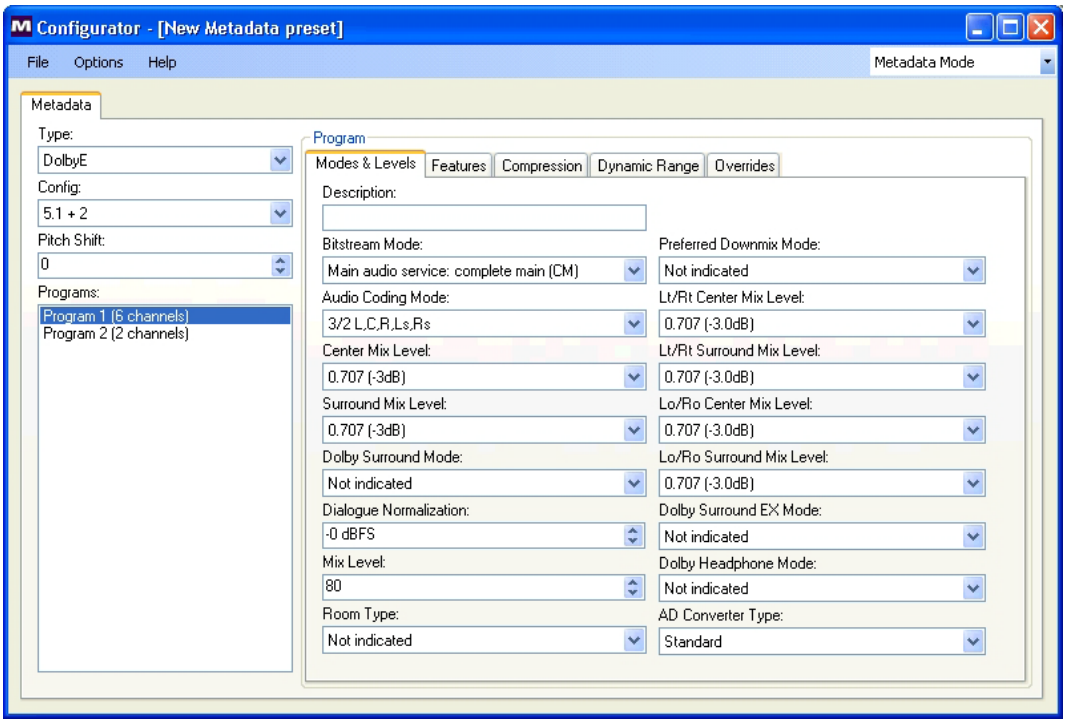


Fig. 6-17: Imagestore 750 Configurator - Metadata Mode, Metadata presets

Metadata Mode

Some metadata parameters are briefly described here. For a full description of Dolby metadata, refer to Dolby Labs' metadata documentation:

- SMPTE RDD 6-2008, *Description and Guide to the Use of the Dolby E Audio Metadata Serial Bitstream*.
- Dolby Labs' *Metadata Guide*.

The following parameters are found on the main left-hand pane of the Configuration Tool when in Metadata Mode.

- 'Type'

  This specifies which type of Dolby metadata is to be generated:

Dolby E	Professional metadata
Dolby Digital	Consumer metadata

- 'Config'

  This specifies the program configuration option. Available program configuration options are listed completely in Program Configuration on page 120.

  ▲ Note: This option is enabled only for Dolby E.

- 'Pitch Shift'

  This indicates the amount of pitch shift between the original playback speed and the current playback speed.

- 'Programs'

  This control shows the available audio "programs" specified by the current 'Config' selection. When more than one "program" is available, you should select the one that you want to modify before making changes to the items in the right-hand pane of the metadata page.

  ▲ Note: This option is enabled only for Dolby E.

'Modes & Levels' Tab

The parameters found in the 'Modes & Levels' tab of the metadata page are described here.

- 'Description'

  This allows the user to enter a textual description for the selected "program." Any description entered appears in brackets within the list of programs.

- 'Bitstream Mode'

  This indicates the type of program service being carried. Choices include the following:

  - Main audio service: complete main (CM).
  - Main audio service: music and effects (ME).
  - Associated service: visually impaired (VI).
  - Associated service: hearing impaired (HI).
  - Associated service: dialogue (D).
  - Associated service: commentary (C).
  - Associated service: emergency (E).
  - Associated service: voice over (VO).
  - Main audio service: karaoke.

- 'Audio Coding Mode'

  This indicates which of the main service channels are in use. Choices include the following:

  - 1/0 C
  - 2/0 L,R
  - 3/0 L,C,R
  - 2/1 L,R,S
  - 3/1 L,C,R,S
  - 2/2 L,R,Ls,Rs
  - 3/2 L,C,R,Ls,Rs

- 'Center Mix Level'

  This indicates the nominal down-mix level of the center channel (C) with respect to the left (L) and right (R) channels. Choices include the following:

  - 0.707 (–3 dB)
  - 0.595 (–4.5 dB)
  - 0.500 (–6 dB)

▲ Note: This option is enabled only for Dolby E.

- 'Surround Mix Level'

  This indicates the nominal down-mix level of the surround channels if they are in use. Choices include the following:

  - 0.707 (–3 dB)
  - 0.500 (–6 dB)
  - 0

  ▲ Note: This option is enabled only for Dolby E.

- 'Dolby Surround Mode'

  This indicates whether program has been encoded in Dolby Surround. It can take one of the following values. Choices include the following:

  - Not indicated
  - Not encoded
  - Encoded

  ▲ Note: This option is not used by the Dolby Digital (AC-3) decoder, but may be used by other portions of the audio reproduction equipment.

- 'Dialogue Normalization'

  The dialogue element of program audio generally serves as a reference for the loudness of all the other audio. When audio from different sources is reproduced, the apparent loudness of the dialogue element frequently varies from source to source.

  The 'Dialogue Normalization' parameter indicates the average dialogue loudness during the program. It is used by the section of the sound reproduction system responsible for setting the reproduction level.

- 'Mix Level'

  The mix level indicates the absolute acoustic sound pressure level of an individual program during the final audio mixing session. The code represents a value in the range 0–31. The peak mixing level is 80 plus the value of the mix level in dB SPL, or 80 to 111 dB SPL. The peak mixing level is the acoustic level of a sine wave in a single channel whose peaks reach 100 percent in the PCM representation. The absolute SPL value is typically measured by means of pink noise with an RMS value of 20 or 30 dB below the peak RMS sine wave level. The value of the mix level is not typically used within the Dolby Digital (AC-3) decoder, but can be used by other parts of the audio reproduction equipment.

- 'Room Type'

  The room type indicates the relative size and monitor frequency response curve of the mixing room used for the final audio mixing session. The room type value is not typically used by the AC-3 decoder, but can be used by other parts of the audio reproduction equipment. Choices include the following:

  - Not indicated.
  - Large room.
  - Small room.

- 'Preferred Down-mix Mode'

  The preferred stereo down-mix mode setting indicates the type of stereo down-mix preferred by the mastering engineer. This information may be used by the Dolby Digital (AC-3) decoder to configure the type of stereo down-mix automatically, but can also be overridden or ignored. Choices include the following:

  - Not indicated.
  - Lt/Rt down-mix preferred.
  - Lo/Ro down-mix preferred.

  Note: For information on down-mix options, see Down-Mix Options on page 115.

- 'Lt/Rt Center Mix Level'

  This setting indicates the nominal down-mix level of the center channel with respect to the left and right channels in a Lt/Rt down-mix. Choices include the following:

  - 1.414 (+3.0 dB)
  - 1.189 (+1.5 dB)
  - 1.000 (0.0 dB)
  - 0.841 (–1.5 dB)
  - 0.707 (–3.0 dB)
  - 0.595 (–4.5 dB)
  - 0.500 (–6.0 dB)
  - 0.000 (–inf dB)

  ▲ Note: The meaning of this field is defined as described only if the audio coding mode is 3/0, 3/1 or 3/2. If the audio coding mode is 1/0, 2/0, 2/1, or 2/2 then the meaning of this field is *reserved*.

- 'Lt/Rt Surround Mix Level'

  This setting indicates the nominal down-mix level of the surround channels with respect to the left and right channels in a Lt/Rt down-mix. Choices include the following:

  - 0.841 (–1.5 dB)
  - 0.707 (–3.0 dB)
  - 0.595 (–4.5 dB)
  - 0.500 (–6.0 dB)
  - 0.000 (–inf dB)

  ▲ Note: The meaning of this field is defined as described only if the audio coding mode is 2/1, 3/1, 2/2 or 3/2. If the audio coding mode is 1/0, 2/0 or 3/0 then the meaning of this field is *reserved*.

- 'Lo/Ro Center Mix Level'

  This setting indicates the nominal down-mix level of the center channel with respect to the left and right channels in a Lo/Ro down-mix. Choices include the following:

  - 0.841 (–1.5 dB)
  - 0.707 (–3.0 dB)
  - 0.595 (–4.5 dB)
  - 0.500 (–6.0 dB)

- 0.000 (–inf dB)

▲ Note: The meaning of this field is defined as described only if the audio coding mode is 2/1, 3/1, 2/2 or 3/2. If the audio coding mode is 1/0, 2/0 or 3/0 then the meaning of this field is *reserved*.

- 'Lo/Ro Surround Mix Level'

  This setting indicates the nominal down-mix level of the surround channels with respect to the left and right channels in a Lo/Ro down-mix. Choices include the following:

  - 0.841 (–1.5 dB)
  - 0.707 (–3.0 dB)
  - 0.595 (–4.5 dB)
  - 0.500 (–6.0 dB)
  - 0.000 (–inf dB)

  ▲ Note: The meaning of this field is defined as described only if the audio coding mode is 2/1, 3/1, 2/2 or 3/2. If the audio coding mode is 1/0, 2/0, or 3/0 then the meaning of this field is *reserved*.

- 'Dolby Surround EX™ Mode'[3]

  This mode indicates whether the program has been encoded in Dolby Surround EX.™ This information is not used by the AC-3 decoder, but can be used by other portions of the audio reproduction equipment. Choices include the following:

  - Not indicated.
  - Not Dolby Surround EX™ encoded.
  - Dolby Surround EX™ encoded.

    Example: Note: The meaning of this field is defined as described only if the audio coding mode is 2/2 or 3/2. If the audio coding mode is 1/0, 2/0, 3/0, 2/1 or 3/1 then the meaning of this field is *reserved*.

- 'Dolby Headphone Mode'

  This setting indicates whether the program has been Dolby Headphone-encoded. This information is not used by the Dolby Digital (AC-3) decoder, but can be used by other portions of the audio reproduction equipment. If the value is set to the reserved code, the decoder should still reproduce audio. Choices include the following:

  - Not indicated.
  - Not Dolby headphone encoded.
  - Dolby headphone encoded.

  ▲ Note: The meaning of this field is only defined as described if the audio coding mode is 2/0. If the audio coding mode is 1/0, 3/0, 2/1, 3/1, 2/2 or 3/2 then the meaning of this field is *reserved*.

- 'AD Converter Type'

  This setting indicates the type of A/D converter used to capture the PCM audio. This information is not used by the AC-3 decoder, but can be used by other portions of the audio repro-

3. "Surround EX" is a trademark of Dolby Laboratories.

duction equipment. If the type of A/D converter used is not known, choose the 'Standard' setting. Choices include 'Standard' and 'HDCD'.

Features Tab

The parameters of the 'Features' tab in the 'Metadata' page are described here.

- 'Low Frequency Effects'

  This setting indicates whether the low-frequency effects (LFE) or subwoofer channel is on or off.

- 'Copyright'

  If you set this attribute, the information in the bitstream is indicated as protected by copyright. Otherwise it is not indicated as protected.

- 'Original Bitstream'

  This attribute indicates whether the bitsteam is original or a copy of another bitstream.

- 'DC High Pass Filter'

  This parameter indicates whether the DC blocking 3 Hz high-pass filter is applied to the main input channels in the Dolby Digital encoder. It is used to remove DC offsets in the program audio and would only be switched off in exceptional circumstances.

- 'Bandwidth Low Pass Filter'

  This parameter determines whether a low-pass filter is applied to the main input channels of a Dolby Digital encoder prior to encoding. The filter removes high-frequency signals that are not encoded. At suitable data rates, this filter operates above 20 kHz. In all cases, it prevents aliasing on decoding. It is normally switched on. This parameter is not passed to the Dolby Digital (AC-3) decoder.

- 'LFE Low Pass Filter'

  This parameter determines whether a 120 Hz low-pass filter (used to remove frequencies above 120 Hz that would cause aliasing when decoded) is applied to the LFE channel input of a Dolby Digital encoder prior to encoding. It is ignored if the LFE channel is disabled. This filter should be switched off only if the audio to be encoded is known to have no signal above 120 Hz. This parameter is not sent to the consumer Dolby Digital (AC-3) decoder.

- 'Surround 90 Degrees Phase'

  This parameter causes the Dolby Digital encoder to apply a 90-degree phase shift to the surround channels. This allows a Dolby Digital decoder to create a Lt/Rt down-mix simply. For most audio material, the phase shift has a minimal impact when the Dolby Digital program is decoded to 5.1 channels, but provides a Lt/Rt output that can be Pro Logic® -decoded to L, C, R, and S, if desired. However, for some phase-critical material (such as music) the phase shift is audible when one is listening in 5.1 channels. Similarly, some material down-mixes to a satisfactory Lt/Rt signal without needing this phase shift. It is therefore important to balance the needs of the 5.1 mix and the Lt/Rt down-mix for each program. This parameter is not sent to the Dolby Digital (AC-3) decoder.

- 'Surround Attenuation'

  The Surround 3 dB attenuation parameter determines whether the surround channel(s) are attenuated 3 dB before encoding. It is used to compensate for the level of the surround signal(s) originating from a theatrical mixing room (dubbing stage) and those originating from mixing rooms used for television and DVDs. For compatibility with older film formats, theat-

rical mixing rooms set the surround playback channel sensitivity (and thus the reproduced SPL) 3 dB lower than the sensitivity (thus reproduced SPL) of the front channels. The consequence is that the surround signal levels on tapes produced in a dubbing stage are 3 dB higher than those produced in a consumer mixing room. Therefore, to convert to a consumer mix from a theatrical mix, it is necessary to reduce the surround levels by 3 dB by enabling this parameter.

- 'RF Pre-Emphasis'

  This parameter is designed to protect against over modulation when a decoded Dolby Digital bitstream is RF-modulated. When enabled, the Dolby Digital encoder includes pre-emphasis in its calculations for RF mode compression. The parameter has no effect when decoding using line mode compression. Except in rare cases, this parameter should be disabled.

Compression Tab

The following are the compression profile parameters found within the 'Compression' tab under 'Metadata Mode' in the Imagestore 750 Configurator.

- Profile

  This field indicates the RF compression word of the AC-3 bitstream associated with the specified program.

  The setting allows the program provider (or broadcaster) to implement a large dynamic range reduction (heavy compression) in a way that ensures that a monophonic down-mix does not exceed a certain peak level. The heavily compressed audio program might be desirable for certain listening situations such as movie delivery to a hotel room, or to an airline seat. The peak level limitation is useful when, for instance, a monophonic down-mix feeds an RF modulator and over modulation must be avoided.

  A compression profile is one of the following:

  - None
  - Film, Standard
  - Film, Light
  - Music, Standard
  - Music, Light
  - Speech

Dynamic Range Tab

Each audio "program" carried within a Dolby E stream has a stream of dynamic range control profiles associated with it. The dynamic range is composed of the profile to which the value applies (value between 1 and 8), and the actual dynamic range profile value:

- None
- Film, Standard
- Film, Light
- Music, Standard
- Music, Light
- Speech

Automation Control

Automation commands can be used to change internal metadata source values. The internal sources of metadata are termed "banks." There are 4 available banks.

▲ **Note:** For details of the Oxtel automation protocol, see the Automation publications listed under Applicable Publications and Tools on page 3.

Internal Metadata Sources

Oxtel automation commands starting with "o" are used for controlling internal Dolby metadata parameters.

▲ **Note:** Although many aspects of metadata sources can be controlled individually, it is preferable to prepare a set of required presets beforehand and load them using the 'oT' command.

Up-Mix

"Up-mix" is the conversion of 2-channel audio to multi-channel audio. The up-mix audio option adds integral up-mix capability to the Imagestore 750. It creates a multi-channel-compatible audio signal from a stereo source using the Linear Acoustic upMAX™ up-mixing algorithm.

The up-mix audio module provides the following features:

- Stereo to multi-channel audio.
- Up to 4 up-mix modules.
- Linear Acoustic's upMAX™ up-mix algorithm.
- AutoMAX™ and metadata follow modes.
- Down-mix compatible output.
- Control through Oxtel automation command extensions.
- Configurable in the 'Audio Graph' page of the Imagestore 750 Configurator. (See Chapter 8.)

  Note: up to 4 Dolby encode, Dolby decode, and Up-Mix audio modules can be installed in the Imagestore 750 at one time.

Up-Mix Configurations

A number of different up-mix combinations can be configured. For example, it can be positioned after or before the A/B mix to suit the formatting of the source audio:

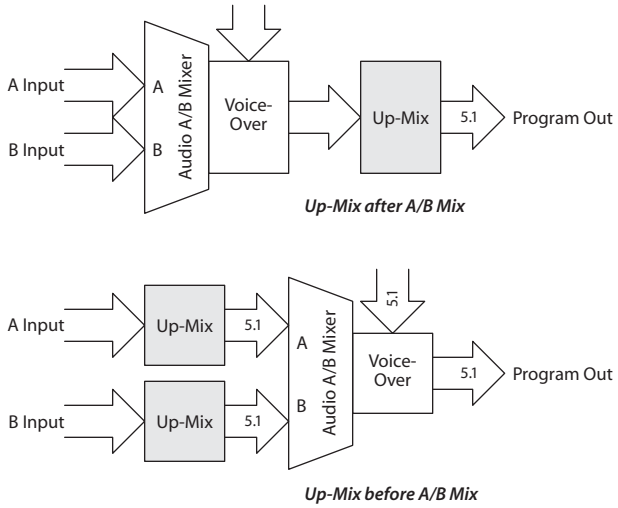


Fig. 6-18: Imagestore 750 Up-Mix positioned before/after A/B Mix

Product Codes

Product codes for Imagestore 750 are as follows:

IS-750-UMX	Up-mix kit
IS-750-UMX-UPG	Up-mix upgrade

The complete set of Imagestore 750 product codes is listed in Chapter 11.

Up-Mix Kit

The up-mix kit is **IS-750-UMX**.

The up-mix kit applies to new factory-built Imagestore 750s. It provides:

- Audio module carrier card.
- Additional RS-485 serial ports.
- Up-mix module (one).

Up-Mix Upgrade

The up-mix upgrade product code is **IS-750-UMX-UPG**.

The up-mix upgrade is used either to supplement a factory-built Imagestore 750 that either has an up-mix kit or Dolby kit. Alternatively, it can be used to purchase additional up-mix modules at a later date.

This option is applicable only to an Imagestore 750 already equipped with a Dolby carrier board. It includes one up-mix module.

Technical Specifications

An Imagestore 750 that is equipped with an up-mix kit has a carrier card containing 4 slots available for either up-mix or Dolby modules. There are no specific slots for up-mix modules because the Imagestore 750 detects the modules' presence and type automatically.

Up-Mix Module

The part number is **MOD-LA-DUP701**.

The up-mix audio module supports Linear Acoustic's upMAX™ 5.1-channel surround-field synthesizer under license. It creates "down-mix-compatible" left, right, center, surround and LFE channels from a two-channel audio input.

You can place each up-mix module in one of 4 modes:

- Pass-through.

  In *pass-through* mode, six input channels are passed through the module unaltered:

Fig. 6-19: Up-Mix module, pass-through mode

- Up-mix.

  In this mode, the module synthesizes a multi-channel audio signal from a stereo audio input.

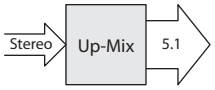


Fig. 6-20: Up-Mix module, Stereo Up-Mix mode

- From metadata.

  In this mode, the control of up-mixing or passthrough is steered by metadata. This allows automated stereo/surround switching between inputs when the input source contains same-source audio transitions.

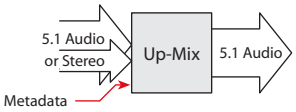


Fig. 6-21: Up-Mix module, From Metadata mode

- AutoMAX.™

  'AutoMAX™' mode will automatically switch between stereo and 5.1 at its input to provide 5.1 output at all times. It will automatically decide whether to up-mix.[4, 5] This ensures a fully automatic delivery of 5.1 audio to the consumer.

4. Current up-mix modules use Linear Acoustics' AutoMax-II™ algorithm.
5. Earlier up-mix modules used an earlier Linear Acoustics' AutoMax-I™ algorithm. When up-mix was enabled, the input channels 1 and 2 (L/R) were always up-mixed onto outputs 1–6 (L/R/C/LFE/Ls/Rs). If input channels 3–6 were also present then these signals were mixed onto the up-mixed C/LFE/Ls/Rs outputs. In summary, there was no dynamic signal detection between 5.1 and stereo inputs.

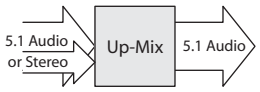


Fig. 6-22: Up-Mix module, AutoMax mode

▲ Note: When AutoMAX™ is enabled, the input channels 1 and 2 (L/R) are always up-mixed onto outputs 1-6 (L/R/C/LFE/Ls/Rs). If input channels 3–6 are also present then these signals are mixed onto the up-mixed C/LFE/Ls/Rs outputs. In summary, there is no dynamic signal detection between 5.1 and stereo inputs.

The following additional parameters may be set on an up-mix module:

Parameter	Description
LFE enable	Enable or disable low frequency effects.
LFE level	Sets the level of the created bass enhancement signal (expressed as percentage)
Center width	Controls how much of the center channel of the up-mixer is spread to the left and right channels. 0%=full center, 100%=full L/R.
Surround depth	Controls back-to-front panning of the surround output where 100% equals full signal from left surround (Ls) and right surround (Rs) and 0% equals surround fully mixed into the left/right/center (L/R/C) channels. 0%=full L/R, 100%=full Ls/Rs.
Up-mix to discrete time	Time (ms) to cross-fade from up-mixed output to discrete (non-up-mixed) source.
Discrete to up-mix time	Time (ms) to cross-fade from discrete (non-up-mixed) source to up-mixed output.
Threshold	Sets the threshold for the AutoMAX-II algorithm to decide that the input audio is not 5.1 (expressed in dB as a positive number).
Down-mix type	Sets the down-mix type as Lt/Rt or Lo/Ro. (See Down-Mix Options on page 115)

Table 6-5: Up-Mix parameters

The Imagestore 750 Configurator's 'Audio Graph' page shows a pair of down-mix outputs in addition to the 6 up-mix outputs. These give an alternative mix for any stereo-only applications:

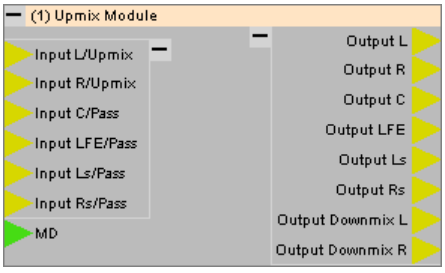


Fig. 6-23: Imagestore 750 Configurator - Audio graph Up-Mix representation

Up-Mix Processing Times

Up-mix processing takes one video frame to perform.

Type	Video Frames
Up-mix	1

Table 6-6: Up-Mix processing times

The Imagestore 750 has built-in video delays that allow you to compensate for this delay. This is described, for Dolby modules, in Audio Delays on page 146. The same principles apply to up-mix.

Upgrading Up-Mix Module Firmware

Firmware for the up-mix modules is included within the Imagestore 750 software release. A module's firmware will be upgraded automatically during a software update, but only when an update is required.

▲ Note: Each up-mix module firmware upgrade can take 3 or 4 minutes to complete. Therefore the overall software upgrade time could be extended by up to 16 minutes.

Please monitor the progress of the upgrade on the Imagestore 750's front panel. Do not power down the Imagestore 750 too early because doing so can render the Imagestore 750 inoperable.

Throughout the upgrade, progress is reflected on the front panel of the Imagestore 750. The panel indicates which software/firmware file is being loaded.

For up-mix modules, the panel shows the firmware upgrade as '**Load up-mix**'.

Configuring Up-Mix

The 'Audio Graph' page of the Imagestore 750 Configurator is the recommended tool for designing audio configurations that incorporate up-mix modules. See Audio Graph on page 161.

Imagestore 750 Configurator

In the Imagestore 750 Configurator, you can do the following:

- Draw the audio configuration, connecting audio inputs and outputs and other audio blocks to up-mix blocks.
- Draw Dolby metadata configurations and connect any required metadata to up-mix modules

Connecting Up-Mix Modules

Figure 6-24 shows how an up-mix module might be inserted in the audio graph. In this example, the inputs can be in stereo or 5.1 surround.

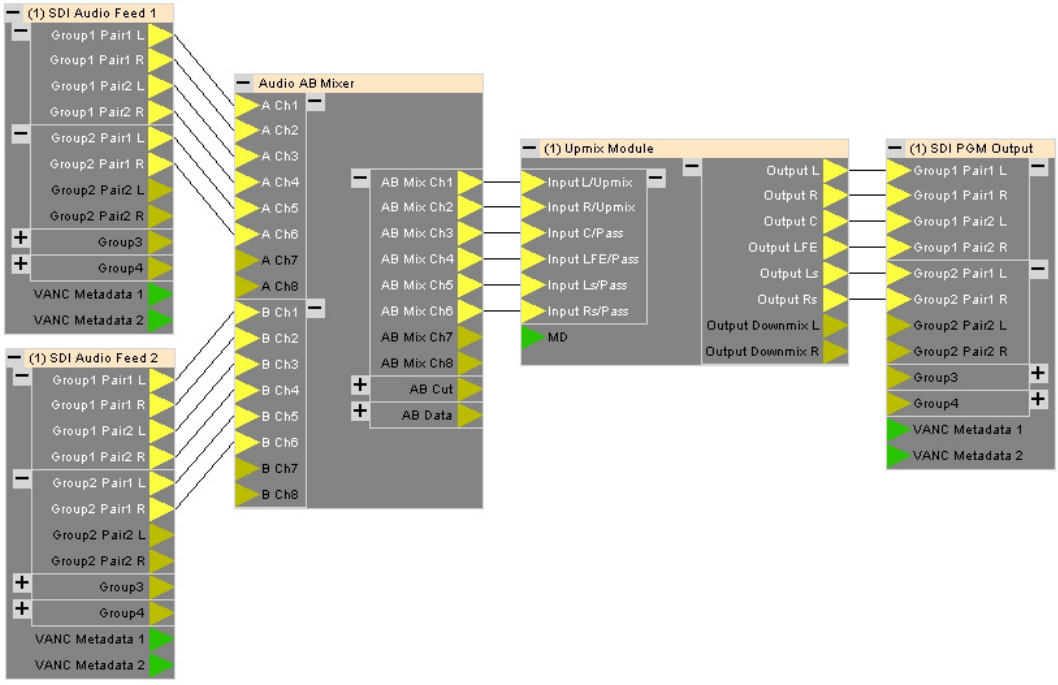


Fig. 6-24: Imagestore 750 Configurator - Connecting Up-Mix modules

Connecting Metadata to Up-Mix Modules

We need to control the up-mix module depending on whether the input is stereo or 5.1 surround, so the module can know whether to up-mix the input, or pass it straight through. To

do this, place up-mix module in 'From Metadata' mode, and then use the first RS-485 port to control whether up-mix is enabled or disabled.

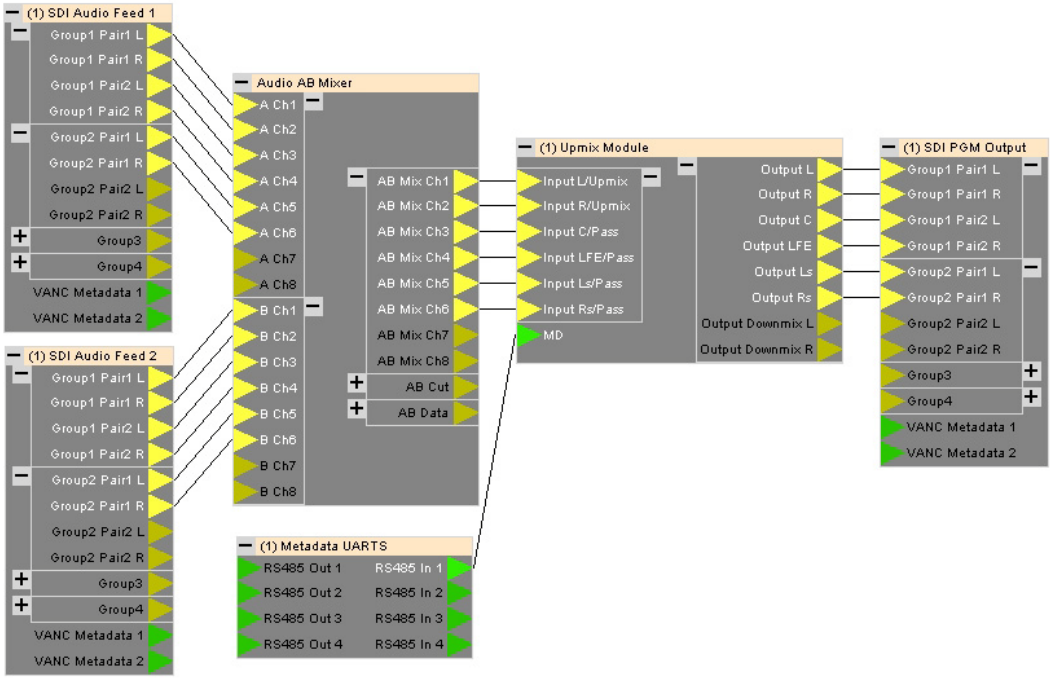


Fig. 6-25: Imagestore 750 Configurator - Connecting Metadata to Up-Mix module

Metadata

Dolby metadata contains information about the audio bit-stream including what configuration of "programs" is being carried; for example 5.1 + 2. Therefore, you can use Dolby metadata to drive an up-mix processor.

Metadata can be carried in the Dolby signal on AES, on SDI, or separately on an RS-485 serial connection.

Metadata handling within the Imagestore 750 includes:

- A/B switching of metadata synchronously with the audio A/B mix.
- RS-485 serial metadata connections.[6]
- Flexible inputs and outputs.
- Custom-defined metadata presets.
- Internal metadata generation from selectable custom-defined presets.
- Changing internally-generated metadata through automation.
- Flexible routing of metadata internally.

These points are explained in Dolby Metadata on page 120.

6. Please refer to Rear Panel and Connections on page 200 for details of the RS-485 ports.

Metadata Monitoring and Processing

The Imagestore 750 can route metadata from any one of its internal metadata sources. It can use custom-defined metadata presets to set up the metadata audio channel mode, parameters of which can then be modified through automation.

▲ Note: There is no support for dynamic processing of metadata parameters contained within an external Dolby bit-stream.

Custom-Defined Metadata Presets

There are 4 user-defined metadata presets available in the Imagestore 750. The metadata presets form a complete list of all metadata parameters.

There are 4 internal metadata sources, called “banks” or “processors.” Custom-defined preset parameters can be loaded into these metadata banks.

The preset metadata parameters are defined in the Imagestore 750 Configurator and transferred to the Imagestore 750 in a configuration file. After the configuration file is transferred, automation can then load individual custom-defined preset files into the internal metadata banks.

After a custom-defined preset is loaded into an internal bank, its values can be over-ridden by subsequent automation commands. This does not affect the original custom-defined preset, just the values currently in use.

Dolby Metadata on page 120 gives further information regarding the individual metadata parameters.

Automation Control

Automation commands can control some aspects of the audio modules and to change internal metadata source values. The internal sources of metadata are called “banks.” There are 4 available banks.

The metadata commands are summarized in Automation Control on page 119.

Note: For details of the Oxtel automation protocol, see the Automation publications listed under Applicable Publications and Tools on page 3.

Up-Mix Modules

The up-mix function can be placed, with the ‘q0’ automation command, in one of the following modes:

0 = Passthrough.

1 = Enable.

2 = AutoMD (follow metadata).

3 = AutoMAX™

Please see Technical Specifications on page 135 for a description of each mode.

Audio Description (AD)

Audio description refers to additional narration for blind and visually impaired consumers of visual media including television. It consists of a narrator talking through the television

program, describing what is happening on the screen during the natural pauses in the audio, and sometimes during dialogue if it is deemed necessary.

When the viewer hears the television program, the original program audio track is mixed with this additional narration or commentary. The mixing can be done at one of two places in the TV signal chain:

- AD receiver mix.
- AD broadcast mix.

AD Receiver Mix

Program audio is mixed with the mono AD commentary in each TV receiver. The viewer can adjust the AD commentary level at their own receiver. Mixing is performed under the control of a special control tone signal, which can be passed as an audio signal through television equipment for transmission. In this mode, both the original program audio and AD tracks (mono commentary and control tone) are broadcast.

Note: No special Imagestore 750 option is needed in this case because the control tone signal and the extra audio commentary track can both be passed as ordinary audio signals through the Imagestore 750.

AD Broadcast Mix

Program audio is mixed in with the AD commentary at the TV station ready for transmission. Mixing is again performed under the control of a special control tone signal, but this time it is done by the Imagestore 750 ahead of transmission. In this mode, both the original program audio and program-with-commentary are broadcast.

A mono commentary track is mixed by Imagestore 750 with stereo background audio to yield an extra program-audio stereo track with the commentary mixed in. The mixing of the commentary track is (again) controlled by a special control tone from another audio channel. The control tone determines how the background audio is ducked and the commentary mixed with it.

Note: The **IS-750-AD** option is required in this case.

Product Code

The code for the Imagestore 750's audio description is **IS-750-AD**. It represents one AD block only.

Note: This is a software option which does not require any hardware upgrade.

The complete set of Imagestore 750 product codes is listed in Chapter 11.

Configuration

After the audio description option has been purchased and installed, a single 'Audio Description' block becomes selectable within the Imagestore 750 Configurator's 'Audio Graph'. You can place this block in your audio configurations as required.

An audio configuration with a single audio feed connected to an AD block is shown in the following 'Audio Graph' example:

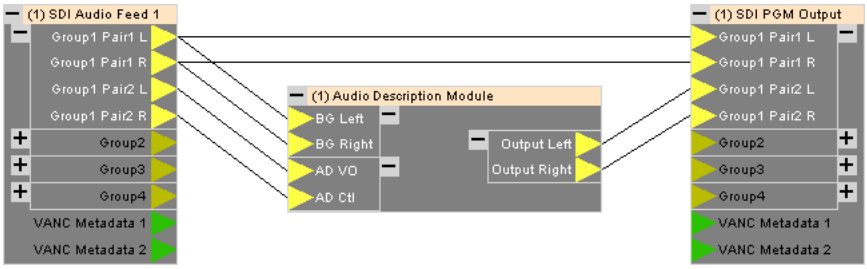


Fig. 6-26: Imagestore 750 Configurator - Audio graph, Audio Description block

The PGM output gives the following audio on its first four channels:

1 Stereo-left background audio.
2 Stereo-right background audio.
3 Stereo-left background audio with AD commentary mix.
4 Stereo-right background audio with AD commentary mix.

The channels (or pins) of the input audio feed contain the following signals:

1 Stereo-left background audio.
2 Stereo-right background audio.
3 AD commentary track.
4 AD control tone.

The first two input pins are passed-through to the 'SDI PGM Output' block (pins 1 and 2) to give a straight copy of the stereo background audio. All four input pins are then connected to the relevant pins of the AD block, the output of which is routed to pins 3 and 4 of the 'SDI PGM Output' block.

An audio configuration with dual audio feeds plus an A/B-mixer feeding an AD block is shown in the following 'Audio Graph' sample:

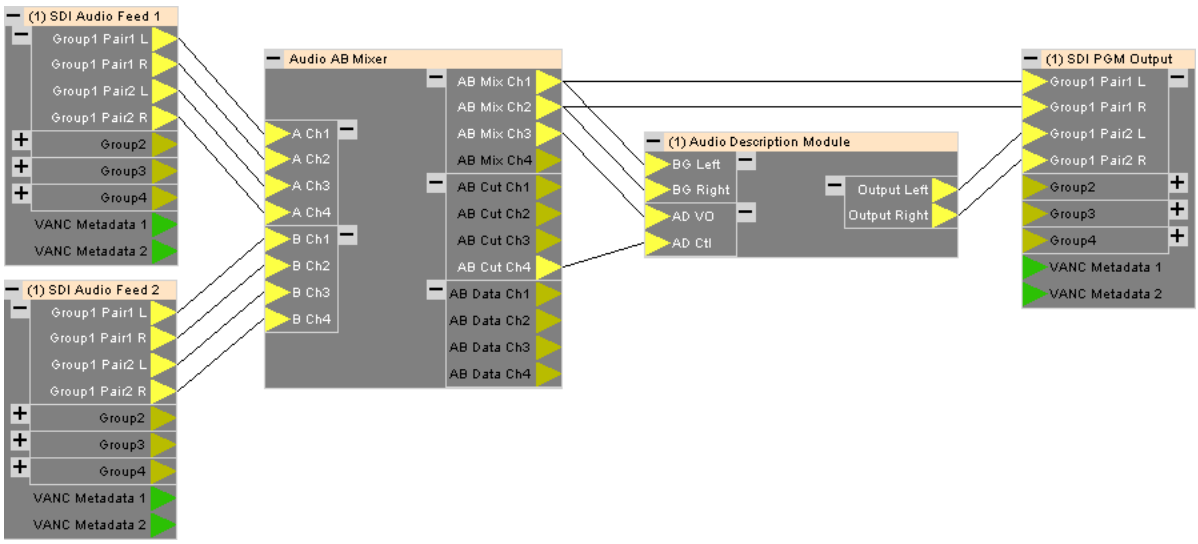


Fig. 6-27: Imagestore 750 Configurator - Audio Description audio graph

Note: The AD control tone must be A/B cut (not A/B mixed) so that the control tone always remains valid.

In both cases, the broadcast consumer will start hearing the AD commentary mix when they switch from the first to the second stereo pair.

Silence Detection

Note: Silence detection is included as part of the standard audio options (**IS-750-Audio6** and **IS-750-Audio16**).

Introduction

Silence detection is used to automate control of one or more audio voice-overs based on the audio level present within the audio source:

- Embedded SDI audio.
- AES inputs.
- Easyplay audio clips (including wide multi-language clips).

When an external audio voice-over can appear at any time (from embedded SDI audio or AES inputs), silence detection automatically ducks the background and mixes the voice-over. This is very useful because it removes the need for synchronous automation to control the voice-over.

Easyplay clips that contain multiple language variants most probably have different running times for each language. With traditional voice-overs, the background for all channels must remain ducked until the final language completes playing out; which is clearly problematic for other languages that finished earlier. The silence detection feature gets around this by detecting the finished language clip and restoring the background audio to its normal level.

Configuration

Follow these steps to add silence detection blocks into an audio configuration:

1 Open the Imagestore 750 Configurator's 'Audio Graph' page.

2 Drag an instance of 'Audio AutoDuck' onto the audio graph.

3 Select the number of channels per mixer source (1 to 16).

Note: A maximum of 16 audio channels can be shared between all silence detection blocks.

4 Connect appropriate sources to the background (BG) and voice-over (VO) input pins.

5 Connect appropriate destinations to the output pins.

6 Set the following parameters for the 'Audio AutoDuck' block:

Parameter	Default	Description
Silence threshold	–40	Level at which to consider the voice-over input as silent (in dB)
Silence trigger duration	25	Duration to wait (in fields) with audio below silence threshold before considering input to be silent
Fade-out rate	25	Fade from duck rate (in fields)
Fade-in rate	2	Fade to duck rate (in fields)

Table 6-7: Imagestore 750 Configurator - Audio AudioDuck parameters

Parameter	Default	Description
Duck level	–20	Duck level (in dB)
Duck mode	Individ-ual mode	Which channels are ducked when the voice-over becomes active. 'Individual mode' means each channel duck is individually con-trolled. 'Collective mode' means that all channels are ducked whenever any voice-over activity is detected.

Table 6-7: Imagestore 750 Configurator - Audio AudioDuck parameters

In this example, an Intuition XG provides a stereo audio voice-over embedded within an SDI fill signal. Whenever the audio voice-over is present, it is mixed automatically into the background audio. There is no need for that the Intuition XG to send any automation commands to the Imagestore 750 to control the voice-over block.

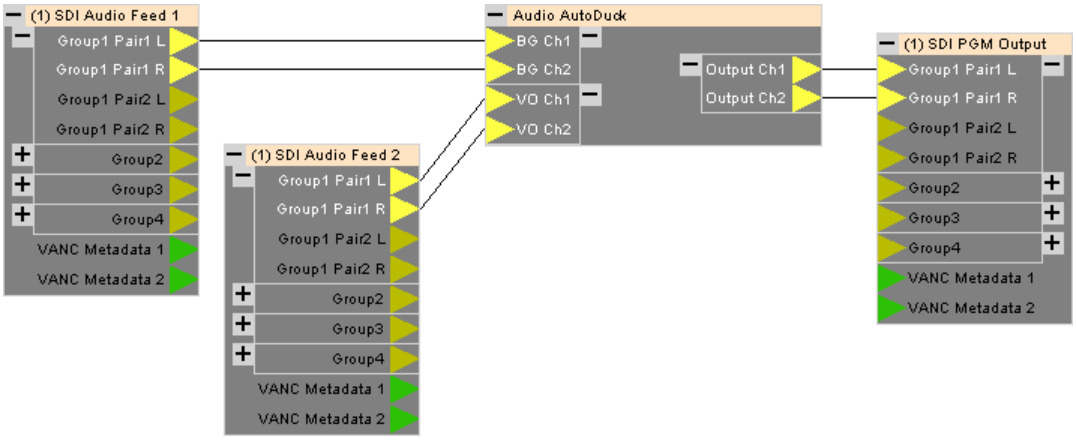


Fig. 6-28: Imagestore 750 Configurator - Silence Detection example, external voice-over audio on SDI fill

Note: AES audio sources (such as EAS audio warning messages) can also provide the external voice-over.

In the next example, a multi-language Easyplay clip (4 x stereo pairs) feeds an 'AutoDuck' silence detection block in 'individual mode':

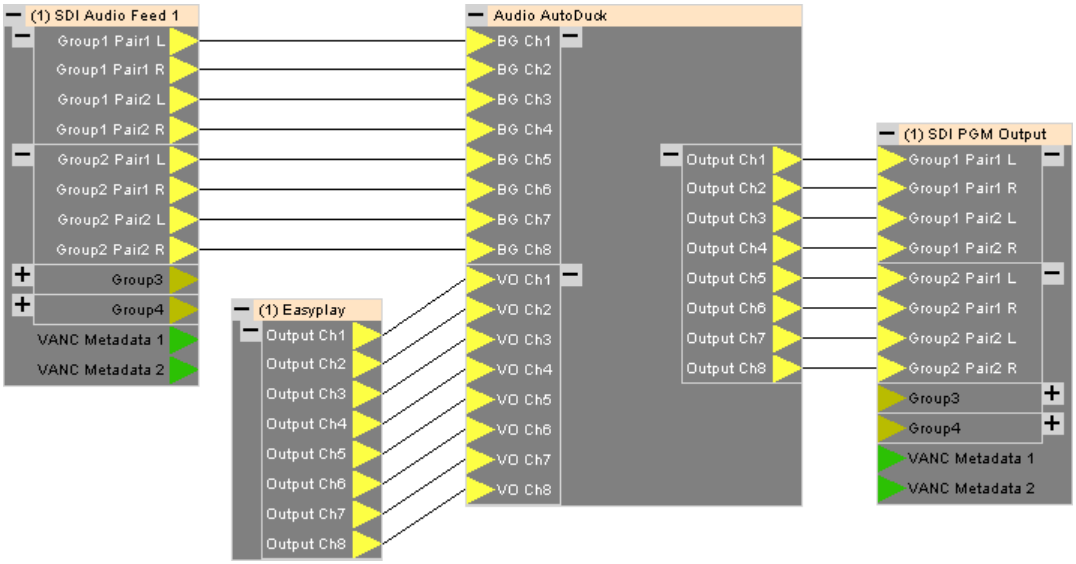


Fig. 6-29: Imagestore 750 Configurator - Silence Detection example, multi-language Easyplay audio clip

Although this configuration is likely to work well, there might be differences in the ducking for an individual language if there is any stereo panning present in the source. A better solution is to use individual 'AutoDuck' blocks for each language and place each block into 'collective mode', as shown here:

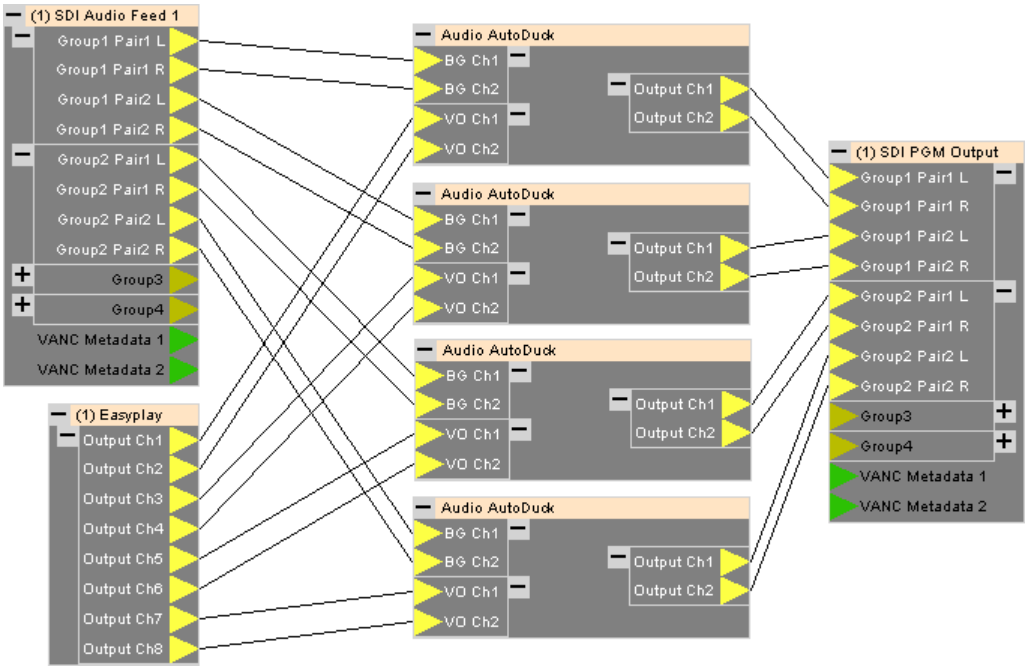


Fig. 6-30: Imagestore 750 Configurator - Silence Detection example with several AutoDucks

This ensures that each stereo pair is ducked collectively.

Audio Delays

Dolby decoding and encoding takes time to perform. It is very important that the audio and video delays through the Imagestore 750 are consistent and unchanging to avoid lip-sync issues or "jumps" in transmission. This section addresses how you can achieve that.

See Dolby Processing Times on page 117,

Dolby Delays

This table lists the audio delay incurred for various Dolby decode/encode use cases, The delay is expressed in video frames:

Decode	Encode	Dolby Delay (Frames)
—	Dolby E	1
—	Dolby Digital	6
Dolby E	—	1
Dolby E	Dolby E	2 = (1 + 1)
Dolby E	Dolby Digital	7 = (1 + 6)

Table 6-8: Delay for Dolby decode/encode

See Video Frame Delays on page 43 for a list of the different video frame delays that are available to compensate for any audio delays incurred by Dolby processing, such as for the use cases listed above.

The following table shows the program delays required for the Dolby use cases above:

Decode	Encode	PGM Audio Delay		PGM Video Delay—No DVE	
		Dolby	PCM	Post A/B-Mix	Output
—	Dolby E	1	—	—	1
—	Dolby Digital	6	—	—	6
Dolby E	—	1	—	—	1
Dolby E	Dolby E	2	—	—	2
Dolby E	Dolby Digital	7	—	—	7

Table 6-9: Video delays for Dolby delay compensation

When an Imagestore 750 is configured to use its DVE, the DVE delays the video by 1 or 2 frames. In this case, a compensating delay must be inserted into the background video path, post AB mixer: A 'PGM post A/B-mix' delays must be applied to PGM video[7] to compensate for the extra video delay that will be incurred when processing DVE:

Interlaced video standards	1 frame.
Progressive video standards	2 frames.

7. A post-A/B mix delay must also be applied to preview bus video if DVE preview is required.

The following table shows the PGM delays required for the above Dolby use cases when DVE processing is required on an interlaced video standard:

Decode	Encode	PGM Audio Delay		PGM Video Delay—DVE (Interlaced)	
		Dolby	PCM	Post A/B-Mix	Output
—	Dolby E	1	—	1	0
—	Dolby Digital	6	—	1	5
Dolby E	—	1	—	1	0
Dolby E	Dolby E	2	—	1	1
Dolby E	Dolby Digital	7	—	1	6

Table 6-10: PGM delays for Dolby cases, with DVE for interlaced video standard

The following table shows the PGM delays required for the above Dolby use cases when DVE processing is required on a progressive video standard:

Decode	Encode	PGM Audio Delay		PGM Video Delay—DVE (Progressive)	
		Dolby	PCM	Post A/B-Mix	Output
—	Dolby E	1	1	2	0
—	Dolby Digital	6	—	2	4
Dolby E	—	1	1	2	0
Dolby E	Dolby E	2	—	2	0
Dolby E	Dolby Digital	7	—	2	5

Table 6-11: PGM delays for Dolby cases, with DVE for progressive video standard

Note: In rows 1 and 3 of the preceding table, the video delay fo in-stream branding exceeds the audio delay for Dolby processing. Additional PCM audio delays must therefore be added so lip sync is maintained.

When an Imagestore 750 is configured for in-stream branding insertion, approximately 6 frames of 'PGM post A/B-mix' delay must be applied to PGM video to compensate for the the extra video delay that will be incurred. The following table shows the PGM delays required for the above Dolby use cases when in-stream branding insertion is required:

Decode	Encode	PGM Audio Delay		PGM Video Delay—In-Stream Branding	
		Dolby	PCM	Post A/B-Mix	Output
—	Dolby E	1	5	6	0
—	Dolby Digital	6	—	6	0
Dolby E	—	1	5	6	0

Table 6-12: PGM delays for Dolby cases, in-stream branding

Decode	Encode	PGM Audio Delay		PGM Video Delay—In-Stream Branding	
		Dolby	PCM	Post A/B-Mix	Output
Dolby E	Dolby E	2	4	6	0
Dolby E	Dolby Digital	7	—	6	1

Table 6-12: PGM delays for Dolby cases, in-stream branding

See In-Stream Branding Insertion on page 18 for additional information.

Note: In rows 1, 3, and 4 of the preceding table, the video delay for in-stream branding exceeds the audio delay for Dolby processing. Additional PCM audio delays must therefore be added so lip sync is maintained.

Metadata Delays

Dolby metadata normally corresponds to one of the following use-cases:

Pass-through	Metadata from the video source(s) is passed through decoder(s) and encoder(s).
Insert at output	Metadata stream is fed to the Dolby encoder.

Dolby metadata that passes through decoders and encoders automatically incur the same delay as audio. (See Dolby Processing Times on page 117 and Dolby Delays on page 146.) Any metadata that bypasses decoders must be set up to match the audio delay.

Note: Dolby metadata processors incur a minimum 2 frame delay when set in modification mode.

Audio Delay Blocks

The audio engine has up to 6 audio delay banks available for use in the 'Audio Graph' of the Imagestore 750 Configurator. Each audio delay bank is 16 audio channels wide. Each banks's delay value is configurable in the Imagestore 750 Configurator 'Audio Graph' or in the front panel using 'Setup > Audio Setup > Delays'. (See Audio Delay Blocks on page 167.)

Each delay bank can provide from 1 to 32,767 audio samples of delay, where the audio sample rate is 48 kHz. This provides over 16 video frames of audio delay for each audio delay block, although the actual delay in frames depends upon the frame rate for the current video standard as follows:

50 Hz standards	Maximum of 17.06 frames audio delay.
59.94 Hz standards	Maximum of 20.45 frames audio delay.

You can use audio delay banks and video frame delays in conjunction to ensure that the audio and video are kept in sync when processing in-stream branding insertion, DVE, Dolby E, Dolby Digital encoding or decoding, stereo to 5.1, or up-mix.

7 Control and Monitoring

Chapter 7 provides information about controlling the Imagestore 750 and monitoring its status.

Topics

Control Options

The Imagestore 750 can be controlled in several different ways:

- From the front panel.
- By automation.
- From iMC panels.
- From PresStation or Presmaster.
- By GPI events.
- By the Emergency Alert System

Front Panel

The front panel and its joystick are for local, manual control and can be used to navigate through a menu of parameters to adjust parameter values.

A full list of menu items available is listed in Appendix A, Front Panel Menu.

Front panel control of the Imagestore 750 is performed using a four-position joystick in conjunction with prompts from the display.

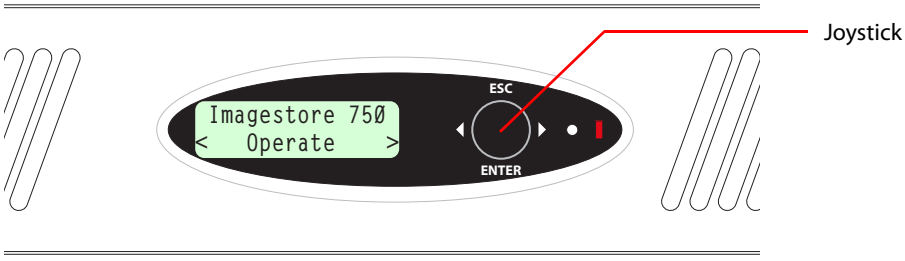


Fig. 7-1: Imagestore 750 Front Panel

Where this user manual discusses joystick input, it represents the 4 positions of the joystick with the terms '[esc]', '[enter]' or the arrow icons ◄ and ►.

At times, additional symbols are shown on the top line of the display, at the right hand edge. These highlight the state of the A/B Mixer (video or audio), the keyers or voice-overs. These are the symbols and their meaning:

A Source A
B Source B
– Intermediate state, transition being processed.
↑ Image/voice-over keyed up (to air)
↓ Image/voice-over keyed down (from air)
B Fade to black
S Fade to silence

Note: The front panel is normally used only during commissioning and is not suitable as a general control method because the Imagestore 750 is likely to be remotely located in an equipment rack. You can, however, use the Imagestore 750's web interface (and its *front panel mirror*) to control the front panel remotely. (See Front Panel Mirror on page 178.)

Automation

External automation drivers using the Oxtel series protocol can control all aspects of Imagestore 750 behavior either through a serial port or over Ethernet. If your system includes the master control option, it can also be controlled using Presmaster automation.

Note: For details of the Oxtel and Presmaster automation protocols, see the automation publications listed under Applicable Publications and Tools on page 3.

iMC Panels

Any iMC panel (iMC-Panel-200, iMC-Panel-300, or iMC-Panel-GUI) can be used to provide manual control of an Imagestore 750 and an override to automation. The Imagestore 750 must include the master control option if it is to be controlled by an iMC panel.

Note: For details about the iMC panels, see the master control documentation listed under Applicable Publications and Tools on page 3.

PresStation / Presmaster

A PresStation master control panel can also provide manual control of an Imagestore 750 and an override to automation. With this setup, the master control logic lies within the Presmaster product.

Note: See the Presmaster documentation listed under Applicable Publications and Tools on page 3.

▲ **Warning:** PresStation panels are not compatible with iMC panels.

GPI Controller Switch

GPI control circuitry connected to the Imagestore 750's GPI connector can be used to trigger internal command macros. See GPI Inputs and Macros on page 48 and GPIO / LTC on page 207 for more detail.

Emergency Alert System

An Emergency Alert System (EAS) receiver can control an Imagestore 750 through its serial port and GPI connector, provided the EAS option is installed. See Emergency Alert System (EAS) on page 35 for more detail.

Monitoring and Alarms

Many different error conditions are being continually monitored by the Imagestore 750 system. By assigning an appropriate alarm level to each error condition, you can determine whether a system is running correctly based on your facility's requirements.

Alarm Levels

Alarm levels are configured for each error condition either in the Imagestore 750 Configurator (System Settings > Status Monitoring) or at the front panel ('Config Alarms'). An alarm level takes one of the following values:

No error	Does not contribute to an alarm.
Minor error	Contributes to an alarm as a minor error.
Major error	Contributes to an alarm as a major error.
Critical error	Contributes to an alarm as a critical error.

See System Settings on page 158.

The following table shows the different error conditions that are monitored by the Imagestore 750. The factory default alarm level for each error condition is shown by a check mark:

Error Condition	Alarm Level			
	No Error	Minor	major	Critical
External reference — unlocked	✓			
External reference — format mismatch	✓			
Video input — [A, B, C, D, Fill-1, Key-1, Fill-2, Key-2] — loss	✓			
Video input — [A, B, C, D, Fill-1, Key-1, Fill-2, Key-2] — format mismatch	✓			
Video input timing — [A, B, C, D, Fill-1, Key-1, Fill-2, Key-2] — timing offset out of range	✓			
Video input — overall input timing offset out of range	✓			
Embedded audio input — audio feed [1–4] — channel [1–16] — type change	✓			
Embedded audio input — audio feed [1–4] — channel [1–16] — audio loss	✓			
AES audio input — pair [1–16] — channel [1 or 2] — type change	✓			
AES audio input — pair [1–16] — channel [1 or 2] — audio loss	✓			
Health — temperature				✓

Table 7-1: Imagestore 750 monitored error conditions

Error Condition	Alarm Level			
	No Error	Minor	major	Critical
Health — voltage				✓
Health — PSU [1 or 2]	✓			
Health — fans	✓		✓	
Health — slave connection	✓			
Health — router connection	✓			
System — network interface link			✓	
System — disk usage			✓	
Video — FTB angle	✓			
Audio — FTS angle	✓			
GPIO line [0 to 15] — direction	✓			
GPIO line [0 to 15] — status	✓			

Table 7-1: Imagestore 750 monitored error conditions

The following types of error condition are supported:

Unlocked	The external reference signal is missing or bad.
Format mismatch	The input signal does not match the output video standard.
Video loss	Video is missing from the input.
Input timing	Input timing either follows behind or is more than one line before the program output.
Overall timing	Any one of the available input timing errors is triggered.
Audio type change	Audio type changes between PCM, Dolby E, Dolby Digital and non-PCM.
Audio loss	Audio signal is not present.
Temperature	FPGA temperature is greater than 80 °C.
Voltage	Any one of the available voltages is out of tolerance by ± 5% or more.
PSU	The power supply unit is out of tolerance by ± 10% or more.
Disk usage	The disk usage exceeds 80% of available capacity.
Slave connection	The slave connection has been lost. Note that the slave heartbeat must be set up in 'Slave > Slave Heartbeat' section under 'Configuration Mode' in the Imagestore 750 Configurator. A valid Intuition XG must connected for the slave connection to operate.
Router connection	The router connection has been lost. Note that the master control option (**IS-750-Master-Control**) must be present for this to operate.
Video FTB	The most downstream keyer (DSK 4) has been faded to black.
Audio FTS	Audio has been faded to silence.
GPIO direction	The GPIO direction has changed.
GPIO status	The GPIO status has changed.

Note: The factory default settings are chosen to give errors for hardware states which are absolutely critical to the operation of the Imagestore 750. During the commissioning of Imagestore 750s, you should decide on additional error conditions that will be needed to optimize the monitoring of your system. For example, errors in the reference, or video and audio inputs, should probably carry some warning level.

Note: When Dolby E or Dolby Digital (AC-3) is fed into the AES inputs, the signal is reported as 'Non-Audio'. This is because Imagestore 750 is unable to detect Dolby E or Dolby Digital (AC-3) on its AES inputs and so treats it as non-PCM..

You can also configure whether an associated SNMP trap should be triggered when any failure occurs. (See SNMP Traps, following.)

SNMP Traps

The alarm settings described under Monitoring and Alarms on page 151 can be monitored using SNMP traps.

In typical SNMP setups, one or more administrative computers, called managers, have the task of monitoring or managing a group of devices on a computer network. Each managed device (in this case, the Imagestore 750) executes a software component called an agent which reports information via SNMP to the manager.

An SNMP-managed network consists of three key components:

- Managed device — the Imagestore 750.
- Agent — software which runs on managed devices.
- Network management system (NMS) — software which runs on the manager.

A network management system (NMS) executes applications that monitor and control managed devices. Although the Imagestore 750 does not permit any SNMP control, it does provide an extensive range of traps for monitoring error states. (See Monitoring and Alarms on page 151 for the alarm settings.)

Network management systems (NMS) provide the bulk of the processing and memory resources required for network management. This means that there is little load placed on the Imagestore 750 as it reports on error states. Also a single manager can monitor many managed devices within one or multiple facilities thus centralizing all monitoring.

SNMP agents expose data on the managed systems as variables. The variables accessible through SNMP are organized in hierarchies. These hierarchies, and other metadata (such as type and description of the variable), are described by Management Information Bases (MIBs).

This document does not describe how to set up an SNMP manager, however there are many examples on the internet.

Note: Miranda makes available two MIBs for the Imagestore 750 — one for the manufacturer (Miranda) and one for the product (Imagestore 750). Please contact Miranda Customer Support for the latest MIBs. They can also be copied from the Imagestore 750 at '/usr/share/snmp/mibs/IMAGESTORE-MIB.txt' and '/usr/share/snmp/mibs/MIRANDA-MIB.txt'.

Status LED

The status LED is located on the front panel of the Imagestore 750 to the right of the joystick. This single-color (red) LED indicates the overall status of the Imagestore 750 by its illumination state:

Off = No error	Slow flashing = Major error
On = Minor error	Fast flashing = Critical error

If there are multiple errors, the LED always shows the most severe error detected.

Note: The status LED is useful during commissioning, but is not suitable as a general status monitoring method because the Imagestore 750 is likely to be remotely located in an equipment rack. It is for this reason that alarms and associated traps are monitored using SNMP.

8 Imagestore 750 Configurator

Chapter 8 provides information regarding the Imagestore 750 Configurator.

Topics

Introduction

The Imagestore 750 is configured using the Imagestore 750 Configurator, version 1.5 or later.

This Windows-based application allows you to control the start-up state of the Imagestore 750. It will then always restart in a known state.

The Media Conversion Suite (MCS) CD that ships with the Imagestore 750 includes a copy of the Imagestore 750 Configurator. The Imagestore 750 Configurator is also available from Miranda Customer Support.

Configurator Mode Selection

The Imagestore 750 Configurator has a number of modes, which are selectable in the drop-down menu at the top right-hand corner of the application window.

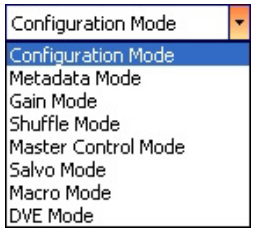


Fig. 8-1: Imagestore 750 Configurator - drop-down Modes menu

Whether a particular mode is available depends on the options you have purchased. For each of these modes, the Imagestore 750 Configurator displays one or more settings pages (or tabs) as listed here:

- Configuration mode

'System settings'	Create and edit the system configuration for use at startup.
'Store manager'	Edit the store allocation used by the DSKs.
'Audio graph'	Create and edit the internal audio routing.
'Licences'	Shows the licences present in the Imagestore 750.

- Metadata mode

'Metadata'	Create and edit metadata presets.
• Gain mode	
'Gain'	Create and edit audio gain presets.
• Shuffle mode	
'Shuffle'	Create and edit audio shuffle presets.
• Master control mode	
'Channel sources'	Create and edit available channel sources.
'Source groups'	Create and edit the source groups as viewed on an iMC panel.
• Salvo mode	
'Router salvos'	Create and edit router salvo information.
• Macro mode	
'Macros'	Create and edit macros. (See Macros on page 50.)
• DVE mode	
'DVE mapping'	Create and edit DVE mappings.

Note: There is a main configuration file for the Imagestore 750 and a configuration file for each mode. Each mode's file is independent of the main configuration. To use any mode, either open or create a configuration file in that mode as described under Modes, following. Mode files must then be referenced by the main configuration.

Modes

Configuration Mode

The validity of any configuration file depends critically on the hardware capabilities of the Imagestore 750 and the software options that are currently installed. These are defined in a capabilities file, which is always available from a running Imagestore 750. The file can also be saved as a file local to your PC. (See Exporting a Capabilities File on page 176.) Configuration files have the file extension **.xml**. Capabilities files have file extension **.caps**.

After starting the Imagestore 750 Configurator, you should open a configuration file to edit. You can create a new (default) configuration, or use an existing configuration either from the Imagestore 750 or from your PC.

Select 'Configuration Mode' in the drop-down list at the top right corner of the Imagestore 750 Configurator.

Use the 'File' menu as follows:

- **File > New > From Device...**

  Creates a new (default) configuration based on device capabilities from a running Imagestore 750.

- **File > New > From File...**

  Creates a new (default) configuration based on device capabilities from a **.caps** file on your PC.

- **File > Open > From Device...**

  Opens an existing configuration from a running Imagestore 750.

This can either be the *active configuration* or another configuration saved in the Imagestore 750.

- **File > Open > Advanced...**

  Opens an existing configuration either from a running Imagestore 750 or from a **.caps** file on your PC.

  The configuration is validated against the device capabilities either from the running Imagestore 750 or from your local **.caps** file.

Note: the *active configuration* is the current state of the Imagestore 750.

During commissioning, the front panel is used to define most of the Imagestore 750's settings. You can then open the current state (or active configuration) in the Imagestore 750 Configurator to adjust particular system settings. (See System Settings on page 158.)

System Settings

The 'System Settings' tab (under 'Configuration Mode') is used to view and edit the *main* configuration. The left-hand pane contains entries for the following groups of main features, which vary depending on the licences installed:

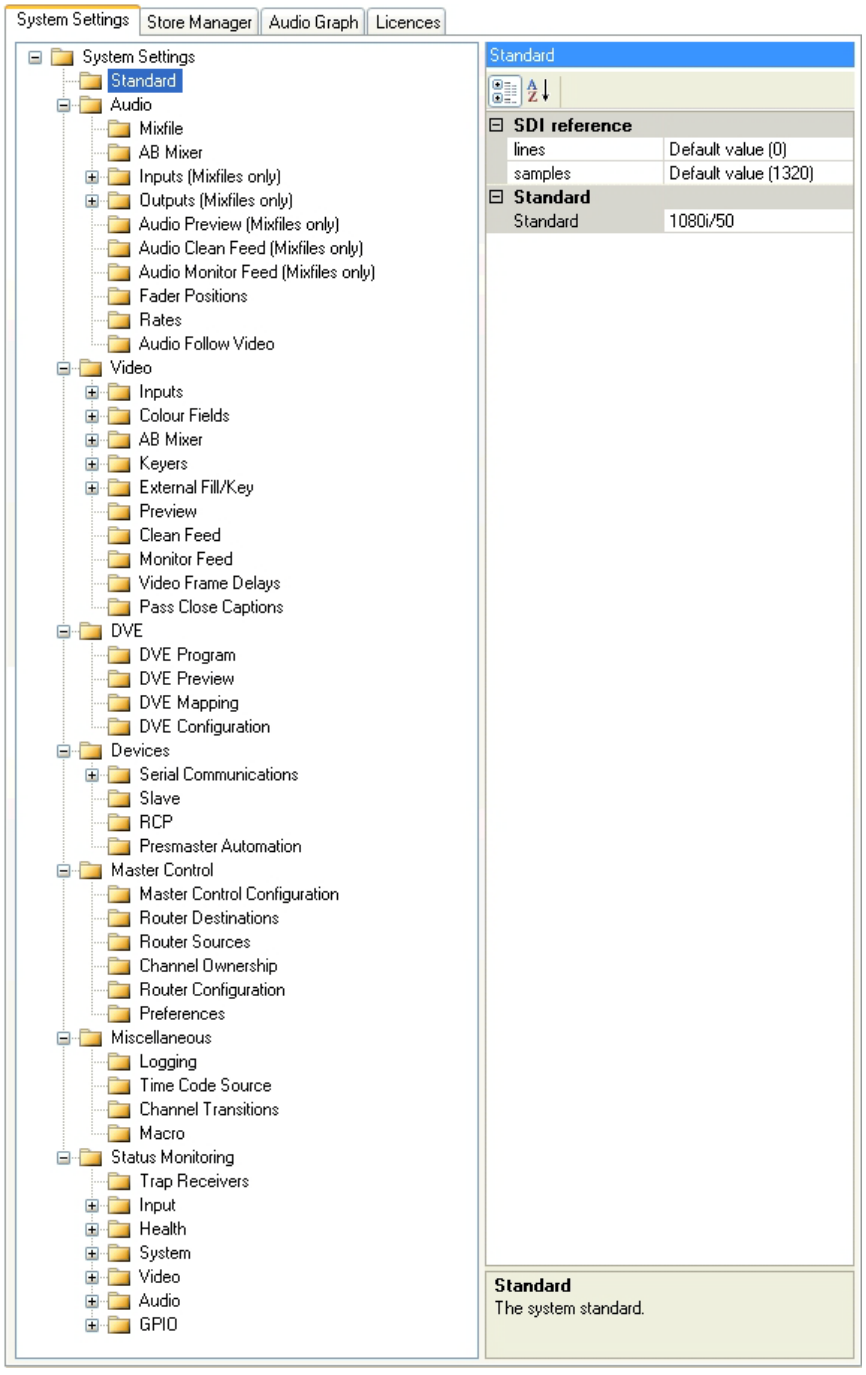


Fig. 8-2: Imagestore 750 Configurator - System Settings page

Features are grouped into categories. You can expand the menu tree wherever a [+] is seen to reveal sub-menu options. You can collapse the menu tree wherever a [–] is seen. You can select

individual system settings for the current configuration and modify them in the right-hand pane. Whenever a setting is clicked, a description of the feature appears below it (in the right-hand pane) as a helpful guide. The description includes the corresponding automation command, which can be cross-referenced against the Oxtel series automation protocol document. See the automation documents listed under Applicable Publications and Tools on page 3.

System settings are of two types:

Persistent	Settings from the **Setup** and **Config Alarms** front panel menus only.
State	Settings from the **Operate** front panel menu, which are volatile in nature.

Persistent System Settings

Persistent settings are options such as the serial port Baud rate (**Setup > Serial Comms > Serial Ports > COM** *x* **> Baud Rate**) which are always expected to persist after being modified during commissioning. The Imagestore 750 Configurator allows such values to be defined within a specific configuration — either to the factory default value or a custom-defined value.

State System Settings

State settings are options (from the 'Operate' menu) such as keyer fader positions and media loads.

At restart, required state settings behavior might be:

- Set to a specific value.
- Set to their last system value.

State settings can be set to their last system value, by selecting 'System value persists' for the parameter in the Imagestore 750 Configurator.

The possible restart behaviours of state settings are as follows:

- Default value — Reset to the factory-default value.
- User value — Reset to a user-defined value.
- System value persists — Persist from the previous session.

An example of restart behavior for Imagestore 750 is a situation where DSK 1, DSK 2 and DSK 3 should be cut down, but DSK 4 should be cut up with the station logo loaded. This may be achieved by configuring 'user values' as shown in the following two figures:

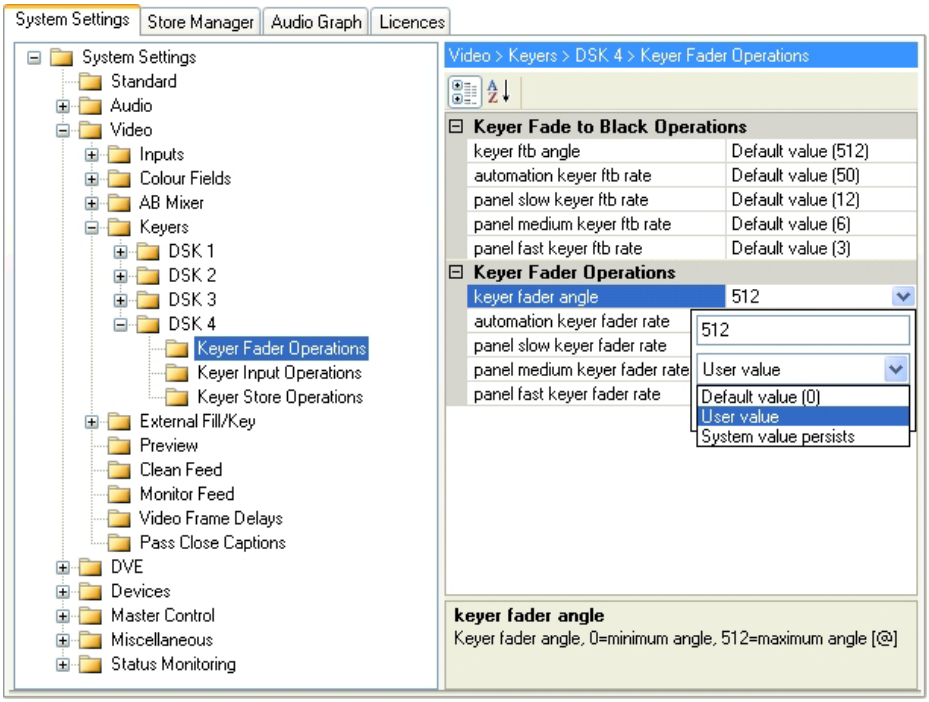


Fig. 8-3: Imagestore 750 Configurator - DSK 4 restart behavior cut up

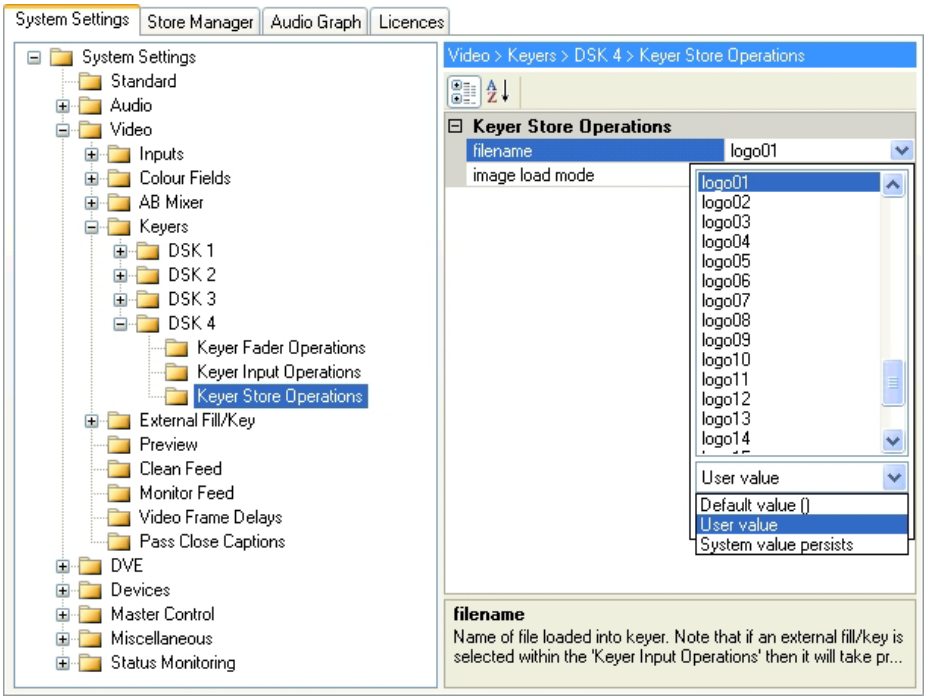


Fig. 8-4: Imagestore 750 Configurator - DSK 4 restart behavior logo filename

Store Manager

The 'Store Manager' tab (under 'Configuration Mode') allows the total store memory to be allocated to 4 available stores on a percentage basis.

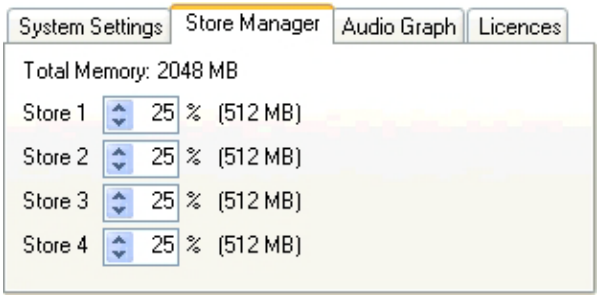


Fig. 8-5: Imagestore 750 Configurator - Store Manager

The 4 stores feed the corresponding keying layers (DSK1–DSK4) on the program and preview buses.

This allows more store memory to be allocated to a specified layer that will be used for playing out long animations. The factory default is for all stores to be equally allocated.

Audio Graph

The 'Audio Graph' tab (under 'Configuration Mode') is used to define all routing within the audio engine graphically. To use the page, choose audio blocks from the left pane and drag them onto

the 'Audio Graph' view (the middle pane). Then connect the appropriate pins between blocks by drawing lines from output pins to input pins:

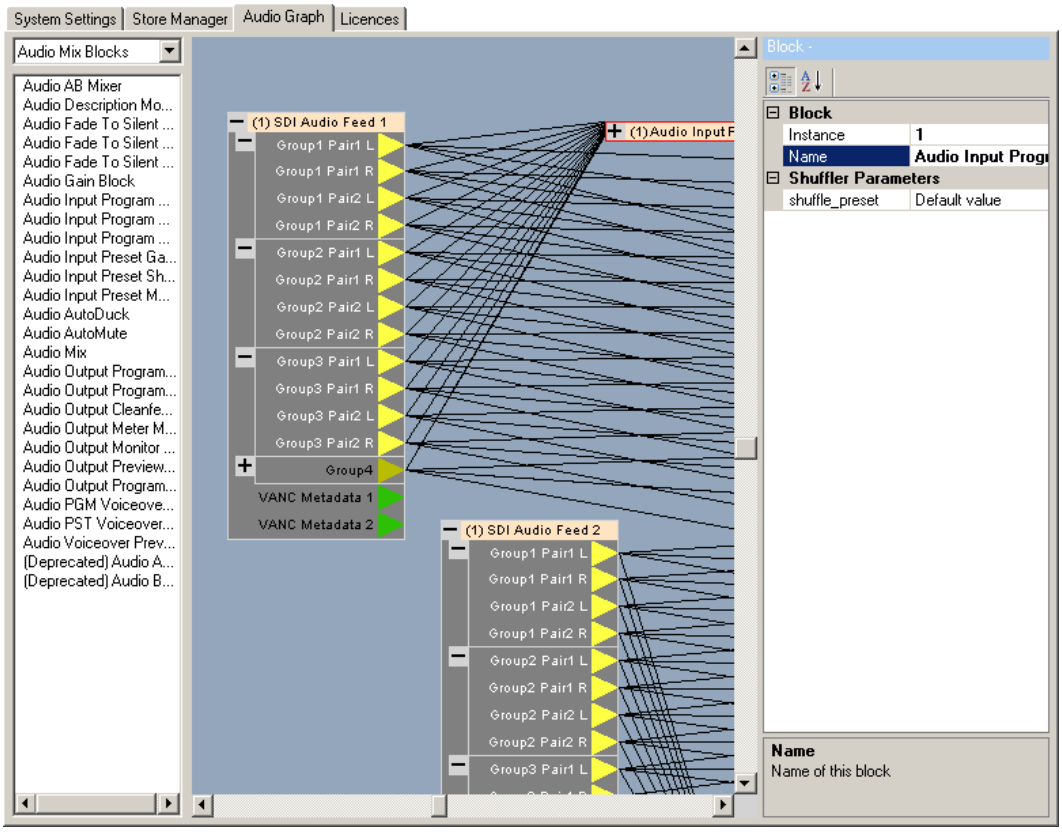


Fig. 8-6: Imagestore 750 Configurator - Audio Graph tab

You can expand or collapse audio blocks (and subblocks) by double-clicking the '+' or '–' symbols at the top left corner of a block.

You can draw multiple lines (at one time) by selecting multiple pins, and then dragging your cursor from one of the pins to the pin to which it connects.

To select multiple pins, use your mouse to drag a selection rectangle around the pins.

The selected audio block (or pin of a block) is highlighted by a red line and its parameters appear in the right pane. You can edit the parameters in the right pane.

To select multiple blocks, use your mouse to drag a selection rectangle around the blocks.

A variety of sample audio templates are supplied as starting points for creating custom audio configurations. These are described in detail in the Imagestore 750 web interface. (See Audio Templates on page 182.)

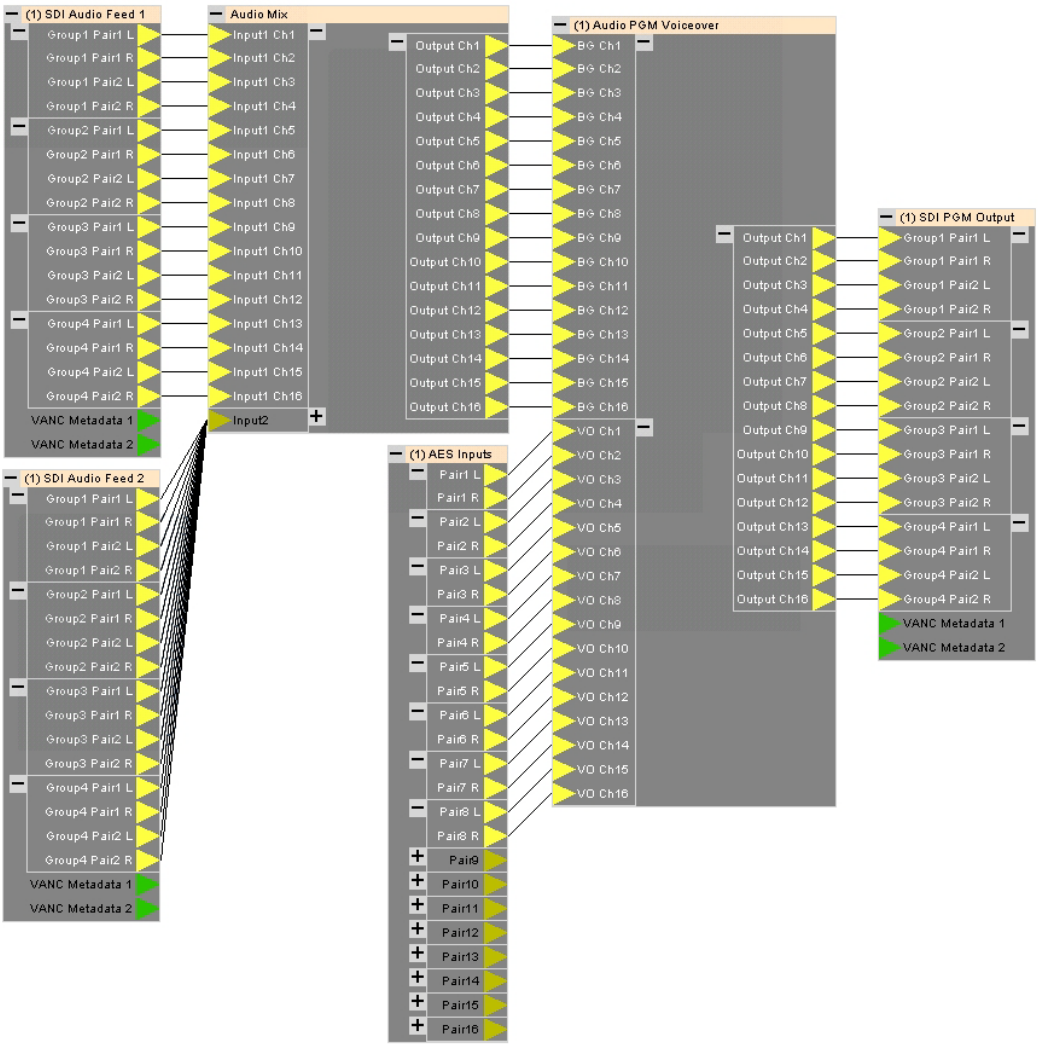


Fig. 8-7: Imagestore 750 Configurator - Audio Graph view

The Imagestore 750 supports the following audio block categories, in each of which you can find several audio block types:

- Inputs
- Outputs
- Audio Mix Blocks
- Audio Delay Blocks
- Audio Modules
- Metadata

You can select a category in the drop-down list at the top of the left pane. When you select a category, the audio blocks that belong to that category appears in the pane below. At the bottom of the category list is 'Show All'. This choice presents all audio block types at once.

Note: There are also 'Legacy Audio Mix Blocks' that are deprecated and should be used only for compatibility with legacy IS23 products. These blocks have been superseded with alternatives that provide enhanced features. If you attempt to add a legacy block, the Imagestore 750 Configurator will suggest an alternative block(s) that should be instead. Legacy audio mix blocks are not described in this document and are not recommended.

Note: Audio graph blocks highlighted in red on the audio graph window indicate that they are not supported by the Imagestore 750. Unsupported blocks occur when you are editing an audio graph created for an Imagestore 750 with different options. Ensure that your audio graph contains no unsupported blocks. They provide no functionality.

Inputs

The input blocks define all possible audio *sources* for the system. The Imagestore 750 supports the following blocks:

Block Type	Description
SDI audio feed	Represents embedded audio from an SDI input. Four audio feeds are supported, each having 16 channels of embedded audio. Each feed can be configured to match any one of the SDI inputs, or it can follow the video A/B mixer's A or B input.
AES inputs	Represents the physical AES inputs on the device. There are 16 AES pairs giving a total of 32 input audio channels.
Easyplay	Represents an Easyplay stream for playing out audio clips. There are 4 Easyplay streams which share a total of 16 audio channels. Each stream can be configured with an associated voice-over that is cut up automatically whenever an Easyplay file is playing out. Alternatively, a queue of the Easyplay stream can follow the associated voiceover position (in which case playing the Easyplay stream does not drive the voiceover). Alternatively, each stream can also be instructed to follow corresponding program or preview video channel keyer cuts and fades, or loads and unloads using a filename association and optional filename prefix. Alternatively, each stream can be driven independently by automation. Each stream can also be configured to indicate whether it is associated with a PGM or PST voiceover.
Silence	Provides an input that is silence.
Test tone	Provides a test tone, the frequency of which can be modified.

Table 8-1: Audio Graph - Input signal blocks

Outputs

The output blocks represent the physical outputs and metering of the Imagestore 750. Pins from input blocks may be routed directly to pins in output blocks, but they are normally routed through one or more mix blocks.

Block Type	Description
SDI PGM output	Represents the physical program SDI output (having 16 embedded audio channels). The audio type for each pair can be set to 'audio', 'non-audio' or 'automatic'.
SDI PVW output	Represents the physical preview SDI output (having 16 embedded audio channels). The audio type for each pair can be set to 'audio', 'non-audio' or 'automatic'.
SDI CLF output	Represents the physical clean-feed SDI output (having 16 embedded audio channels). The audio type for each pair can be set to 'audio', 'non-audio' or 'automatic'
SDI MON output	Represents the physical monitor SDI output (having 16 embedded audio channels). The audio type for each pair can be set to 'audio', 'non-audio' or 'automatic'.
Meters	Represents the audio meters (48 channels)
AES output	Represents the 16 AES output pairs (on the AES connector). The audio type for each pair can be set to 'audio', 'non-audio' or 'automatic'.

Table 8-2: Audio Graph - Output blocks

For the outputs listed, when the audio type is configured to be automatic, the audio type for each pair will change if an input suddenly switched from data to audio (pass-through).

Audio Mix Blocks

The audio mix blocks define all possible methods for mixing audio sources. The Imagestore 750 supports the following blocks, all of which support mixing of streams up to 48 channels wide:

Block Type	Description
Audio AB mixer	Provides A/B mix, A/B cut, and A/B data cut between two input sources.
Audio mix	Provides custom mixing of up to 8 input sources.
Audio description	Allows a background mono commentary track to be mixed with the stereo background audio for people who are visually impaired. The commentary track is controlled by an AD control tone. (See Audio Description (AD) on page 140.)
Audio PGM voice-over	Provides a voice-over onto background program audio, ducking the background appropriately. Gain presets and shuffle presets can be used for the voice-over input, and fade rates, duck level, and preset levels and the initial fader position on startup can be set. See Gain Mode on page 170 and Shuffle Mode on page 171
Audio PST voice-over	Provides a voice-over on background preset audio, using the settings from the program voice-over of the same index allowing previewing the armed state of voice-overs before they are taken to air. Arming and disarming a PGM voice-over automatically causes a change in the PST voice-over.

Table 8-3: Audio Graph - Mix blocks

Block Type	Description
Audio voice-over preview	Provides preview of voice-over of shuffle-sensitive, gain-adjusted voice-over channels but without any being affected by the associated program voice-over position. This has been superseded by the *Audio PST voice-over,* and is recommended for use only in legacy configurations.
Audio gain	Allows audio sources to be attenuated at a specific level (expressed in dB) with per-channel control.
Audio input program gain	Provides gain modification through gain presets or the **j0** automation commands. The **j011** (mute), **j012** (trim), **j013** (phase) and **j014** (level) can be used to control up to 16 channels. See Gain Mode on page 170.
Audio input program shuffler	Provides shuffles through shuffle presets or the **j0** automation commands. The **j010** command can be used to shuffle up to 16 channels. See Shuffle Mode on page 171.
Audio input program multiplexor	Provides multiplexing of several sources of audio onto a single output. This is useful for monitoring different audio sources on the same audio output.
Audio input preset gain	Provides gain modification through gain presets or the **j0** automation commands. The **j031** (mute), **j032** (trim), **j033** (phase) and **j034** (level) can be used to control up to 16 channels. See Gain Mode on page 170.
Audio input preset shuffler	Provides shuffles through shuffle presets or the **j0** automation commands. The **j030** command can be used to shuffle up to 16 channels. See Shuffle Mode on page 171.
Audio input preset multiplexor	Provides multiplexing of several sources of audio onto a single output. This is useful for monitoring different audio sources on the same audio output.
Audio output program gain	Provides gain modification via gain presets or the program gain automation commands. The **j100** commands (set output level), and **j101** (set output mute) adjust the levels or mutes of channels passed through the block. The **j1030** (set program output level via gain type) adjusts the master gain for the entire program output gain block. Each channel has its own gain/mute flag in addition to a master gain (i.e., they are totally independent).
Audio output program shuffler	Provides the ability to perform shuffles through shuffle presets on the program output. See Shuffle Mode on page 171.
Audio output program multiplexor	Provides multiplexing of several sources of audio onto a single output. This is useful for monitoring different audio sources on the same audio output.
Audio output preview multiplexor	Provides multiplexing of several sources of audio onto a single output. This is useful for monitoring different audio sources on the same audio output.
Audio output meter multiplexor	Provides multiplexing of several sources of audio onto a single output. This is useful for monitoring different audio sources on the same audio output.
Audio output cleanfeed multiplexor	Provides multiplexing of several sources of audio onto a single output. This is useful for monitoring different audio sources on the same audio output.
Audio output monitor multiplexor	Provides multiplexing of several sources of audio onto a single output. This is useful for monitoring different audio sources on the same audio output.
Audio fade to silent mix	Manipulates the audio when the fade-to-silent fader is moved. The block will ramp over the period of the FTS fader.
Audio fade to silent cut	Manipulates the audio when the fade-to-silent fader is moved. The block will cut to silence at the point when the FTS fader is fully off. The cut is performed over 1 field to ensure there are no clicks or squeaks in the audio.

Table 8-3: Audio Graph - Mix blocks

Block Type	Description
Audio fade to silent data	Manipulates the audio when the fade-to-silent fader is moved. The block cuts to silence at the point when the FTS fader is fully off. The cut is performed instantaneously and will result in clicks or squeaks if used with non-data. It is intended to be used within data streams that would otherwise be corrupted if a fade were attempted.
Audio AutoMute	Mutes the output of the block for a user-specified amount of time when the "sense" pin changes types (i.e., between PCM, Dolby-E, AC3, or non-audio).
Audio AutoDuck	This is a silence detection block used to control an associated voice-over forcing it to fade up or down according to whether a volume level exceeds a definable threshold, or is below the threshold, for a definable duration. The fade in and out rates, and the duck level can be defined. Whether the triggering of a duck is dependent or independent on other channels can be configured.

Table 8-3: Audio Graph - Mix blocks

Mixing generally requires that the input sources to the block be PCM. Exceptions to this are the 'Audio A/B Mixer' block, 'Audio Fade to Silent Data' block, and 'Audio AutoMute' block, which may be used with data streams.

Audio Delay Blocks

The Imagestore 750 supports 6 delay banks, each of which provides 16 channels of input and output.

Each delay bank can provide from 1 to 32,767 audio samples of delay, where the audio sample rate is 48 kHz. This results in over 16 video frames of audio delay for each audio delay block, although the actual delay in frames depends upon the frame rate for the current video standard as follows:

50 Hz standards	Maximum of 17.06 frames audio delay.
59.94 Hz standards	Maximum of 20.45 frames audio delay.

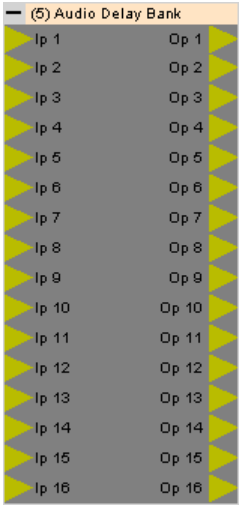


Fig. 8-8: Audio Graph - audio delay bank

See Audio Delay Blocks on page 148 for more information.

Audio Delay Calculation

The following audio blocks incur audio delays of varying duration:

- Dolby decode and encode modules
- Metadata delays
- Up-mix modules
- Audio delay blocks

The audio delay calculation feature lets you determine the cumulative audio delay at any pin on any audio block in the 'Audio Graph'. The delay is shown in frames (including fractions of frames to two decimal places) and samples (at 48 kHz). This helps to ensure that there is consistent and unchanging audio delay throughout the system.

To calculate audio delays, perform the following steps:

- Create your audio configuration using the Imagestore 750 Configurator's 'Audio Graph' page.
- Select 'Tools > Calculate delays' from the menu, or press 'F2'.
- Select 'Yes' in the warning dialog, "Calculating the delays in a configuration can take a very long time. Do you wish to continue?"
- Position your mouse over audio or metadata pins on any block within the 'Audio Graph' to see the delay in both frames and samples.

Note: Calculation of audio delays in complex audio configurations with many route permutations can take a long time. It might be possible to remove non-essential parts of the 'Audio Graph' before starting the audio calculation.

Audio Modules

The audio modules present depend on the hardware and licences present in the Imagestore 750:

Block Type	Description
Dolby decoder module	This module (1) decodes Dolby E and Dolby Digital (AC-3) and (2) outputs surround PCM with a stereo down-mix alternative. It also decodes Dolby metadata and provides backup audio capability. See Dolby Decode Module on page 113 for a details
Dolby Digital (AC-3) encoder module	Encodes up to 8 channels of PCM as Dolby Digital (AC-3). See Dolby Digital Encoder Module on page 116.
Dolby E encoder module	Encodes up to 8 channels of PCM as Dolby E. See Dolby E Encoder Module on page 115.
Up-mix module	Provides up-mix capability from stereo to 5.1 surround audio. See Up-Mix on page 133.

Table 8-4: Audio Graph - Audio Modules

Metadata

The metadata blocks generate and manipulate metadata. See Dolby Metadata on page 120 for general metadata information and Metadata Mode on page 126 for more information on the 'Metadata' tab of the Imagestore 750 Configurator.

Block Type	Description
Metadata AB mixer	Provides the ability to switch between A and B metadata streams.
Metadata blank source	Provides an empty metadata source.
Metadata processor	Allows metadata to be generated, manipulated, or passed through.
Metadata UARTs	These represent the metadata RS-485 ports (on the GPIO connector) of the Imagestore 750.

Table 8-5: Audio Graph - metadata blocks

Licences

The 'Licences' tab lists the licence names that are currently enabled for the Imagestore 750. The second column shows licence values. (Where these are applicable, they are non-zero.) The third column gives a description of the licence.

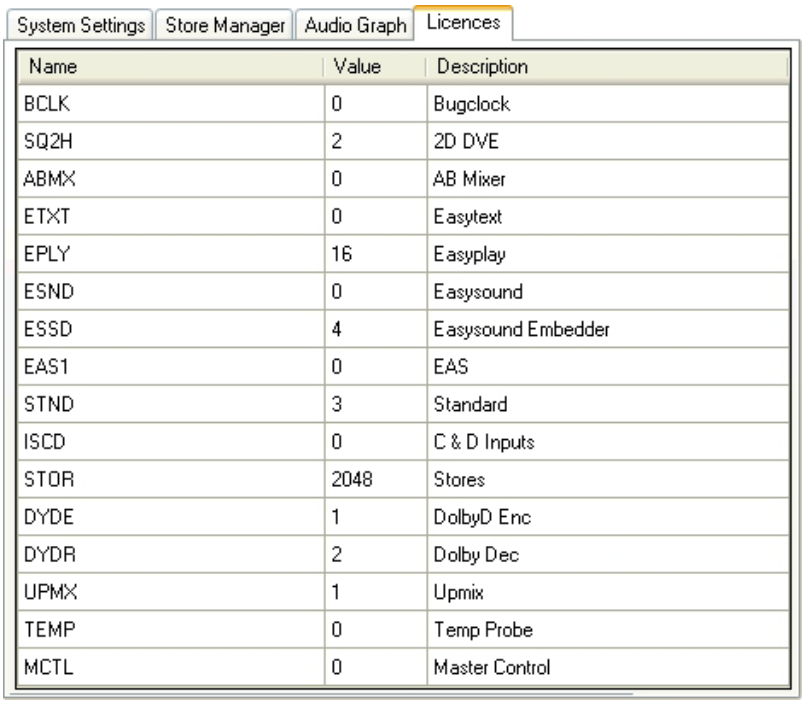


Fig. 8-9: Imagestore 750 Configurator - Licences tab

Note: For historical reasons, the licence names shown by the Imagestore 750 Configurator do not correspond to the option names listed in Chapter 11, Options.

Metadata Mode

Please refer to Metadata Mode on page 126 which presents the 'Metadata' tab of the Imagestore 750 Configurator when it is in 'Metadata Mode'.

Gain Mode

When the Imagestore 750 Configurator is in 'Gain Mode', you can define gain presets which can then dynamically adjust overall gain and the level, trim, mute, and phase characteristics of individual audio channels at various points within the audio mix.

To enter 'Gain Mode', select it from the drop-down list at the top right corner of the Imagestore 750 Configurator.

You can then create or edit gain preset files by selecting 'File > New' or 'File > Open'. When you create a gain preset file, you must specify the number of channels.

The following attributes may be defined for each gain preset file:

- Number of channels 1 to 48
- Master gain +28 dB to –100 dB 0 dB default
- Per-channel level +28 dB to –100 dB 0 dB default
- Per-channel trim +28 dB to –100 dB 0 dB default
- Per-channel mute Enabled or disabled
- Per-channel phase Enabled or disabled

The following example shows a portion of 16-channel gain preset file with default settings:

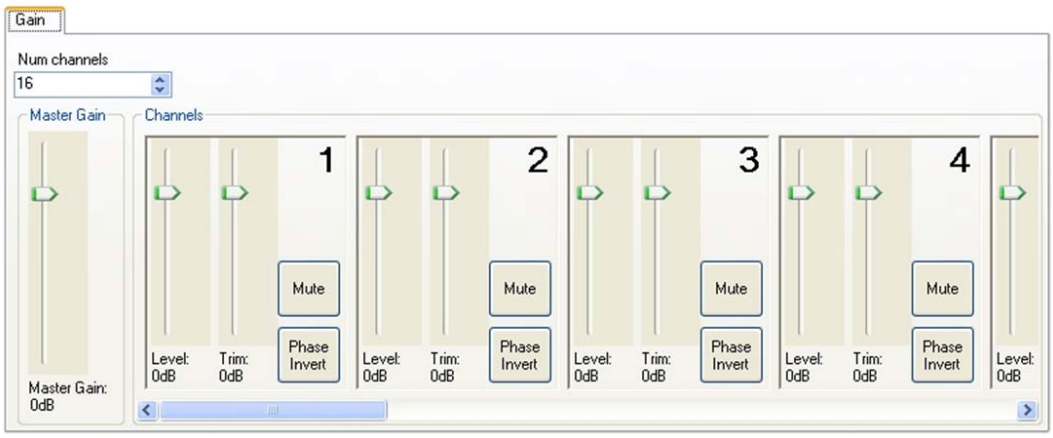


Fig. 8-10: Imagestore 750 Configurator - Gain Mode, Gain Presets

When the preset is complete, you can save it to the Imagestore 750 by selecting 'File > Save'. (See Saving a Configuration on page 175.)

Gain presets that are saved to the system can be used within these audio mixer blocks.

- Audio gain.
- Audio input program gain.
- Audio input preset gain.
- Audio output program gain.
- Audio program voice-over.

(See Audio Mix Blocks on page 165.)

Shuffle Mode

When the Imagestore 750 Configurator is in 'Shuffle Mode', you can define shuffle presets which can then dynamically adjust the channel shuffling at various points within the audio mix.

To enter 'Shuffle Mode', select it from the drop-down list at the top right corner of the Imagestore 750 Configurator.

You can then create or edit shuffle preset files by selecting 'File > New' or 'File > Open'. When you create a shuffle preset file, you must specify the number of channels. The number of inputs can range from 1 to 48 channels. The number of outputs can range from 1 to 48 channels. Square and non-square shuffle presets are supported.

To edit the shuffle, click any of the squares in the matrix. Red squares represent a connection. White squares represent the absence of a connection.

▲ Be aware that rows are inputs and columns are outputs.

The following example shows a 16×16 shuffle preset:

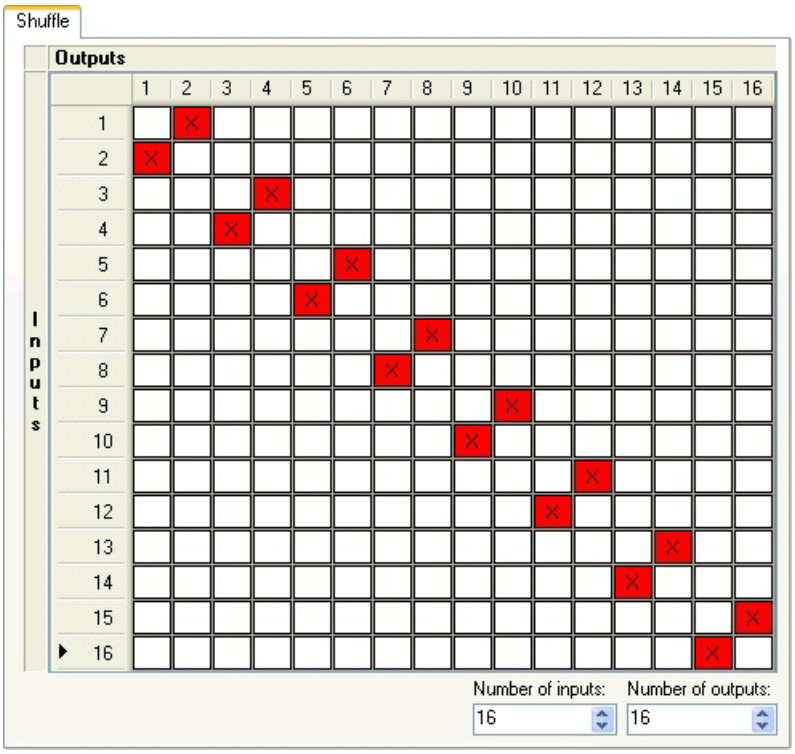


Fig. 8-11: Imagestore 750 Configurator - Shuffle Mode, Shuffle Preset

This particular preset swaps stereo pairs.

When the preset is complete, you can save it to the Imagestore 750 by selecting 'File > Save'. (See Saving a Configuration on page 175.)

Shuffle presets that are saved to the Imagestore 750 can be used in these audio mixer blocks.

- Audio input program shuffler.
- Audio input preset shuffler.
- Audio output program shuffler.
- Audio program voice-over

(See Audio Mix Blocks on page 165.)

Master Control Mode

▲ This mode is available only when the master control licence (**IS-750-Master-Control**) is installed.

Master control mode allows you to create and edit the channel sources and source groups that will permit the inclusion of the Imagestore 750 in an iMC master control system and permit control of router switching by iMC panels and automation.

To enter 'Master Control Mode', select it from the drop-down list at the top right corner of the Imagestore 750 Configurator. You can then create or edit master control configurations by selecting 'File > New' or 'File > Open'.

When the configuration is complete, you can save it to the Imagestore 750 by selecting 'File > Save'. (See Saving a Configuration on page 175.)

Go to **System settings > Master control > Master control configuration** to specify a master control configuration to use:

Please refer to Master Control Configuration on page 72 for details regarding master control setup.

Salvo Mode

▲ This mode is available only when the master control licence (**IS-750-Master-Control**) is installed.

Salvo mode allows you to create and edit the mapping between router salvo names, which are retrieved from the NV9000 router control system, and IDs that can be used by automation. When an iMC panel is connected to the Imagestore 750, it uses salvo IDs to drive salvos in the NV9000.

To enter 'Salvo Mode', select it from the drop-down list at the top right corner of the Imagestore 750 Configurator.

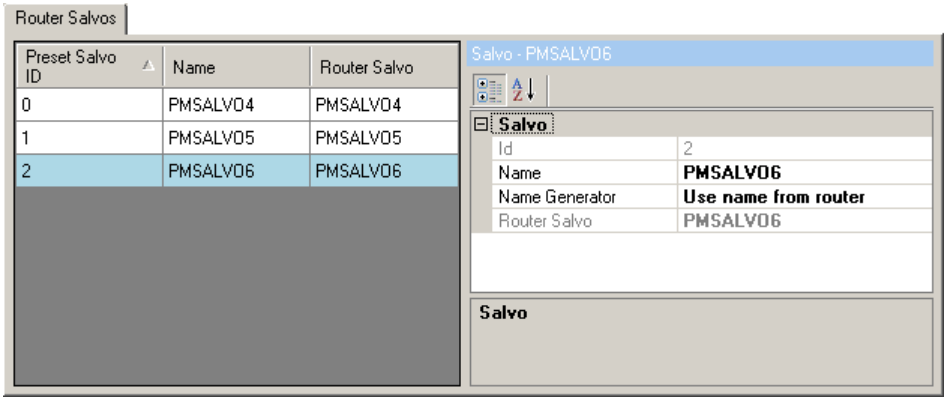


Fig. 8-12: Imagestore 750 Configurator - Salvo Mode

Right-click on the left pane to expose a context menu that allows the following actions to be performed:

Add salvo(s)	This allows one or more salvo to be added from the macro list in the connected NV9000 router control system. Use the control or shift key to select multiple sequences.
Reassign router salvo(s)	This allows you to reassign the selected salvo(s).
Modify ID(s)	This allows you to change the IDs of the selected salvo(s), as used by automation.
Rename	This allows you to rename the salvo(s). You can change the entry in the 'Name' column. Multiple salvos can be renamed with a number appended to differentiate them. You can choose the router salvo name or generate names of your own choosing.
Delete	This allows you to delete salvo(s).

You can create or edit salvo configurations by selecting 'File > New' or 'File > Open'. When the configuration is complete, you can save it to the device by selecting 'File > Save'. (See Saving a Configuration on page 175.)

Go to **System settings > Master control > Master control configuration** to specify a salvo configuration file to use:

Please refer to Salvo Configuration on page 80 for details regarding salvo setup.

Macro Mode

Macro mode provides a versatile and user-friendly way to edit macros which include a custom sequence of Oxtel automation commands. The operation of macros and 'Macro Mode' are described in more detail in Adding Macros on page 51.

Note: For details of the Oxtel automation protocol, see the Automation publications under Applicable Publications and Tools on page 3.

To enter 'Macro Mode', select it from the drop-down list at the top right corner of the Imagestore 750 Configurator.

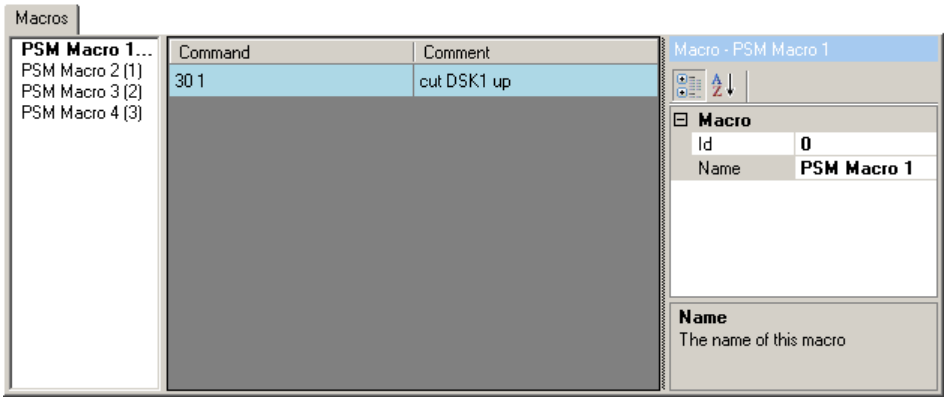


Fig. 8-13: Imagestore 750 Configurator - Macro Mode

Click in the left panel to select a macro.

Right-click in the middle pane to expose a context menu that allows the following actions to be performed:

Add command	This adds another row to the middle pane, in which you can enter a command and a comment for the selected macro.
Move commands up	This allows you to reorder commands.
Move commands down	This allows you to reorder commands.
Delete command	This deletes the selected command(s).

Enter commands in the 'Command' column of the middle pane. Enter comments in the 'Comment' column.

You can create or edit macro configurations by selecting 'File > New' or 'File > Open'. When the configuration is complete, you can save it to the Imagestore 750 by selecting 'File > Save'. (See Saving a Configuration on page 175.)

Go to **System settings > Miscellaneous > Macro** to specify a macro preset file to use:

DVE Mode

▲ This mode is available only when the DVE licence (**IS-750-DVE**) is installed.

DVE mode allows the DVE sequences stored on the Imagestore 750 to be mapped to an ID that is used by automation. When an iMC panel is controlling the Imagestore 750, its DVE button(s) can be mapped onto any available DVE sequence by making use of the current DVE configuration.

Note: DVE sequences are created and transferred to the Imagestore 750 using the 'DVE Editor' provided on the Media Conversion Suite CD that ships with the Imagestore 750.

To enter 'DVE Mode', select it from the drop-down list at the top right corner of the Imagestore 750 Configurator.

This is a sample DVE mode window:

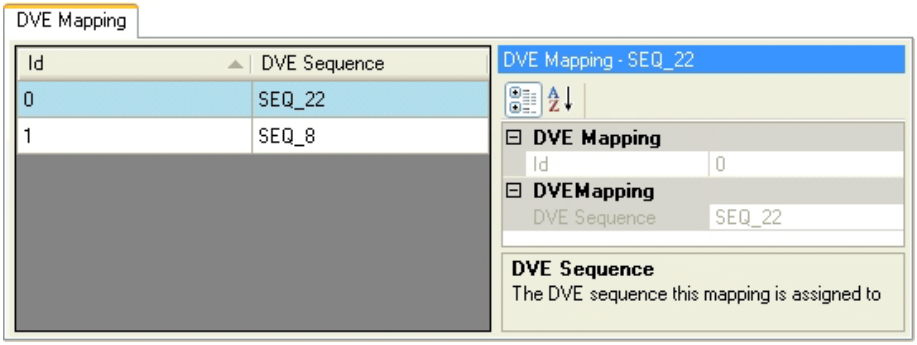


Fig. 8-14: Imagestore 750 Configurator - DVE Mode, DVE Configurations

Right-click on the left pane to expose a context menu that allows the following actions to be performed:

Add DVE sequence(s)	This allows selection of one or more DVE sequences from those stored on the Imagestore 750. Use the control or shift key to select multiple sequences.
Reassign DVE sequence(s)	This allows selected DVE sequences to be re-assigned.
Modify ID(s)	This allows the IDs of one or more selected DVE sequence to be changed.

Delete	This deletes the selected DVE sequence(s).

Once the configuration is complete, you can save it to the device by selecting 'File > Save'. (See Saving a Configuration on page 175.)

Go to **System settings > DVE > DVE Mapping** to specify a DVE mapping preset file to use.

Managing Configurations

Saving a Configuration

When a configuration (or preset) from any of the available configurator modes is completed, you can save it to one or more Imagestore 750s and create a backup file as necessary. Use the 'File' menu as follows:

- 'File > Save'

  Confirm the IP address of the Imagestore 750 and the filename under which to save the configuration.

  Subsequent saves reuse the same IP address and filename.

- 'File > Save As > To Device…'

  Confirm the IP address of the Imagestore 750 and the filename under which to save the configuration. This creates a new configuration file.

- 'File > Save As > To File…'

  Make a backup copy of the configuration (to your PC or elsewhere).

  You can also copy the current 'active configuration' to a file by selecting **User Presets > Export** from the front panel. The configuration filename created is in the format '**YYYYMMDD_HHMMSS.xml**' within the Imagestore 750.

Importing a Configuration

There are two ways to import (or apply) the main system configuration so that it becomes 'active' on the Imagestore 750.

The first method uses the Imagestore 750 Configurator:

1. Select 'Configuration Mode' from the drop-down list at the top right corner.
2. Open the configuration that you want, using one of the 'File' menu options listed in Configuration Mode on page 156. To copy the current state of the Imagestore 750, select 'File > Open > From Device... > Active configuration'.
3. Make changes to the configuration as required.
4. Select 'File > Save and Apply Configuration…' from the menu.
5. Confirm the IP address of the target Imagestore 750, configuration filename, and that you wish to proceed.
6. The Imagestore 750 restarts as a result of the 'Save and Apply Configuration' command.

The second method uses the front panel to import a configuration that has already been saved on the Imagestore 750:

1. Select 'User Presets > Import > *filename*.xml' from the front panel menu.

2 Restart the Imagestore 750, as instructed, for the configuration to be applied.

3 If you do not restart the Imagestore 750 and want to cancel the import selection, re-enter 'User Presets > Import' menu and select 'Keep Current'.

During the restart, the last imported configuration (or the active configuration if there was no import) is validated against the Imagestore 750's capabilities and the resulting settings become the new active configuration.

Note: If the same configuration file is imported to Imagestore 750s with different capabilities files, then each Imagestore 750 will use its own capabilities file to validate all configuration settings. Configuration settings that cannot be supported will be ignored. Configuration settings that are not defined, but are supported, will assume the factory default settings.

Assuming that no further configuration files are imported (normally the case, after a system is set up correctly), the 'active configuration' continues to apply on subsequent restarts. Please note however that the 'active configuration' is subsequently modified on an ongoing basis by changes to 'persistent' settings. (See System Configuration on page 58.)

The 'active configuration' from any Imagestore 750 can be copied into the Imagestore 750 Configurator at any time so that edits can be made to 'persistent' settings and the restart behavior of 'state' settings. The new configuration file can then be saved back to the Imagestore 750 and re-imported when required.

Note: The restart behavior of "state" settings cannot be changed without a restart of the Imagestore 750.

The front panel's 'User Preset > Last Config' menu option shows the name of the last configuration file that was imported. This is really just a reminder on which configuration file the 'active configuration' was originally based. This value persists between system restarts providing there are no further imports.

Exporting a Capabilities File

The validity of any configuration file depends critically on the hardware capabilities of the Imagestore 750 and the options that are currently installed. These are defined in a capabilities file (**.caps**), which is always generated by a running Imagestore 750.

The capabilities file and 'active configuration' file are useful for fault diagnosis.

If you want a local copy of a capabilities file, use the Imagestore 750 Configurator to open the 'active configuration' from the target device, and then select 'File > Export Capabilities File…'. You will be prompted to enter a file name.

The capabilities file is also availadble from the Imagestore 750 web interface. (See System Information on page 179.)

9 Web Interface

Chapter 9 provides information regarding the Imagestore 750's web interface.

Topics

Connecting

You can access the Imagestore 750's web interface by entering the IP address[1] of the Imagestore 750 in the address bar of your web browser. The Imagestore 750 web interface supports Internet Explorer (version 7 and later) and Mozilla Firefox (version 3 and later).

Fig. 9-1: Imagestore 750 - Web Page

▲ **Warning:** Some features available in the Imagestore 750's web interface will affect the operation of the unit and can result in the loss of output. Exercise great care if you are using the web interface while the Imagestore 750 is on-air.

After clicking on the "LOGIN" button, the software asks you for a password.

Fig. 9-2: Imagestore 750 Web page - Log In

▲ **Note:** The default password is "miranda" — all lower case.

1. You can determine the IP address from the front panel menu **Status > System Info > IP Address**.

When you log in, the home page appears and offers an introduction. Links to various other pages are available on the left side of the window. The current software version appears at the top of the page:

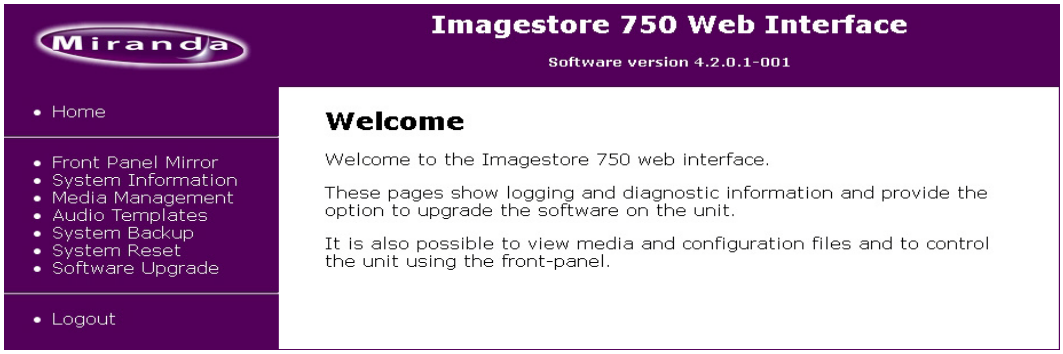


Fig. 9-3: Imagestore 750 Web Interface - Home page

Web Interface Pages

Front Panel Mirror

This page allows you to manipulate settings of the Imagestore 750. It is a mirror (or emulator) of the Imagestore 750's front panel. You can operate or configure the Imagestore 750 remotely. You can navigate this front panel "mirror" the same way you navigate the menu at the actual front panel: in this case, by clicking the '<', '>', 'ESC' and 'ENT' buttons, or using the four arrows on your keyboard if you first click somewhere in the white window.

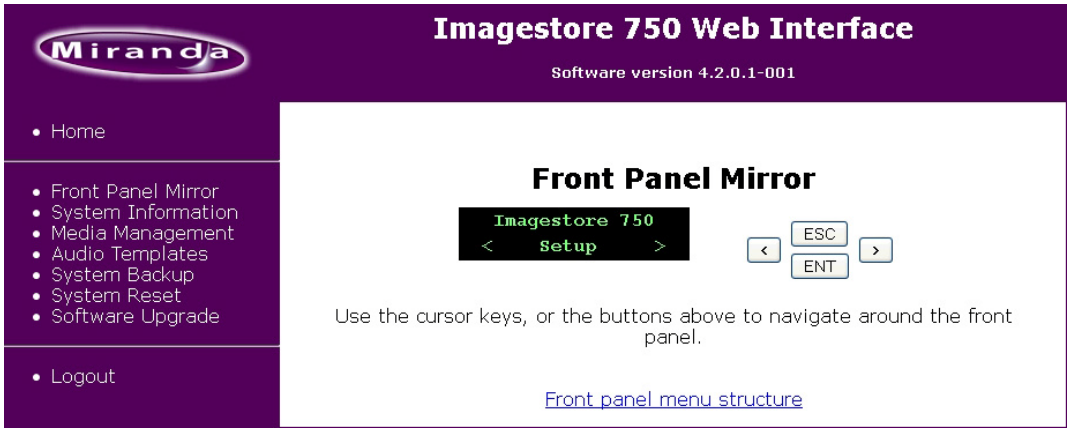


Fig. 9-4: Imagestore 750 Web Interface - Front Panel Mirror

▲ **Warning:** This page should be used with great care when the Imagestore 750 is on-air since on-air output can be affected.

The page has a link at which you can view the full menu structure of the Imagestore 750. Note that many of the items in the menu depend upon installed options. See Appendix A, Front Panel Menu for a complete listing of menu items.

System Information

This page gives access to the following system information:

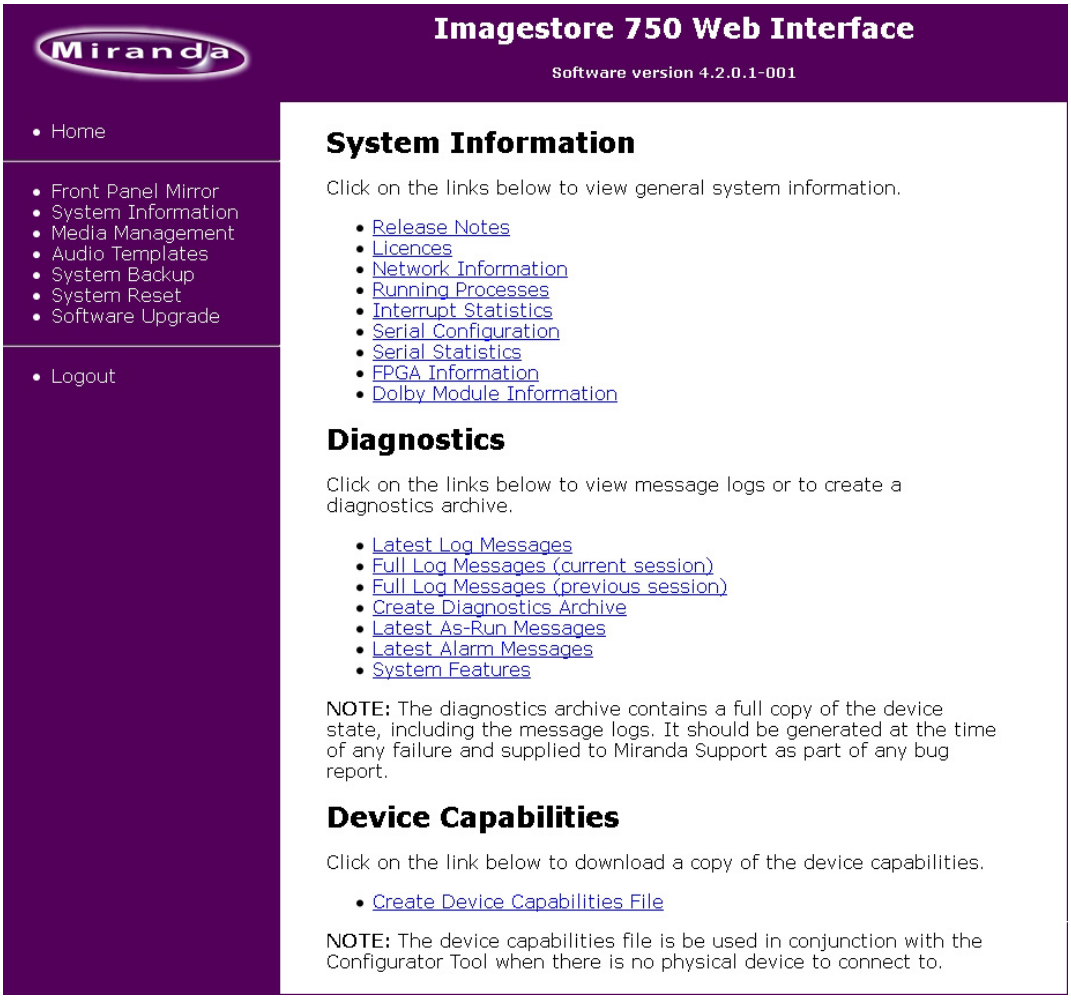


Fig. 9-5: Imagestore 750 Web Interface - System Information

The page has links to the following pages:

- System information

  'Release Notes' — new features or bugs fixed in each release of the software.

  'Licences' — the currently installed Imagestore 750 options.

  'Network Information' — information related to the Ethernet interface.

  'Running Processes' — a list of processes currently running on the Imagestore 750.

  'Interrupt Statistics' — interrupt statistics for the Imagestore 750.

  'Serial Configuration' — how the serial ports are configured.

  'Serial Statistics' — serial port data statistics.

  'FPGA Information' — firmware build date, identity and version number.

  'Dolby Module Information' — audio module types, firmware version, and status.

- Diagnostics

'Latest Log Message' — shows, and continually updates, the most recent additions to the Imagestore 750's message log.

'Full Log Messages (current session)' shows the full log message file for this boot session. If the file is very long, it can take some time to load. The display updates (only) if you click 'Refresh' in the web browser.

'Full Log Messages (previous session)' shows the full log message for the previous boot session. If the file is very long, it can take some time to load.

'Create Diagnostics Archive' will collate all system information about an Imagestore 750. It is intended for fault diagnosis and should always be submitted to Miranda Support after a failure with any Imagestore 750 before you restart it. The archive file also includes the log message files. The file created is named **diagnostic.tar.gz** by default and is saved in the location on your PC (or its network) that you specify.

Note: See Message Logging on page 57 for details of how to modify the amount of logging information accumulated in message logs.

- Device Capabilities

'Create Device Capabilities File' allows you to download a copy of the Imagestore 750 capabilities file. The file created is named **devicecaps.caps** by default and is saved in the location on your PC (or its network) that you specify.

This file tells the Imagestore 750 Configurator about the Imagestore 750's device capabilities and available options. See Chapter 8 for information on the Imagestore 750 Configurator.

▲ The device capabilities file can be used in conjunction with the Imagestore 750 Configurator when there is no actual Imagestore 750 you can connect.

Media Management

This page allows you to upload, download, or delete files (to or from the Imagestore 750).

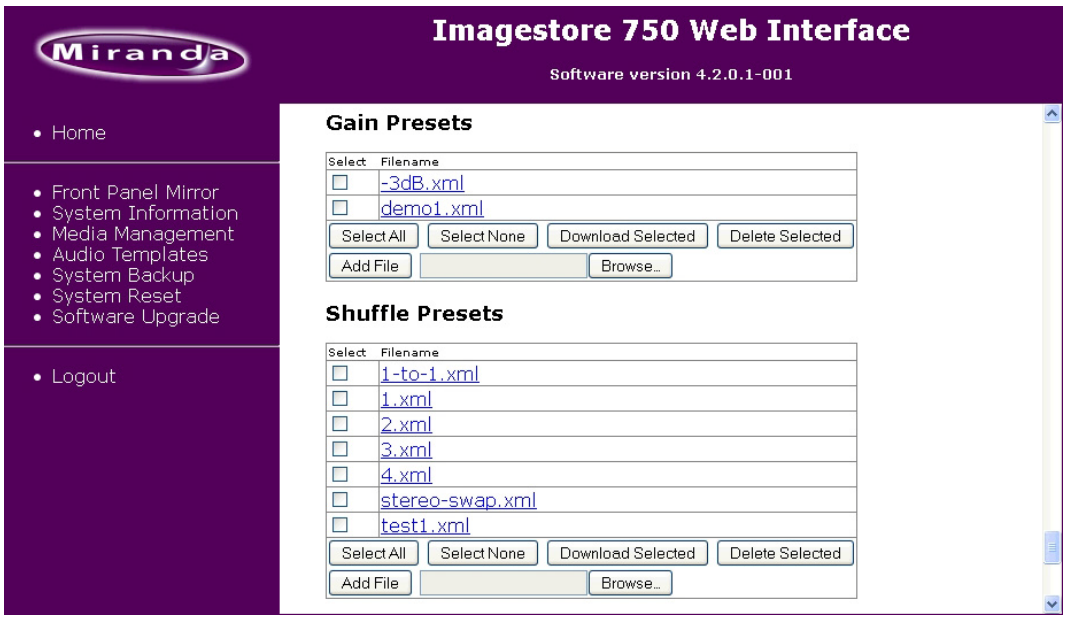


Fig. 9-6: Imagestore 750 Web Interface - Media Management

The page allows you manage these file types:

- Graphics files
- Easyplay files
- Configuration preset files
- Active configuration files
- Default mix files
- Custom mix files
- Gain presets
- Shuffle presets
- Metadata presets
- Macro presets
- Master control configuration
- Router salvos
- DVE sequences
- DVE presets

▲ **Warning:** Use this page with great care when the Imagestore 750 is on-air because on-air output can be affected.

It is recommended that a media management system is used to transfer media to the Imagestore 750.

You can download individual media files directly by clicking on the file name. You can download multiple media files in a single**.tar** file by selecting them and then clicking on the 'Download Selected' button. You might have to scroll to find the button.

You can delete multiple media files by selecting them and choosing the 'Delete Selected' button.

You can upload individual media files to the Imagestore 750 by clicking the 'Browse' button, navigating to select a file, and then clicking 'Add File'.

The page also lists configuration files and preset files in addition to media files. You can upload, download, or delete preset files and other configuration files as you can media files. Deleting configuration files is not recommended. If you do, exercise caution.

If you replace any configuration file, a reboot is required so that the Imagestore 750 can read and apply the settings.

Note: This web page is intended for convenience and should not be considered a viable alternative for professional media management tools or FTP transfers.

Note: Media transfers using the web page are likely to be slower and less effective for large files. For information on the FTP interface, please refer to the FTP Interface section.

Audio Templates

This page provides links to sample audio configuration templates to aid in the design of complex audio models in the 'Audio Graph' page of the Imagestore 750 Configurator. The page lists the principal features of each template and also lists all inputs, outputs, and preview modes.

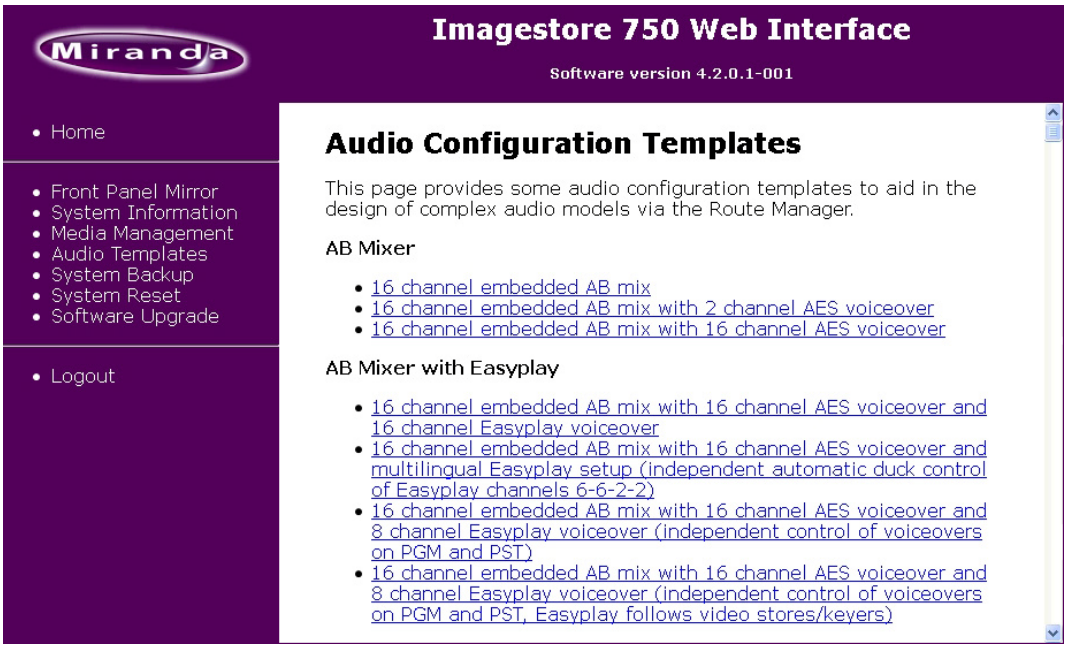


Fig. 9-7: Imagestore 750 Web Interface - Audio Templates

See Sample Audio Graph Templates on page 27 for more information.

System Backup

This page allows you to back up ***all*** presets, fonts, and configurations of the Imagestore 750 or to restore files to the Imagestore 750. A backup is generated in a**.tar** file.

Fig. 9-8: Imagestore 750 Web Interface - System Backup

To create a backup, click the 'Backup' button. The backup file generated is named backup.tar and is saved in a location on your PC (or its network) that you specify.

To restore a file, click the 'Browse' button, navigate to select a backup file, and then click the 'Restore' button.

Note: System backups do not include media or sound files. Those should be backed up using FTP instead.

System Reset

This page allows you to reboot the Imagestore 750.

Fig. 9-9: Imagestore 750 Web Interface - System Reset

▲ **Warning:** Never use this option when the Imagestore 750 is on-air.

Software Upgrade

This page allows you to upgrade the Imagestore 750's software.

- **Warning:** Do not switch off the Imagestore 750 during an upgrade.
- **Warning:** Carrying out an upgrade instantly stops the Imagestore 750's software, resulting in a loss of output.
- **Warning:** Upgrades can take a long time to complete, depending on features and software versions: You can expect up to 15 minutes plus 3 to 4 minutes for each Dolby module installed.

The software upgrade page is long and is presented next in two parts, following.

This is the first part:

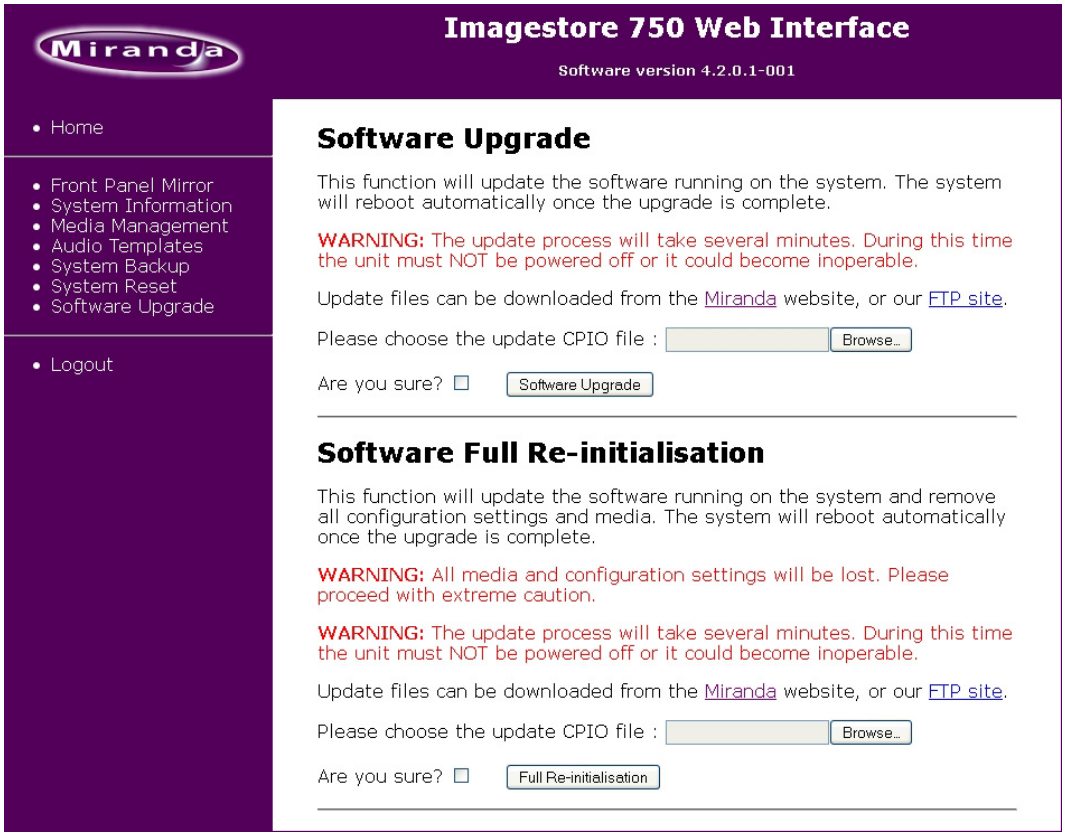


Fig. 9-10: Imagestore 750 Web Interface - Software Upgrade

This is the last part:

Fig. 9-11: Imagestore 750 Web Interface - Revert Software option

There are two types of upgrades possible:

- 'Software Upgrade' — leaves all media and configuration settings intact.
- 'Software Full Re-initialisation' — removes the configuration files as well as the media and restores the Imagestore 750 to its factory settings. Only the network settings will persist.

  ▲ **Warning:** The Imagestore 750 will lose its output during an upgrade. Both of these upgrade options instantly stop the Imagestore 750's software, resulting in a loss of output.

  ▲ **Warning:** Do not switch off the Imagestore 750 during an upgrade. Do not switch off the Imagestore 750 if you see a progress bar on the Imagestore 750's hardware front panel.

  Switching off will interrupt the upgrading process, including interrupting the programming of the CPU FPGA "platform flash" memory, which will render the Imagestore 750 inoperable. It would then need to be returned for repair.

  Warning: Imagestore 750 upgrades can take a long time to complete, depending on features and software versions. You can expect up to 15 minutes plus 3 to 4 minutes for Dolby module installed.

  It may take several minutes for the software update to transfer to the Imagestore 750 during which time a web page message window is displayed stating that the update is under way. Progress is shown on the hardware front panel. After the software has installed, the Imagestore 750 will automatically power cycle and boot the new software.

Note: This page does not allow software version 2.0 to be downgraded. This requires a bootable USB stick.

The 'Software Full Re-Initialisation' option is similar to the 'Software Upgrade' option, but the full system image will be refreshed, including all settings and media. This option should be required only if a disk failure occurs.

▲ **Warning:** The 'Software Full Re-initialisation' option reformats the compact flash drive.

The 'Software Full Re-initialisation' option reformats the compact flash drive (and HDD option if it is installed), so all existing media and configurations will be lost. Please use extreme caution and ensure that appropriate backups are made before using this option.

Revert Software

The 'Revert Software' option reverts the Imagestore 750 to its previously installed software. The Imagestore 750 will reboot automatically. All media files and configurations are maintained.

To start the reversion, check the 'Are you sure?' checkbox and then click 'Revert'. You should monitor the progress of the software reversion and not interrupt the process.

Bootable USB Key

The 'Create Bootable USB Key' option allows you to create a bootable USB key containing an HTTP server. (Software upgrades from version 2.0 or later do not require a USB key to be created because software can be updated directly from the Web page.)

Note: Always ensure that you use a USB key (not a USB HDD) when creating a bootable USB stick for updating software. The Imagestore will not be able to boot from a USB device that reports itself as a USB HDD device, even though it will appear to have imaged correctly.

The appropriate update zip file (**is750-update-v42.zip**) is required to create the bootable USB key. The process is as follows:

- Insert a blank USB key into the Imagestore 750. (You must remove the front fascia from the Imagestore 750. The USB port is located to the left of the front panel display.)
- Click 'Browse'.
- Select the update**.zip** file from the 'Choose File' dialog.
- Check the 'Media Inserted' checkbox and click 'Create'.
- Monitor the progress on the Imagestore 750's front panel until it shows '**DONE! Press Any Key**'.
- Press the front panel joystick to remove the message.
- Remove the USB key (unless it is further required for this Imagestore 750).

This process creates a bootable USB key which can be used to upgrade an Imagestore 750, re-initialize an Imagestore 750, or revert an Imagestore 750 to its previous software version.

Page Intentionally blank

10 FTP Interface

Chapter 10 provides information about transferring media to the Imagestore 750 via FTP.

Topics

Media transfer via FTP

Introduction

It is recommended that a media management system is used to transfer media to the Imagestore 750.

However, in the absence of a media management system, it is recommended that media is transferred to the Imagestore 750 via FTP. GUI-based or command-line-driven FTP client software utilities are freely available on most platforms and are installed by default on many.

File Transfer Protocol (FTP) is a standard network protocol used to transfer files from one host to another host over a TCP-based network, such as the Internet. The Imagestore 750 provides an FTP interface.

Login Credentials

The default Imagestore 750 FTP server login credentials are case-sensitive and are:

User name: miranda
Password: password

Note: Miranda reserves the right to change the defaults if necessary. In case of difficulty logging in, please contact Miranda support.

For more details on FTP etc, please contact Miranda support.

Imagestore 750 Media Folders

Each Imagestore 750 media type resides in a specific folder on the Imagestore 750.
The table below lists the media's media folder name, i.e where the media file must be transferred to.

For example:

In a GUI FTP client, drag-and-drop a graphics media file to the Imagestore 750 "images" folder.

Media Type	→	Imagestore 750 Media Folder name	*(Imagestore 750 internal Linux folder full path, for information only)*
Graphics	→	images	*/home/images (linked to /home/non_critical/images)*
Easyplay	→	sounds	*/home/sounds*
Configuration Preset	→	configs	*/home/configs*
Active Configuration	→	params	*/home/params (linked to /home/params.root1)*
Default mix Files	→	cfgtemplates_default	*/home/ cfgtemplates_default*
Custom Mix Files	→	mixes	*/home/mixes*
DVE Sequences	→	sequences	*/home/sequences*
DVE Presets	→	dvepresets	*/home/dvepresets*
Gain Presets	→	gainpresets	*/home/gainpresets*
Shuffle Presets	→	shufflepresets	*/home/shufflepresets*
Metadata Presets	→	mdpresets	*/home/mdpresets*
Macro Presets	→	macropresets	*/home/macropresets*

Table 10-1: Imagestore 750 Media folders for FTP transfers

The Imagestore 750 media folder names seen from the FTP login are links to Imagestore 750's internal folders. The Linux folder full path names are listed in the table above, for information only.

Secure transfers

Media may also be securely transferred to the unit using SFTP / SCP (file transfers will be made using AES encryption). A client such as WinSCP is required to use this feature. The default login credentials are the same as for FTP.

For more details on FTP etc, please contact Miranda support.

Example FTP Clients

Example FTP Client - Windows Explorer

Type in the Imagestore URL into the address bar of the Windows Explorer window:

```
ftp://10.96.203.121
```

Type in User name and Password into the Log On dialog:

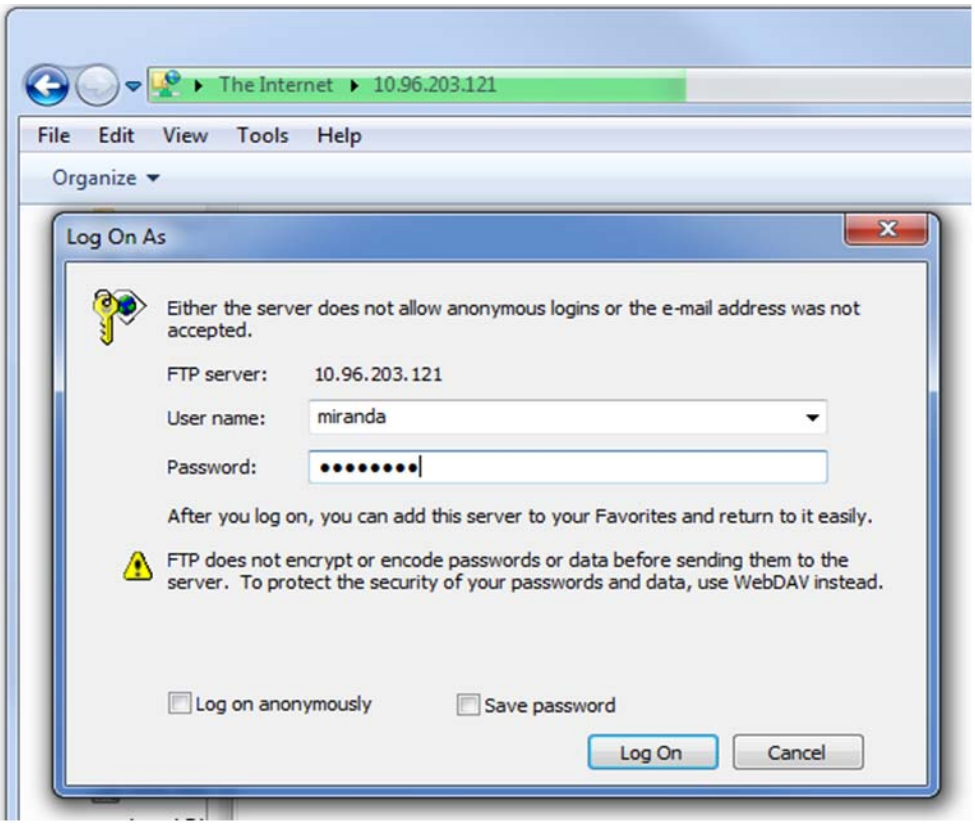


Fig. 10-1: FTP login via Windows Explorer

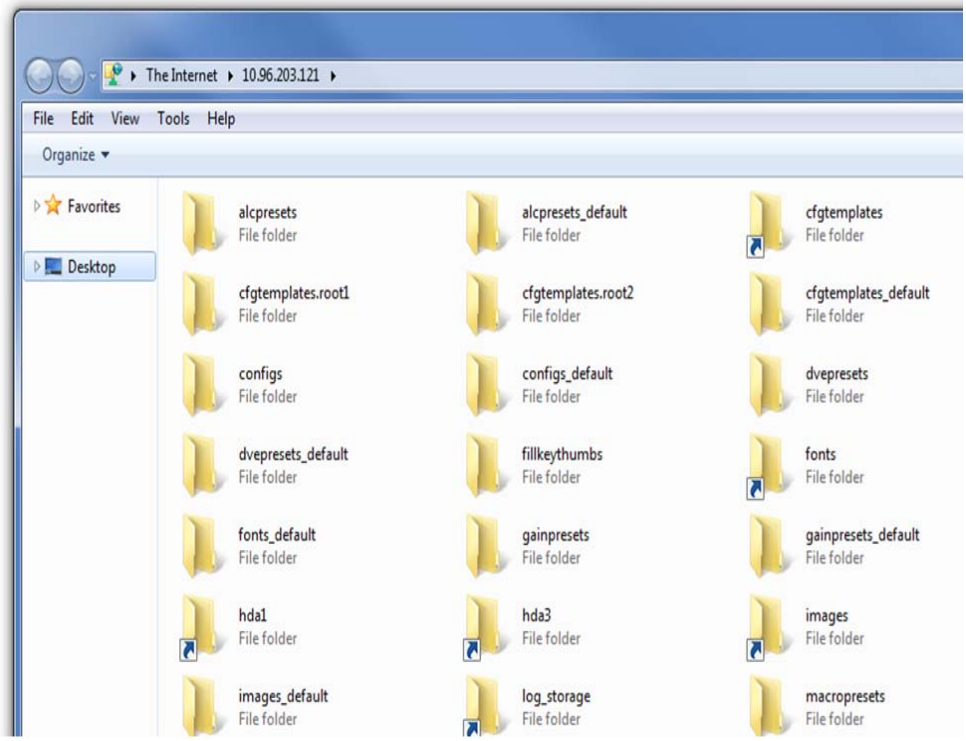


Fig. 10-2: FTP login Folder View from Windows Explorer

Example FTP Client - WinSCP

(WinSCP is a GPL-licensed FTP client for Windows, downloadable from http://winscp.net.)

In the WinSCP Login dialog, enter the Imagestore IP address as Host name, type in the User name and Password and select FTP as File protocol. Login.

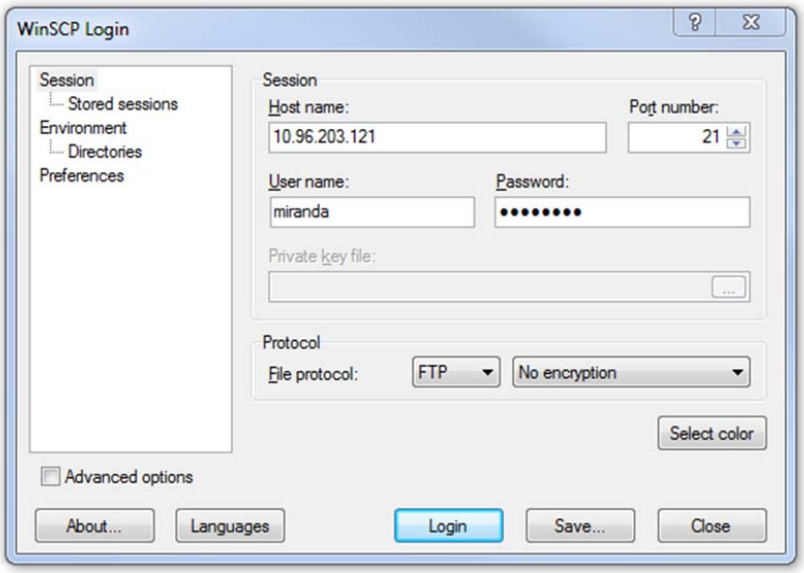


Fig. 10-3: FTP login with WinSCP

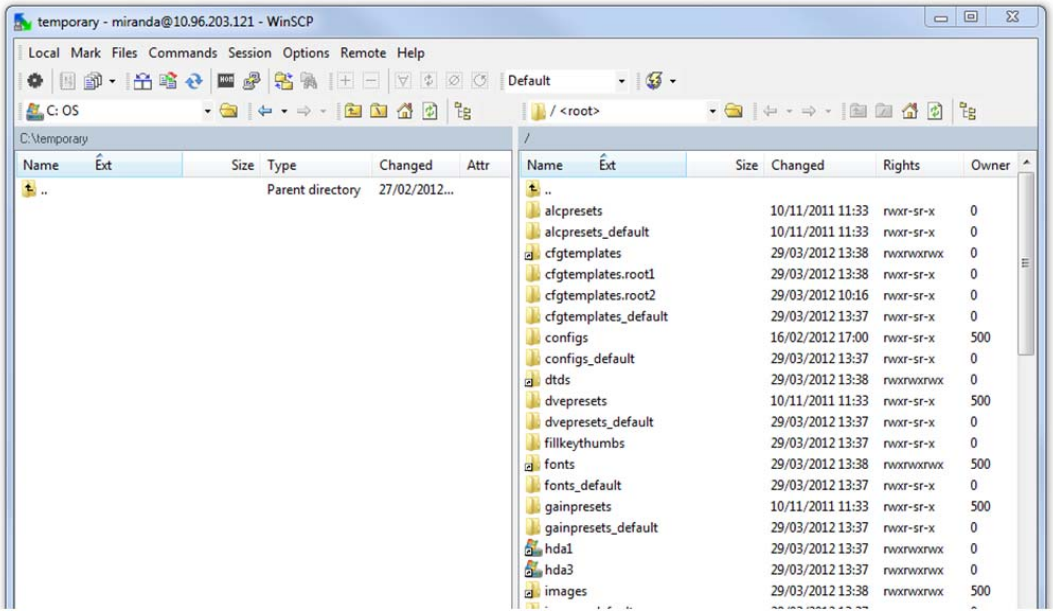


Fig. 10-4: FTP folder view from WinSCP (dual window, media folder and IS750)

11 Options

Chapter 11 presents licensing options for the Imagestore 750.

Topics

About Options

Licences, or purchase options, enable different features of the Imagestore 750. These options are either pre-installed, with the original purchase order, or can be used to upgrade an Imagestore 750.

When options are enabled, they are listed in two places:

- The **Options** menu of the front panel.
- The 'Licences' tab of the Imagestore 750 Configurator (under 'Configuration Mode'). See Licences on page 169.

Available options

The following Imagestore 750 options are available:

Option	Description
IS-750	The basic Imagestore 750, which includes A and B inputs, 3 fill/key inputs (including C and D inputs), A/B mix, program output, preview output, clean feed output, monitor output, 512 MB of stores memory, and supports SD and HD video standards
IS-750-LOGO	A *reduced* Imagestore 750 "logo inserter" (A input only, 2 fill/key inputs, program output, preview output, 512 MB of stores memory, and supports SD and HD video standards
IS-750-LOGO-CD	C and D input upgrade for **IS-750-LOGO**.
IS-750-LOGO-CF	Clean-feed output upgrade for **IS-750-LOGO**
IS-750-LOGO-MF	Monitor output upgrade for **IS-750-LOGO**
IS-750-DVE	Single DVE (PGM and PVW)
IS-750-DVE-DUAL	Dual DVE (PGM and PVW)
IS-750-Audio6	Audio: 1 group embedded, 16 AES in, 16 AES out
IS-750-Audio16	Audio: 4 groups embedded, 16 AES in, 16 AES out

Table 11-1: Imagestore 750 Licence Options

Option	Description
IS-750-EAS	Emergency Alert System (includes one AES input when no audio option is present).
IS-750-EP2	Easyplay stereo (16 channels available in version 3.1 and later).
IS-750-EP8	Easyplay 8 channels (16 channels available in version 3.1 and later).
IS-750-EP16	Easyplay 16 channels (available in version 3.1 and later)
IS-750-ET	Easytext text generation
IS-750-Clock	Bugclock (digital or analog).
IS-750-MEM-2GB	Stores memory: 2 GB option
IS-750-HDD	Internal media storage hard disk drive kit. (Software and operating system reside on the compact flash.)
IS-750-DOLBY-CARRIER-BOARD	Carrier board without any advanced audio modules. This option makes the Imagestore 750 "Dolby-ready." Note that all Dolby and up-mix kits listed below ***do*** include the carrier board option. Extra module upgrades may be purchased up to a total of four modules.
IS-750-DOLBY-DEC	One Dolby decoder module, plus carrier board.
IS-750-DOLBY-DEC2	Two Dolby decoder modules, plus carrier board.
IS-750-DOLBY-DEC2-ENCE	Two Dolby decoder modules and one Dolby E encoder module, plus carrier board.
IS-750-DOLBY-DEC2-ENCD	Two Dolby decoder modules and one Dolby Digital (AC-3) encoder module, plus carrier board.
IS-750-DOLBY-ENCE	One Dolby E encoder module, plus carrier board.
IS-750-DOLBY-ENCD	One Dolby Digital (AC-3) encoder module, plus carrier board.
IS-750-DOLBY-DEC-UPG	Add one Dolby decoder.
IS-750-DOLBY-ENCE-UPG	Add one Dolby E encoder.
IS-750-DOLBY-ENCD-UPG	Add one Dolby Digital (AC-3) encoder.
IS-750-UMX	One up-mix module, plus carrier board.
IS-750-UMX-UPG	Add one up-mix module.
IS-750-TEMP	Temperature probe (available in version 3.0 and later)
IS-750-AD-1	Audio description block (available in version 3.1 and later)
IS-750-Master-Control	Router control, source selection, arm and disarm, for iMC control panels (available in version 4.2 and later)
IS-750-Dual-NIC	Dual NIC option allowing separation of master control and media (available in version 4.2 and later). Contact Miranda for more details.

Table 11-1: Imagestore 750 Licence Options

IS-750-LOGO Option

The **IS-750-LOGO** option is a branding-only product. From a hardware perspective, it is identical to the standard Imagestore 750, but the following features are disabled:

- A/B mixing
- C and D inputs (Fill-3/Key-3).
- Clean-feed output.

- Monitor output.

If you need to enable these features at a future date, it is possible to upgrade to a standard Imagestore 750 by purchasing the appropriate licence(s). These are highlighted with a yellow background in the preceding options table.

▲ **Note:** The **IS-750-Master-Control** option is not compatible with **IS-750-LOGO** because master control requires A/B mixing.

Audio Options

The Imagestore 750's audio options include an appropriate audio breakout option. These options include a SCSI cable and a 1RU breakout box that allows easy connection of 75W BNC or 110W 3-pin, quick-release AES cables. (The SCSI pin-out is described in Rear Panel and Connections on page 200.)

The product code of the 75W breakout box is **ABT-32-32-D75**. The product code of the 110W breakout box is **ABT-32-32-D110**.

If you have purchased the **IS-750-EAS** option without the **IS-750-Audio6** or **IS-750-Audio16** option, then a stereo audio break-out cable (product code **1872-9100-100**) is shipped with the unit. This is a SCSI-to-XLR cable giving one stereo pair voice-over capability.

Dolby modules (Dolby decode, Dolby E encode, Dolby Digital encode) and up-mix module options require that a Dolby carrier board also be installed. The carrier board and module options can be retrofitted to older Imagestore 750s. Please note that if the RS-485 ports are not present then metadata input and output will not be possible.

Page Intentionally blank

12 Installation

Chapter 12 provides guidelines for the integration of Imagestore 750(s) into a broadcast system.

Topics

For installation of an iMC master control system, see Chapter 5.

Rack Mounting Instructions

Observe these points:

1 Elevated operating ambient temperature.

If you install the Imagestore 750 in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Therefore, give consideration to installing the equipment in an environment compatible with the maximum ambient temperature specified by the manufacturer.

2 Reduced air flow.

Install the Imagestore 750 in a rack so that the amount of air flow does not compromise safe operation of the equipment.

3 Mechanical loading.

Mount the Imagestore 750 in the rack with even mechanical loading to prevent potential hazardous conditions.

4 Circuit overloading.

Give consideration to the connection of the equipment to your plant's power supply circuit and the effect that circuit overloading might have on over-current protection and supply wiring. Consider equipment nameplate ratings appropriately.

5 Reliable grounding.

Maintain reliable grounding of rack-mounted equipment. Give particular attention to supply connections other than direct connections to the branch circuit (for example, the use of power strips).

Ventilation

The Imagestore 750 is ventilated front-to-back. Air enters the unit through the front, and exhaust air leaves the unit through the rear of the unit and through slots in the side at the rear.

Example: Note: It is essential that the air ventilation holes in the front, rear, and side of the Imagestore 750 remain clear of any obstruction. Miranda recommends leaving a minimum half-inch gap above and below the Imagestore 750 in a rack.

Power Requirements

The Imagestore 750 has a main supply input circuit that automatically senses whether the applied AC voltage is in the range of 90–132 VAC or 180–264 VAC and responds accordingly. The Imagestore 750 accepts both 50 Hz and 60 Hz AC supplies. Under normal conditions, power consumption is approximately 150 Watts. The power consumed depends on the number of options that were installed.

Environment

The Imagestore 750 tolerates operating temperatures from 5 °C to 40 °C with humidity between 20 and 80%, non-condensing. The Imagestore 750 can be stored at temperatures ranging from –10 °C to +70 °C.

Restricted Access Location

The Imagestore 750 must be in a restricted access location. Access should be granted only to service persons or users who have been instructed on the precautions that should be taken within the location.

Rear Panel and Connections

The rear panel connections are arranged as shown here:

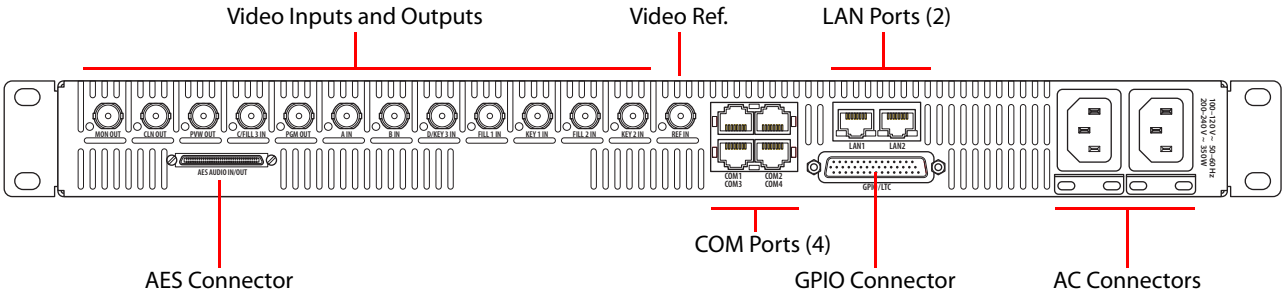


Fig. 12-1: Rear Panel Connectors

- At the left:

  12 BNCs[4.4] — 8 SDI video inputs and 4 SDI video outputs.

  1 BNC — analog reference input.

  1 AES connector (16 AES pairs, input and output).

- At the right:

  4 serial communication ports (COM1–COM4, RJ45).

  2 RJ45 Ethernet connectors (LANs 1 and 2).

  1 GPIO connector (GPI, LTC, Dolby metadata).

  2 AC inputs.

Video Inputs and Outputs

The SDI ports function according to SMPTE 292M-1998 (HD) and SMPTE 259M-1997 (SD). The video standards supported are:

HD 1080i50, 720p50, 1080i59.94, 720p59.94

SD 625i50, 525i59.94

Each input and output connector is a 75W BNC.

If an invalid SDI signal is present then the input to the program bus will revert to black video. Alternatively a color field or test pattern may be substituted in place of valid SDI.

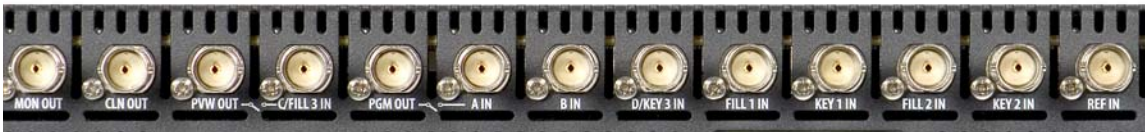


Fig. 12-2: Rear Panel Connectors - Video Inputs and Outputs

The following table lists the video signals, in order from left to right:

Name	Description
MON OUT	Video monitor output. The Imagestore 750 allows you to monitor a number of internal signal paths through this connector. You can monitor video throughout the system, from the inputs through to the outputs (including between keyers) plus the contents of stores (fill and key), DVE scalers, color fields and test patterns.
CLN OUT	Clean-feed output. The Imagestore 750 allows you to view a number of internal signal paths through this connector. The clean-feed output can be used to view partially branded video of the program bus.
PVW OUT	Preview output. The Imagestore 750 allows you to view a number of internal signal paths through this connector. Graphics for each keying layer are shared between the program and preview video buses, but keyer states are independent. The preview output is typically used for previewing graphics, audio voice-overs, and DVE moves prior to bringing them to air on the program bus. Audio for program and preview can be controlled independently. This allows Easyplay clips or external voice-overs to be previewed before being heard on the program output.
C/FILL-3 IN	Key 3's fill input. This signal is also called 'C IN'.
PGM OUT	Program output. The signal on this connector is the output generated by the Imagestore 750: a combination of an input video signal with any graphics that are keyed onto the program bus, plus embedded audio output from the audio mix engine. An exception to this is when a test pattern is routed directly to PGM OUT, which is only useful for commissioning purposes. Whenever the Imagestore 750's software is inactive, a bypass relay on the rear panel connects A IN directly to PGM OUT (and C IN directly to PVW OUT). This ensures that input video always gets to air, although the Imagestore 750 loses its ability to key graphics at this time.

Table 12-1: Video Connectors Inputs and Outputs

Name	Description
A IN	Video input A. (This signal is also called the “PGM IN” and “background.”)
B IN	Video input B. (This signal is also called “PVW IN.”)
D/KEY-3 IN	Key 3’s key input. This signal is also called ‘D IN’.
FILL-1 IN	Key 1’s fill input.
KEY-1 IN	Key 1’s key input.
FILL-2 IN	Key 2’s fill input.
KEY-2 IN	Key 2’s key input.
REF IN	Analog reference, either HD tri-level sync or SD bi-level sync (“black and burst”).

Table 12-1: Video Connectors Inputs and Outputs

Note that audio for program and preview can be controlled independently. This enables Easy-play clips or external voice-overs to be previewed before being heard on the program output.

Reference Input

There is a single video reference input:

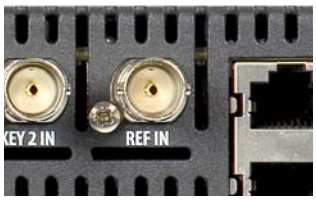


Fig. 12-3: Rear Panel Connector - REF Input

REF IN (BNC) accepts a standard analog reference such as SD analog bi-level sync and HD tri-level sync. It accepts both 50 Hz and 59.94 Hz frame rates, but all of the input signals (including fill and key) must use the same frame rate as the reference input. Refer to Reference Types on page 22 for a compatibility matrix between REF IN and output video format.

▲ Note: Only VITC ANSI/SMPTE standard 12M-1995 may be present on bi-level sync.

Video Relay Bypass

The Imagestore 750 has 2 mechanical relays that bypass the Imagestore 750’s video and audio processing when the Imagestore 750 loses power and also when it is starting up. These relays route A IN to PGM OUT and C/FILL 3 IN to PVW OUT.

This rear silk screen shows the bypass connections:

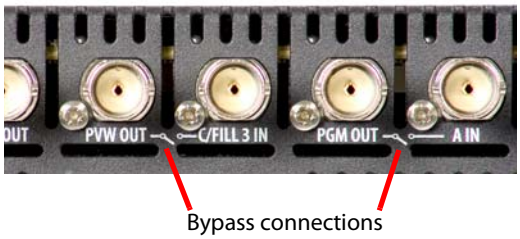


Fig. 12-4: Rear Panel Connectors - Video Relay Bypass

AES Connector

The AES connector is a 68-pin SCSI VHDCI-68 female connector. You can connect 16 AES/EBU input pairs and 16 AES/EBU output pairs at this port.

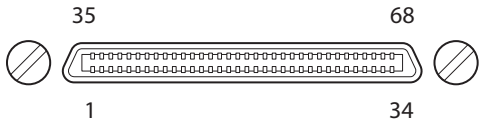


Fig. 12-5: Rear Panel Connector- Audio AES Connector

(This provides 32 mono audio channels in and 32 mono audio channels out.)

Each AES channel should be connected to the Imagestore 750 over two wires using balanced (differential + and –) signals and a grounded shield. Signal and associated pinout connections are given in the following table.

Pin	Signal	Pin	Signal
1	AES_IN_1 (+)	35	AES_IN_1 (–)
2	AES_IN_2 (+)	36	AES_IN_2 (–)
3	AES_IN_3 (+)	37	AES_IN_3 (–)
4	AES_IN_4 (+)	38	AES_IN_4 (–)
5	AES_IN_5 (+)	39	AES_IN_5 (–)
6	GND	40	GND
7	AES_IN_6 (+)	41	AES_IN_6 (–)
8	AES_IN_7 (+)	42	AES_IN_7 (–)
9	AES_IN_8 (+)	43	AES_IN_8 (–)
10	AES_IN_9 (+)	44	AES_IN_9 (–)
11	AES_IN_10 (+)	45	AES_IN_10 (–)
12	AES_IN_11 (+)	46	AES_IN_11 (–)
13	AES_IN_12 (+)	47	AES_IN_12 (–)
14	AES_IN_13 (+)	48	AES_IN_13 (–)
15	AES_IN_14 (+)	49	AES_IN_14 (–)
16	AES_IN_15 (+)	50	AES_IN_15 (–)
17	AES_IN_16 (+)	51	AES_IN_16 (–)
18	AES_OUT_1 (+)	52	AES_OUT_1 (–)
19	AES_OUT_2 (+)	53	AES_OUT_2 (–)
20	AES_OUT_3 (+)	54	AES_OUT_3 (–)
21	AES_OUT_4 (+)	55	AES_OUT_4 (–)
22	AES_OUT_5 (+)	56	AES_OUT_5 (–)
23	AES_OUT_6 (+)	57	AES_OUT_6 (–)
24	AES_OUT_7 (+)	58	AES_OUT_7 (–)
25	AES_OUT_8 (+)	59	AES_OUT_8 (–)
26	AES_OUT_9 (+)	60	AES_OUT_9 (–)
27	AES_OUT_10 (+)	61	AES_OUT_10 (–)
28	AES_OUT_11 (+)	62	AES_OUT_11 (–)
29	AES_OUT_12 (+)	63	AES_OUT_12 (–)

Table 12-2: Audio AES Connector pinout

Pin	Signal	Pin	Signal
30	GND	64	GND
31	AES_OUT_13 (+)	65	AES_OUT_13 (–)
32	AES_OUT_14 (+)	66	AES_OUT_14 (–)
33	AES_OUT_15 (+)	67	AES_OUT_15 (–)
34	AES_OUT_16 (+)	68	AES_OUT_16 (–)

Table 12-2: Audio AES Connector pinout

1RU audio breakout boxes are available for both 110 Ω and 75 Ω connectors. (These are products **ABT-32-32-D110** and **ABT-32-32-D75** respectively.) Connect to the audio breakout box with a SCSI VHDCI-68 male to HD68 male SCSI cable.

This is a drawing of the 110 Ω breakout box, which has 3-pin quick-release connectors:

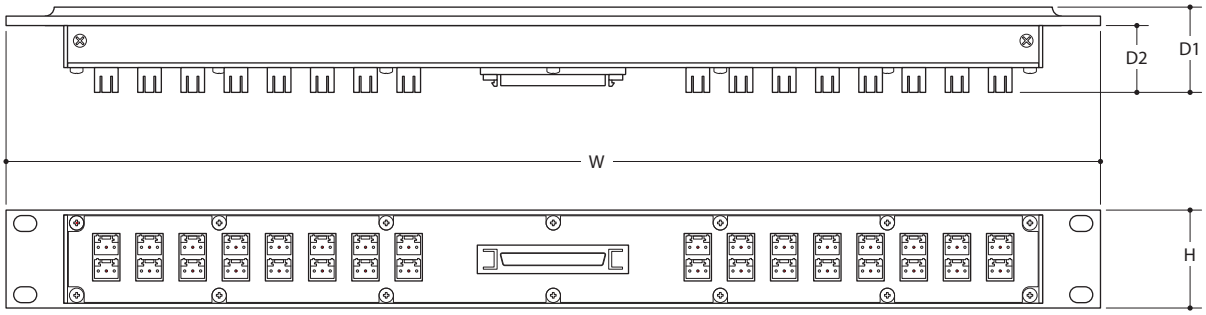


Fig. 12-6: Audio Breakout Box - ABT-32-32-D75

This is a drawing of the 75 Ω breakout box, which has BNCs:

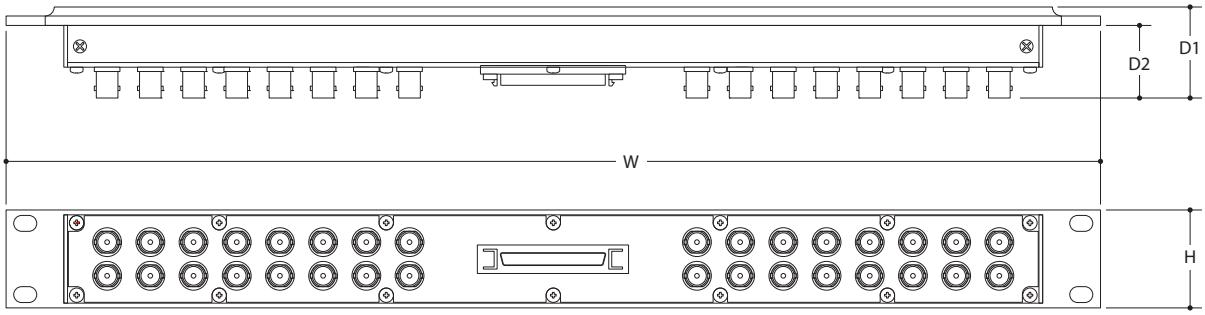


Fig. 12-7: Audio Breakout Box - ABT-32-32-D110

The following table shows the dimensions of the audio breakout boxes:

Product	W	H	D1	D2
ABT-32-32-D110	482.6 mm 19.00 inches	43.2 mm 1.70 inches	37.7 mm 1.48 inches	29.4 mm 1.16 inches
ABT-32-32-D75	482.6 mm 19.00 inches	43.2 mm 1.70 inches	40.1 mm 1.58 inches	31.9 mm 1.26 inches

Table 12-3: ABT-32-32 dimensions

LANs 1 and 2

The Ethernet connectors (LANs 1 and 2) are RJ45 10/100baseT ports, which automatically negotiate the fastest speed possible:

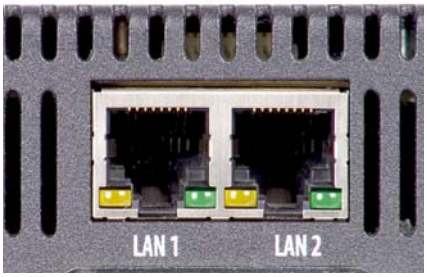


Fig. 12-8: Rear Panel Connectors - LAN ports 1 and 2 - RJ45

These ports are typically used for uploading and downloading media and configuration files, but can also be used for automation. You can connect the Imagestore 750 to two local networks.

- Note: It is recommended that both LAN ports be connected, ideally to separate switches because the ports are 'bonded' together (in software) to achieve Ethernet redundancy on the same IP address.
- Note: Separate IP addresses can be assigned to LAN 1 and LAN 2 for master control applications where media transactions must be isolated from automation control. This is known as VLAN port tagging. It is not usually required since modern networks can deal with all transactions over one IP address, and network redundancy is lost. Please contact Miranda Customer Support for details.

The pin-out of the Ethernet port is:

Pin	Signal Name
1	TDP
2	TDN
3	RDP
4	n.c.
5	n.c.
6	RDN
7	n.c.
8	n.c.

Table 12-4: LAN ports connector pinout

Each of the LAN ports has two integral LED indicators.

Green	Indicates 100 Mbps speed.
Yellow	Indicates active network link.

COM 1–4

There are 4 COM ports, COM 1 through COM 4:

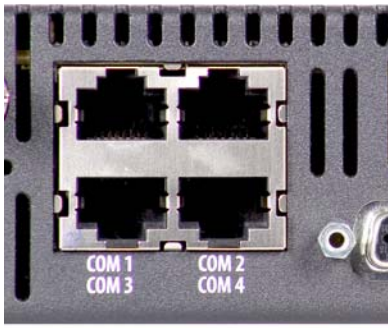


Fig. 12-9: Rear Panel Connectors - Serial Comms ports

They are 8-pin RJ45 ports that provide serial bidirectional communications to external automation systems, EAS units, a slave device, RCP Classic, or an ST61XX thermometer. The serial port type can be configured as RS-232 or RS-422. The Baud rate can be set to 1200, 9600, 19200, 38400, 57600 or 115200.

See Emergency Alert System (EAS) on page 35, Temperature Probe on page 38, and Graphics Co-Processors on page 52for more information.

A serial port can be set to receive Oxtel automation commands or to transmit certain Oxtel automation commands to a slave device using the “Oxtel Slave” protocol. For EAS, the serial port will receive “ENDEC 1822” and “TFT EAS 911T” protocols, and for the temperature probe, it will receive “ST61XX Thermometer” protocol.

▲ A Baud rate of 1200 is valid only when used with the protocol for the ST61XX thermometer.

When your Imagestore 750 is used for master control, the serial port can also be set to send and receive Presmaster protocol automation using the “Presmaster Automation” protocol, although Oxtel automation is a superior and more flexible protocol and should therefore be preferred.

If a Presmaster Control System (PCS) is controlling the Imagestore 750, you should select “Oxtel Automation” protocol, and it is recommended that a Baud rate of 57,600 and serial type of RS-422 be used. Note that Presmaster software version 4.6 or higher is required for controlling all four DSKs.

The pin-out of each COM port is:

Pin	Signal Name RS-422	Signal Name RS-232
1	TX+	RTS
2	TX–	TXD
3	RX+	CTS
4	n.c.	n.c.
5	n.c.	n.c.
6	RX–	RXD
7	n.c.	n.c.
8	GND	GND

Table 12-5: Serial Comms Ports connector pinout

Serial Connection to Intuition XG

If the Imagestore 750 uses an Intuition XG co-processor, it often requires a serial connection to the Intuition XG.

This connection can be achieved with a normal Ethernet cable plus a Miranda RJ45-to-DB9 adapter supplied with the Imagestore 750.

The adapter is Miranda part number 1897-1800-100 (Intuition-XG RS232-to-IS750 Com Port). The adapter is illustrated here:

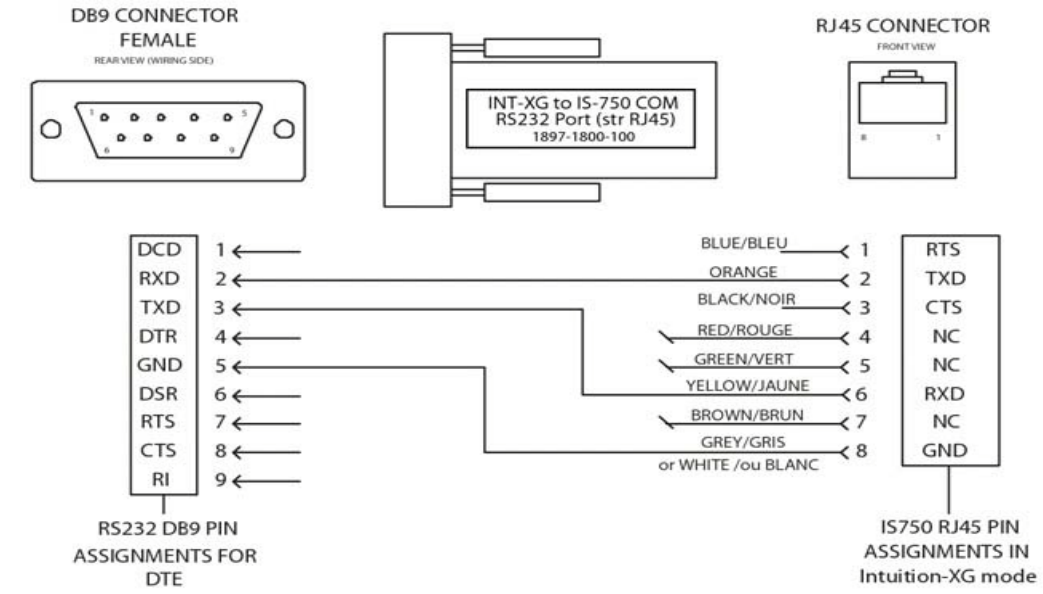


Fig. 12-10: Intuition-XG RS232-to-IS750 adapter

GPIO / LTC

The GPIO / LTC connector is a 44-pin HD type:

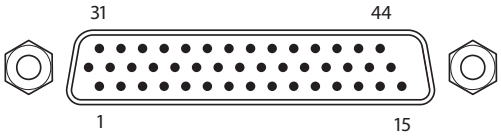


Fig. 12-11: Rear Panel Connectors - GPIO / LTC connector

An Imagestore 750 that has a Dolby or upmix option can use the RS-485 connections on this connector, which are dedicated to Dolby metadata. Dolby metadata is transmitted on a serial RS-485 link as an intermittent and asynchronous serial data stream, with bursts of data occurring at the video frame rate. This connector supports a variety of signals:

- General-purpose interface.

  16 general-purpose interface ports, software configurable as inputs or outputs.

  1 +12 V supply (500 mA max).

  1 +5 V supply (500 mA max).

  1 ground pin.
- Linear time code port.

LTC+, LTC–, ground.

- Total DC fail alarm.

  2-pin "contact closure" for a condition of total DC voltage failure within the Imagestore 750. (When the Imagestore 750 is normally powered, these 2 pins are isolated.) These contacts can be used to switch on some external warning buzzer or lamp (provided this is less than 400 mA, and less than 25 V.

- Dolby metadata RS-485 serial ports.

  4 ports (4 differential signals) configured as input or output.

  115200 Baud.

  1 start bit, 8 data bits, 1 stop bit, no parity

- Two RS-232 ports for future use.

The table below shows pin-outs for the GPIO 44-way D-type connector.

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
1	LTC–	16	RS485/1+	31	LTC+
2	LTC_GND	17	RS485/1–	32	GP_GND
3	TOTAL_DC_FAIL	18	RS485/2+	33	GPIO_15
4	GPIO_14	19	RS485/2–	34	GPIO_13
5	GPIO_12	20	RS485/3+	35	GPIO_11
6	GPIO_10	21	RS485/3–	36	GPIO_9
7	GP_+5V	22	RS485/4+	37	TOTAL_DC_FAIL
8	GP_+12V	23	RS485/4–	38	GPIO_8
9	GPIO_7	24	GND	39	GPIO_6
10	GPIO_5	25	GND	40	GPIO_4
11	GPIO_3	26	GND	41	GPIO_2
12	GPIO_1	27	RS232A_TX (reserved)	42	GPIO_0
13	GP_GND	28	RS232A_CTS (reserved)	43	RS232A_RX (reserved)
14	RS232B_TX (reserved)	29	RS232A_RTS (reserved)	44	RS232B_RX (reserved)
15	RS232B_RTS (reserved)	30	RS232B_CTS (reserved)		

Table 12-6: GPIO / LTC connector pinouts

Note: GPI numbering is zero-based for pin-outs, automation, and the front panel. (Use GPI-0, GPI-1, GPI-2, and so on, to GPI-15.)

Miranda offers a 44-terminal GPIO adapter to help you use this connector. Its order code is **GPIO-44TBA**. Another adapter is the IS-25-44-ADP, which is a 25-pin-to-44-pin adaptor that allows wiring designed for the 25-pin GPI/LTC connector to be used with the 44-pin GPI/LTC connector.

Note: The 25-pin GPIO/LTC port was used with earlier Imagestore 750s. Please refer to the Imagestore 750 user's manual for version 1.14.0 or 1.14.1 software.

Connection of General-Purpose Interface (GPI)

Any GPI port can be used either to trigger the execution of a series of internal pre-programmed commands (input) or to monitor the status of the Imagestore 750 (output). Each GPI can be configured as either an input or an output. See General Purpose Interface (GPI) on page 47.

Input to GPI

Where a GPI port is used as an input, the command macro with which it is associated can be activated either by connecting or by disconnecting the input line to GPI ground (GPIO pin 13 or 15) depending whether 'GPI On' or 'GPI Off' has been assigned to the port.

Output from GPI

A GPI port can be used as an output and its active status (on) is defined by the output being internally pulled to ground by a Darlington transistor. (Active low is represented by +0.7 V or less.) Lamps or relays attached to an output port can use either the GP +12 V supply (pin 8) or GP +5 V supply (pin 7) but the maximum current drawn from either supply should not exceed 500 mA. These supplies are fused.

Where a GPI output is used to drive a relay coil, you should incorporate reverse voltage protection diodes in the circuit to protect the Imagestore 750 from voltage transients.

LTC Connection

Where linear timecode is provided for the Imagestore 750, it should conform to ANSI/SMPTE standard 12M-1995. The input level should be between 1.0 and 2.0 volts peak-to-peak.

AC Input

The Imagestore 750 is equipped with two 350 W power supply units, each fed from its own rear IEC connector. The power supplies are auto-ranging from 100–120 VAC and 200–240 VAC.

Fig. 12-12: Rear Pael Connectors - IEC Mains AC Inlets

Applying Power

Each of the two power supply units (PSU) of the Imagestore 750 has a power switch that becomes accessible when you remove the front fascia. The Imagestore 750 should be connected to main power with an appropriate circuit breaker on each circuit.

After power is applied, the Imagestore 750 will boot automatically. The normal complete boot process takes about 50 seconds, or approximately 90 seconds after a software upgrade. Additional time should be allowed for advanced audio module firmware upgrades.

Before applying power, ensure that the USB port does not contain a USB device. When starting up, the Imagestore 750 first checks to see if there is a USB device present. If it finds one, it will attempt to boot from that device. Note that this USB port is hidden by the front fascia.

The normal boot sequence is complete when the following top level “boot-up” menu appears on the front panel display.

Fig. 12-13: Imagestore 750 Front Panel message after booting

Note: When a restart is required to change any configuration setting, then you can perform a software restart. This option usually completes in approximately 16 seconds. It is much faster than a hardware restart.

13 Specifications

Chapter 13 presents the core product specifications for the Imagestore 750.

SDI Inputs and Outputs

The Imagestore 750 can receive and transmit the following SD-SDI / HD-SDI video standards:

525i, 59.94 Hz	SMPTE 259M-1997	270 Mb/s
625i, 50 Hz	SMPTE 259M-1997	270 Mb/s
1920x1080i, 59.94 Hz	SMPTE 274M-1998	1.485 Gb/s
1920x1080i, 50 Hz	SMPTE 274M-1998	1.485 Gb/s
1280x720, 59.94 Hz	SMPTE 296M-2001	1.485 Gb/s
1280x720, 50 Hz	SMPTE 296M-2001	1.485 Gb/s

Input is through screened 75W BNC connectors. The return loss is better than –15 dB up to 1.5 GHz. Each input circuit is provided with automatic adaptive equalization circuitry suitable for lengths of up to 110 m of Belden 8281 or Belden 1694A cable.

All outputs have amplitudes of 800 mV (± 10%).

The Imagestore 750 delays the video path by no more than one line, excluding any in-circuit frame delays that are configured.

Power Requirements

The Imagestore 750 accepts either 110 VAC or 230 VAC (auto-ranging from 100–120 VAC and 200–240 VAC), 60 Hz or 50 Hz. There are supply fuses within each of two removable power supply modules. There are DC supply fuses within the Imagestore 750.

Interfaces

The Imagestore employs these interfaces:

COM (RS-232 or RS-422)	Automation serial control interfaces
Ethernet	Image-loading, configuration, and transfer or automation
GPIs	16 GPIs with an input and output macro editor
RS-485	Dolby metadata serial interfaces (4)

Video Frame Rates

These are video frame rate data for the rates handled by the Imagestore 750:

Standard	Pixels per Active Line (S/AL)	Active Lines per Frame	Frame Rate (Hz)	Scanning Format	Interface Sampling Clock frequency F_s (MHz)	Clock Periods per Total Line (S/TL)	Total Lines per Frame
SMPTE 259M							
525i, 59.94	720	486	30/1.001	2:1 interlaced	13.5	858	525
625i, 50	720	576	25	2:1 interlaced	13.5	864	625
SMPTE 274M							
1920 × 1080, 59.94, 2:1	1920	1080	30/1.001	2:1 interlaced	74.25/1.001	2200	1125
1920 × 1080, 50, 2:1	1920	1080	25	2:1 interlaced	74.25	2640	1125
SMPTE 296M							
1280 × 720, 59.94	1280	720	60/1.001	1:1 progressive	74.25/1.001	1650	750
1280 × 720, 50	1280	720	50	1:1 progressive	74.25	1980	750

Table 13-1: Imagestore 750 Video Frame Rate Information

Mechanical

The Imagestore 750 has a 1RU chassis with the following mechanical specification:

Height	44.5 mm (1.75 in — 1RU)
Width	482.6 mm (19.0 in) with mounting ears; 442.0 mm (17.40 in) without ears
Depth	660.4 mm (26.0 in)
Weight	9.0 kg (19.8 lbs) minimum system, 1 PSU
Cooling	Forced air, internal fans

Environmental

Operating temperature	5 °C to 40 °C
Storage temperature	–10 °C to 70 °C
Humidity	20% to 80%, non-condensing

Note: An air-conditioned environment is recommended for optimal performance and reliability.

A Front Panel Menu

Appendix A presents the commands of the front panel menu.

The following list shows the hierarchical structure of the Imagestore 750's front panel menus. Many menu items are dependent on the presence of one or more licence options.

(Commands at the same indentation can be accessed, at the front panel, by moving the joystick to the left or right, corresponding to the arrows on the front panel. A command that is indented relative to the previous command is accessed by moving the joystick down, corresponding to the word "enter" on the front panel.)

Note: This is a long list. Some items are marked with "*Repeats for . . .*" to shorten the list.

Status	
General Status	General system status
Temperature	Temperature of the FPGA
PSUA 12V	Actual voltage of the 12V PSUA
PSUB 12V	Actual voltage of the 12V PSUB
SYS 5V	Actual voltage of the 5V supply rail
SYS 3.3V	Actual voltage of the 3.3V supply rail
SYS 2.5V	Actual voltage of the 2.5V supply rail
SYS 1.8V	Actual voltage of the 1.8V supply rail
SYS 1.2V	Actual voltage of the 1.2V supply rail
DVE 12V	Actual voltage of the 12V supply rail on the DVE card
DVE 2.5V	Actual voltage of the 2.5V supply rail on the DVE card
DVE 1.8V	Actual voltage of the 1.8V supply rail on the DVE card
DVE 1.2V	Actual voltage of the 1.2V supply rail on the DVE card
PSU A	Status of the 12V PSUA
PSU B	Status of the 12V PSUB
FAN 1 SPEED	Speed of the first fan, in RPM
FAN 2 SPEED	Speed of the second fan, in RPM
FAN 3 SPEED	Speed of the third fan, in RPM
FAN 4 SPEED	Speed of the fourth fan, in RPM
FAN 5 SPEED	Speed of the fifth fan, in RPM
Timecode Status	"LTC" or "VITC" if valid timecode is present; otherwise "BAD-Internl"
	"DF" for dropframe; "ND" for no dropframe
	"Fwd" or "Bwd" shows LTC direction
Timecode Time	"Ext" if valid external time code; "Int" if using internal clock
Ref Status	
Ref Source	"External Ref" if locked to EXT REF; "SDI A" if locked to A; "Free Running" or "Unknown"
Ext Reference	
Ext Ref Status	"Locked" if the external reference is valid; "Unlocked" if missing. It does not differentiate between tri-level (HD) or bi-level (SD) analogue references.
Ext Standard	"625 Line", "525 Line", "1080i/59.94", "1080i/50", "720p/59.94", "720p/50 or "Unknown" if not present

Input Status	
A Input	
Video Standard	"625 Line", "525 Line", "1080i/59.94", "1080i/50", "720p/59.94", "720p/50" or "Unlocked" if signal is not present
Input Timing	Input timing relative to the Program Output in lines/samples; "Unlocked" if video signal is not present, or "Unknown" if the signal is not recognized.
B Input	
Video Standard	See "A Input" (above)
Input Timing	See "A Input" (above)
C Input	
Video Standard	See "A Input" (above)
Input Timing	See "A Input" (above)
D Input	
Video Standard	See "A Input" (above)
Input Timing	See "A Input" (above)
FILL-1 Input	
Video Standard	See "A Input" (above)
Input Timing	See "A Input" (above)
KEY-1 Input	
Video Standard	See "A Input" (above)
Input Timing	See "A Input" (above)
FILL-2 Input	
Video Standard	See "A Input" (above)
Input Timing	See "A Input" (above)
KEY-2 Input	
Video Standard	See "A Input" (above)
Input Timing	See "A Input" (above)
Audio Feed 1–4	*Repeats for audio feeds 1–4*
Channel 1	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 2	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 3	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 4	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 5	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 6	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 7	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 8	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 9	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 10	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 11	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 12	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 13	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 14	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 15	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Channel 16	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
AES	
Pair 1L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 1R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 2L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 2R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 3L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 3R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 4L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"

Pair 4R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 5L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 5R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 6L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 6R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 7L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 7R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 8L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 8R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 9L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 9R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 10L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 10R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 11L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 11R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 12L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 12R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 13L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 13R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 14L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 14R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 15L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 15R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 16L	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Pair 16R	"PCM", "DolbyE", "DolbyD" "Non-PCM" or "Unlocked"
Clocks	
27 MHz Clk	Shows the status of the 27 MHz clock as "Locked" or "Unlocked"
54 MHz Clk	Shows the status of the 54 MHz clock as "Locked" or "Unlocked"
74 MHz Clk	Shows the status of the 74 MHz clock as "Locked" or "Unlocked"
Output Status	
Program	
Video Standard	Video standard of Program Output
Preview	
Video Standard	Video standard of Preview Output
Audio Mod Stat	
Module 1 Status	"Module Error", "Module OK", "Not Filled" or "Unknown"
Module 2 Status	"Module Error", "Module OK", "Not Filled" or "Unknown"
Module 3 Status	"Module Error", "Module OK", "Not Filled" or "Unknown"
Module 4 Status	"Module Error", "Module OK", "Not Filled" or "Unknown"
Module 1 Type	"Dolby Decoder", "Dolby D Encoder", "Dolby E Encoder", "Up-mix", "Not Filled" or "Unknown"
Module 2 Type	"Dolby Decoder", "Dolby D Encoder", "Dolby E Encoder", "Up-mix", "Not Filled" or "Unknown"
Module 2 Type	"Dolby Decoder", "Dolby D Encoder", "Dolby E Encoder", "Up-mix", "Not Filled" or "Unknown"
Module 2 Type	"Dolby Decoder", "Dolby D Encoder", "Dolby E Encoder", "Up-mix", "Not Filled" or "Unknown"
System Info	
Serial Number	Serial number (factory set)
IP Address	IP address (changed via Setup > Network menu).
Hostname	Hostname (changed via Setup > Network menu).
Network Mask	Network mask (changed via Setup > Network menu).

Gateway Add	Gateway address (changed via Setup > Network menu).
MAC Addres	MAC address (factory set)
NTP Server	NTP server address (changed via Setup > Network menu).
Op System	Linux operating system kernel version
File Sys Type	File system type for the /home partition (JFS)
Animation Mem	Store memory associated with DSK 1
Animation Mem	Store memory associated with DSK 2
Animation Mem	Store memory associated with DSK 3
Animation Mem	Store memory associated with DSK 4
Images Used	Number of files in the image library (up to 4000 displayable on the front panel)
Disk Space Used	Disk space used, in MB or GB, with percentage of total space used
Current MixFile	'Audio Graph' if audio is defined by the Imagestore 750 Configurator. Otherwise, the name of the mix file
COM 1 Counters	"Rx" (received data), "Tx" (transmitted data), "FE" (framing errors), "PE" (parity errors), "BI" (breaks), "OE" (overrun errors)
COM 2 Counters	See "COM 1 Counters" (above)
COM 3 Counters	See "COM 1 Counters" (above)
COM 4 Counters	See "COM 1 Counters" (above)
RS232 A Counters	See "COM 1 Counters" (above). *Reserved for future use*
RS232 B Counters	See "COM 1 Counters" (above). *Reserved for future use*
RS485 1 Counters	See "COM 1 Counters" (above)
RS485 2 Counters	See "COM 1 Counters" (above)
RS485 3 Counters	See "COM 1 Counters" (above)
RS485 4 Counters	See "COM 1 Counters" (above)
Time Zone	Time zone offset from GMT (changed via Setup > Date/Time)
Current Date	Current date (changed via Setup > Date/Time)
Current Time	Current time (changed via Setup > Date/Time)
Running Since	Date and time when the unit was last powered up
Main Board Rev	Main board revision
I/O Board Rev	I/O board revision
DVE Board Rev	DVE board revision
Store SPD	Store memory Serial Presence Detect (SPD) size and product ID
Delay SPD	Delay memory Serial Presence Detect (SPD) size and product ID
CPU FPGA Date	Firmware build date
CPU FPGA Ident	Firmware mode: "SD" or "HD"
CPU FPGA Version	Firmware version number
Operate	
Set Inputs	
A	
Pass SDI	Selects incoming SDI input for use by this input
Colour Field 1	Selects Color Field 1 for use by this input (in place of SDI)
Colour Field 2	Selects Color Field 2 for use by this input (in place of SDI)
Colour Field 3	Selects Color Field 3 for use by this input (in place of SDI)
Test Pattern 1	Selects Test Pattern 1 for use by this input (in place of SDI)
Test Pattern 2	Selects Test Pattern 2 for use by this input (in place of SDI)
B	
Pass SDI	See "A" (above)
Colour Field 1	See "A" (above)
Colour Field 2	See "A" (above)
Colour Field 3	See "A" (above)
Test Pattern 1	See "A" (above)
Test Pattern 2	See "A" (above)

C	
Pass SDI	See “A” (above)
Colour Field 1	See “A” (above)
Colour Field 2	See “A” (above)
Colour Field 3	See “A” (above)
Test Pattern 1	See “A” (above)
Test Pattern 2	See “A” (above)
D	
Pass SDI	See “A” (above)
Colour Field 1	See “A” (above)
Colour Field 2	See “A” (above)
Colour Field 3	See “A” (above)
Test Pattern 1	See “A” (above)
Test Pattern 2	See “A” (above)
Fill-1	
Pass SDI	See “A” (above)
Colour Field 1	See “A” (above)
Colour Field 2	See “A” (above)
Colour Field 3	See “A” (above)
Test Pattern 1	See “A” (above)
Test Pattern 2	See “A” (above)
Key-1	
Pass SDI	See “A” (above)
Colour Field 1	See “A” (above)
Colour Field 2	See “A” (above)
Colour Field 3	See “A” (above)
Test Pattern 1	See “A” (above)
Test Pattern 2	See “A” (above)
Fill-2	
Pass SDI	See “A” (above)
Colour Field 1	See “A” (above)
Colour Field 2	See “A” (above)
Colour Field 3	See “A” (above)
Test Pattern 1	See “A” (above)
Test Pattern 2	See “A” (above)
Key-2	
Pass SDI	See “A” (above)
Colour Field 1	See “A” (above)
Colour Field 2	See “A” (above)
Colour Field 3	See “A” (above)
Test Pattern 1	See “A” (above)
Test Pattern 2	See “A” (above)
Input Masks	
A	Allows a rectangular mask to be applied to each physical SDI input by adjusting the Left, Right, Top and Bottom extent of the mask. Warning: Setting masks will directly affect the equivalent SDI source, so anything else that uses that source (for example, the AB Mixer or a DVE Input) will be also affected. If an input is associated with a color field or test pattern (so that it is not using its SDI input source), then the image will not be masked. Only the SDI source is masked.
B	See “A” (above)
C	See “A” (above)
D	See “A” (above)

Fill-1	See “A” (above)
Key-1	See “A” (above)
Fill-2	See “A” (above)
Key-2	See “A” (above)
Colour Fields	
Colour Field 1	Defines Color Field 1 in terms of RGB values as a percentage
Colour Field 2	Defines Color Field 2 in terms of RGB values as a percentage
Colour Field 3	Defines Color Field 3 in terms of RGB values as a percentage
Mix A Input	
A	Selects A as the A input for the AB mixer
B	Selects B as the A input for the AB mixer
C	Selects C as the A input for the AB mixer
D	Selects D as the A input for the AB mixer
Fill-1	Selects Fill-1 as the A input for the AB mixer
Key-1	Selects Key-1 as the A input for the AB mixer
Fill-2	Selects Fill-2 as the A input for the AB mixer
Key-2	Selects Key-2 as the A input for the AB mixer
Mix B Input	
A	Selects A as the B input for the AB mixer
B	Selects B as the B input for the AB mixer
C	Selects C as the B input for the AB mixer
D	Selects D as the B input for the AB mixer
Fill-1	Selects Fill-1 as the B input for the AB mixer
Key-1	Selects Key-1 as the B input for the AB mixer
Fill-2	Selects Fill-2 as the B input for the AB mixer
Key-2	Selects Key-2 as the B input for the AB mixer
Program Input	
A	Selects A as the Program input for IS-750-LOGO
B	Selects B as the Program input for IS-750-LOGO
C	Selects C as the Program input for IS-750-LOGO
D	Selects D as the Program input for IS-750-LOGO
Fill-1	Selects Fill-1 as the Program input for IS-750-LOGO
Key-1	Selects Key-1 as the Program input for IS-750-LOGO
Fill-2	Selects Fill-2 as the Program input for IS-750-LOGO
Key-2	Selects Key-2 as the Program input for IS-750-LOGO
AB Mixer	
Cut AB	Cuts the AB mixer between the A/B inputs
Cut To A	Cuts the AB mixer to the A input
Cut To B	Cuts the AB mixer to the B input
Fade AB	Fades AB mixer between the A/B inputs over AB mixer fade duration
Fade To A	Fades AB mixer to the A input over AB mixer fade duration
Fade To B	Fades AB mixer to the B input over AB mixer fade duration
Trans Type	
X-Fade	Selects cross-fading as the mode for AB mixing
V-Fade	Selects V-fading as the mode for AB mixing
Mix Rate	Selects AB mixer fade rate in fields/frames (interlaced/progressive) used when fades as performed via the front panel or automation
V-Fade Colour	Selects the RGB color field through which V-fades will transition. The default color is black.
Set Cut Mode	
Any Field	Selects A/B cuts or fades to start on any field (interlaced)
Field 1 (Def)	Selects A/B cuts or fades to start on field 1 (interlaced)
Field 2	Selects A/B cuts or fades to start on field 2 (interlaced)

2D DVE (PGM)	
Play Forward	Plays the selected DVE sequence in the forward direction.
Play Backward	Plays the selected DVE sequence in reverse direction.
Load Sequence	Select and play DVE sequence. When sequence is selected this plays the previously selected sequence in reverse.
Load Action	
First Keyframe	Loading the DVE sequence will start it at the first keyframe
Last Keyframe	Loading the DVE sequence will start it at the last keyframe
Play Forward	Loading the DVE sequence will start it playing forwards
Play Backward	Loading the DVE sequence will start it playing backwards
DVE Mode	
Disabled	DVE is out of circuit (bypassed).
	If the DVE will be enabled at run-time, add compensating video delays to match the DVE delay.
Enabled	DVE is in circuit and active.
	There is a video delay through the DVE. The DVE inputs are defined by DVE 1 input and DVE 2 input (if licensed). You must add compensating video delays to match the DVE delay.
DVE 1 Input	
A	Video input A is passed into the first DVE window.
B	Video input B is passed into the first DVE window.
C	Video input C is passed into the first DVE window.
D	Video input D is passed into the first DVE window.
AB Mixer	AB mixer output is passed into the first DVE window.
Fill-1	Video input Fill-1 is passed into the first DVE window.
Key-1	Video input Key-1 is passed into the first DVE window.
Fill-2	Video input Fill-2 is passed into the first DVE window.
Key-2	Video input Key-2 is passed into the first DVE window.
DVE 2 Input	
A	Video input A is passed into the second DVE window.
B	Video input B is passed into the second DVE window.
C	Video input C is passed into the second DVE window.
D	Video input D is passed into the second DVE window.
AB Mixer	AB mixer output is passed into the second DVE window.
Fill-1	Video input Fill-1 is passed into the second DVE window.
Key-1	Video input Key-1 is passed into the second DVE window.
Fill-2	Video input Fill-2 is passed into the second DVE window.
Key-2	Video input Key-2 is passed into the second DVE window.
2D DVE (PVW)	
Play Forward	Plays the selected DVE sequence in the forward direction on PVW.
Play Backward	Plays the selected DVE sequence in reverse direction on PVW.
Load Sequence	Select and play DVE sequence. When sequence is selected, this plays the previously selected sequence in reverse.
Load Action	
First Keyframe	Loading the DVE sequence will start it at the first keyframe
Last Keyframe	Loading the DVE sequence will start it at the last keyframe
Play Forward	Loading the DVE sequence will start it playing forwards
Play Backward	Loading the DVE sequence will start it playing backwards
DVE Mode	
Disabled	DVE is out of circuit (bypassed). Add video delays if compensation of the DVE delay is required
Enabled	DVE is in circuit and active. The inputs are defined by DVE 1 input and DVE 2 input (if licensed). Add video delays if compensation of the DVE delay is required.
DVE 1 Input	
A	Video input A is passed into the first DVE window.

B	Video input B is passed into the first DVE window.
C	Video input C is passed into the first DVE window.
D	Video input D is passed into the first DVE window.
AB Mixer	AB mixer output is passed into the first DVE window.
Fill-1	Video input Fill-1 is passed into the first DVE window.
Key-1	Video input Key-1 is passed into the first DVE window.
Fill-2	Video input Fill-2 is passed into the first DVE window.
Key-2	Video input Key-2 is passed into the first DVE window.
DVE 2 Input	
A	Video input A is passed into the second DVE window.
B	Video input B is passed into the second DVE window.
C	Video input C is passed into the second DVE window.
D	Video input D is passed into the second DVE window.
AB Mixer	AB mixer output is passed into the second DVE window.
Fill-1	Video input Fill-1 is passed into the second DVE window.
Key-1	Video input Key-1 is passed into the second DVE window.
Fill-2	Video input Fill-2 is passed into the second DVE window.
Key-2	Video input Key-2 is passed into the second DVE window.
DVE Config	
K1K2 DVE K3K4	DVE output positioned between DSK 2 and DSK 3 within the video channel streams on both PGM and PVW.
K1 DVE K2K3K4	DVE output positioned between DSK 1 and DSK 2 within the video channel streams on both PGM and PVW.
DVE K1K2K3K4	DVE output positioned before DSK 1 within the video channel streams on both PGM and PVW.
DSK 1–4	*Repeat for DSKs 1–4*
Keyer Ops	
Cut Up/Down	Cuts up/down the keyer over the background video
Cut Up	Cuts up the keyer over the background video
Cut Down	Cuts down the keyer over the background video
Fade Up/Down	Fades up/down the keyer over the background video
Fade Up	Fades up the keyer over the background video
Fade Down	Fades down the keyer over the background video
Fade Rate	Adjusts the keyer fade rate between 1 and 999 fields as used by the front panel and automation
Set Key Params	
Source	
Self	Key data is derived from the Fill signal
Separate	Key data is derived from Key signal
None	Key data is set white so there is no transparency
Type	
Full	Passes the foreground signal where the key signal is present
Linear	Sums background and foreground images to create the signal
Sense	
Normal	Selects the mode in which a black key means transparent and a white key is opaque
Invert	Selects the mode in which a white key means transparent and a black key is opaque
Masking	
Disable	Uses no masking of the keyer output
Setup	Defines a mask area within the range determined by the size of the image and the standard.
C, G & T	Sets clip, gain and transparency. Clip is the level under which the key signal will be forced to black. Gain amplifies the signal forcing grey levels to approach white. Transparency affects the luminance of the key and therefore the amount of background allowed in the output.
Cut To/Fr Blk	Cuts to/from black output
Cut From Blk	Cuts from black output

Cut To Blk	Cuts to black output
Fade To/Fr Blk	Fades to/from black output
Fade From Blk	Fades from black output
Fade To Blk	Fades to black output
FTB Rate	Sets fade-to-black rate in fields between 1 and 999 used by the front panel and automation
Input Ops	
Fill-1/Key-1	Selects keyer input from Fill-1/Key-1 rather than store
Fill-2/Key-2	Selects keyer input from Fill-2/Key-2 rather than store
Fill-3/Key-3	Selects keyer input from Fill-3/Key-3 rather than store
Unload Input	Sets no external input and unloads any associated store
Store Ops	
Load Image	Loads a file from the image library into the appropriate store
Set Position	Sets the position of an image or animation. Does not adjust graphics from external fill/key.
Save Image	Saves the current image with changed settings
Unload Image	Unloads the contents of the appropriate store
Load Mode	
Clean Load	Unloads an existing image before loading new one
Cut Load	Existing image remains active until new one is loaded, then a cut occurs, Warning: Loading a new image will fail in this mode if the sum of the resident image/animation and the new image/animation exceeds the image memory capacity. Use Clean Load mode when using such large animations
Start Strap	Starts an Easytext crawl loaded into this layer
Stop Strap	Stops an Easytext crawl loaded into this layer
Start Timer	Starts a Bugclock timer loaded into this layer
Stop Timer	Stops a Bugclock timer loaded into this layer
Reset Timer	Resets a Bugclock timer loaded into this layer
Play Animation	Starts an animation loaded into this layer
Restart Anim	Restarts an animation loaded into this layer from the beginning
Stop Animation	Stops an animation loaded into this layer when it has completed a loop
Stop Anim Now	Stops an animation loaded into this layer immediately
Preview Output	
Preview o/p	Selects default Preview Output
Program o/p	Selects a copy of PGM OUT as the Preview Output
PGM AB Mix	Selects output from PGM AB Mixer as the Preview Output
PGM DVE o/p	Selects output from the PGM DVE as the Preview Output
PGM DSK1 o/p	Selects output from PGM DSK1 as the Preview Output
PGM DSK2 o/p	Selects output from PGM DSK2 as the Preview Output
PGM DSK3 o/p	Selects output from PGM DSK3 as the Preview Output
Clean Output	
Program o/p	Selects a copy of PGM OUT as the Clean Feed Output
SDI A	Selects a copy of SDI A as the Clean Feed Output
SDI B	Selects a copy of SDI B as the Clean Feed Output
SDI C	Selects a copy of SDI C as the Clean Feed Output
SDI D	Selects a copy of SDI D as the Clean Feed Output
PGM AB Mix	Selects a copy of the program AB mix output as the Clean Feed Output
PGM DVE o/p	Selects a copy of PGM DVE output as the Clean Feed Output. The output seen with the PGM DVE output depends on the current DVE Configuration.
PGM DSK1 o/p	Selects output from PGM DSK1 as the Clean Feed Output
PGM DSK2 o/p	Selects output from PGM DSK2 as the Clean Feed Output
PGM DSK3 o/p	Selects output from PGM DSK3 as the Clean Feed Output
Store 1 Fill	Selects a copy of DSK 1 store fill as the Clean Feed Output

Store 1 Key	Selects a copy of DSK 1 store key as the Clean Feed Output
Store 2 Fill	Selects a copy of DSK 2 store fill as the Clean Feed Output
Store 2 Key	Selects a copy of DSK 2 store key as the Clean Feed Output
Store 3 Fill	Selects a copy of DSK 3 store fill as the Clean Feed Output
Store 3 Key	Selects a copy of DSK 3 store key as the Clean Feed Output
Store 4 Fill	Selects a copy of DSK 4 store fill as the Clean Feed Output
Store 4 Key	Selects a copy of DSK 4 store key as the Clean Feed Output
SDI Fill-1	Selects a copy of SDI Fill-1 as the Clean Feed Output
SDI Key-1	Selects a copy of SDI Key-1 as the Clean Feed Output
SDI Fill-2	Selects a copy of SDI Fill-2 as the Clean Feed Output
SDI Key-2	Selects a copy of SDI Key-2 as the Clean Feed Output
Monitor Output	
Program o/p	Selects a copy of PGM OUT as the Monitor Output
Preview o/p	Selects a copy of PVW OUT as the Monitor Output
SDI A	Selects a copy of SDI A as the Monitor Output
SDI B	Selects a copy of SDI B as the Monitor Output
SDI C	Selects a copy of SDI C as the Monitor Output
SDI D	Selects a copy of SDI D as the Monitor Output
PGM AB Mix	Selects a copy of the program AB mix output as the Monitor Output
PVW AB Mix	Selects a copy of the preview AB mix output as the Monitor Output
PGM DVE o/p	Selects a copy of PGM DVE output as the Monitor Output. The output seen with the PGM DVE output depends on the current DVE Configuration.
PGM DSK1 o/p	Selects output from PGM DSK1 as the Monitor Output
PGM DSK2 o/p	Selects output from PGM DSK2 as the Monitor Output
PGM DSK3 o/p	Selects output from PGM DSK3 as the Monitor Output
Store 1 Fill	Selects a copy of DSK 1 store fill as the Monitor Output
Store 1 Key	Selects a copy of DSK 1 store key as the Monitor Output
Store 2 Fill	Selects a copy of DSK 2 store fill as the Monitor Output
Store 2 Key	Selects a copy of DSK 2 store key as the Monitor Output
Store 3 Fill	Selects a copy of DSK 3 store fill as the Monitor Output
Store 3 Key	Selects a copy of DSK 3 store key as the Monitor Output
Store 4 Fill	Selects a copy of DSK 4 store fill as the Monitor Output
Store 4 Key	Selects a copy of DSK 4 store key as the Monitor Output
SDI Fill-1	Selects a copy of SDI Fill-1 as the Monitor Output
SDI Key-1	Selects a copy of SDI Key-1 as the Monitor Output
SDI Fill-2	Selects a copy of SDI Fill-2 as the Monitor Output
SDI Key-2	Selects a copy of SDI Key-2 as the Monitor Output
Colour 1	Selects a copy of Color field 1 as the Monitor Output
Colour 2	Selects a copy of Color field 2 as the Monitor Output
Colour 3	Selects a copy of Color field 3 as the Monitor Output
Colour 4	Selects a copy of the V-fade color as the Monitor Output
Pattern 1	Selects a copy of Test Pattern 1 as the Monitor Output
Pattern 2	Selects a copy of Test Pattern 2 as the Monitor Output
PGM DVE1	Selects a copy of program DVE Input 1 as the Monitor Output
PGM DVE2	Selects a copy of program DVE Input 2 as the Monitor Output
PVW DVE1	Selects a copy of preview DVE Input 1 as the Monitor Output
PVW DVE2	Selects a copy of preview DVE Input 2 as the Monitor Output
Audio	
AB Mixer	
Cut A/B	Cuts the audio AB mixer between the A/B inputs
Cut To A	Cuts the audio AB mixer to the A input
Cut To B	Cuts the audio AB mixer to the B input

Fade A/B	Fades the audio AB mixer between the A/B inputs over its fade duration
Fade To A	Fades the audio AB mixer to the A input over its fade duration
Fade To B	Fades the audio AB mixer to the B input over its fade duration
Set Rate	Selects the fade rate duration for the audio AB mixer used by the front panel and automation
FTS Fader	
Toggle Silence	Alternatively fades between Program Output and silence
Fade To Sil	Fades down the Program Output to silence
Fade From Sil	Fades up the Program Output from silence
Set Rate	Selects the fade rate duration for the fade-to-silence used by the front panel and automation
Voice-Overs	
Voice-Over 1–8	*Repeat for voice-overs 1–8*
Toggle Vo	Fades up/down the voice-over over its fade duration
Fade Up Vo	Fades up the voice-over over its fade duration
Fade Down Vo	Fades down the voice-over over its fade duration
Set Rate	Selects the voice-over fade rate duration used by the front panel and automation
Duck	Selects the background audio level attenuation during voice-overs
Preset	Selects the level of the voice-over audio
Gains	
Load Preset	Loads a gain preset to be used with this voice-over
Save Preset	Saves the current gain settings as a new preset
Shuffles	
Load Preset	Loads a shuffle preset to be used with this voice-over
Save Preset	Saves the current shuffle settings as a new preset
Easyplay	
Stream 1–4	Repeats for streams 1–4
Queue 1	
Easyplay Load	Loads an Easyplay audio clip into the appropriate queue of this stream
Easyplay Start	Plays the Easyplay audio clip
Easyply Stop	Stops playing the Easyplay audio clip
Eplay Unload	Unloads the Easyplay audio clip
Queue 2	
Easyplay Load	Loads an Easyplay audio clip into the appropriate queue of this stream
Easyplay Start	Plays the Easyplay audio clip
Easyply Stop	Stops playing the Easyplay audio clip
Eplay Unload	Unloads the Easyplay audio clip
Queue 3	
Easyplay Load	Loads an Easyplay audio clip into the appropriate queue of this stream
Easyplay Start	Plays the Easyplay audio clip
Easyply Stop	Stops playing the Easyplay audio clip
Eplay Unload	Unloads the Easyplay audio clip
Queue 4	
Easyplay Load	Loads an Easyplay audio clip into the appropriate queue of this stream
Easyplay Start	Plays the Easyplay audio clip
Easyply Stop	Stops playing the Easyplay audio clip
Eplay Unload	Unloads the Easyplay audio clip
Input Mux	
Program Select	Selects an input for the Audio Input Program Multiplexor
Preset Select	Selects an input for the Audio Input Preset Multiplexor
Output Mux	
Program Selset	Selects an input for the Audio Output Program Multiplexor
Preview Select	Selects an input for the Audio Output Preset Multiplexor

Clean Selset	Selects an input for the Audio Output Clean Feed Multiplexor
Monitor Select	Selects an input for the Audio Output Monitor Multiplexor
Meter Select	Selects an input for the Audio Output Meter Multiplexor
Input Buses	
PGM Input	
Gains	
Load Preset	Loads a gain preset for the Audio Input Program Gain
Save Preset	Saves a gain preset for the Audio Input Program Gain
Shuffles	
Load Preset	Loads a shuffle preset for the Audio Input Program Shuffler
Save Preset	Saves a shuffle preset for the Audio Input Program Shuffler
PST Input	
Gains	
Load Preset	Loads a gain preset for the Audio Input Preset Gain
Save Preset	Saves a gain preset for the Audio Input Preset Gain
Shuffles	
Load Preset	Loads a shuffle preset for the Audio Input Preset Shuffler
Save Preset	Saves a shuffle preset for the Audio Input Preset Shuffler
Output Buses	
PGM Output	
Gains	
Load Preset	Loads a gain preset for the Audio Output Program Gain
Save Preset	Saves a gain preset for the Audio Output Program Gain
Shuffles	
Load Preset	Loads a shuffle preset for the Audio Output Program Shuffler
Save Preset	Saves a shuffle preset for the Audio Output Program Shuffler
MD Preset	
Processor 1	Selects Metadata preset 1 to be loaded into the internal Metadata sources
Processor 2	Selects Metadata preset 2 to be loaded into the internal Metadata sources
Processor 3	Selects Metadata preset 3 to be loaded into the internal Metadata sources
Processor 4	Selects Metadata preset 4 to be loaded into the internal Metadata sources
Legacy Shuffles	
A-Input	
Channel 1	Select the legacy shuffle mapping for input bunch 1 of the A Input
Channel 2	Select the legacy shuffle mapping for input bunch 2 of the A Input
Channel 3	Select the legacy shuffle mapping for input bunch 3 of the A Input
Channel 4	Select the legacy shuffle mapping for input bunch 4 of the A Input
Voice-Over	
Channel 1	Select the legacy shuffle mapping for input bunch 1 of the VO1 Input
Channel 2	Select the legacy shuffle mapping for input bunch 2 of the VO1 Input
Channel 3	Select the legacy shuffle mapping for input bunch 3 of the VO1 Input
Channel 4	Select the legacy shuffle mapping for input bunch 4 of the VO1 Input
B-Input	
Channel 1	Select the legacy shuffle mapping for input bunch 1 of the B Input
Channel 2	Select the legacy shuffle mapping for input bunch 2 of the B Input
Channel 3	Select the legacy shuffle mapping for input bunch 3 of the B Input
Channel 4	Select the legacy shuffle mapping for input bunch 4 of the B Input
GPI Output	
GPI Out 0 On	Sets GPI Output 0 on
GPI Out 0 Off	Sets GPI Output 0 off
GPI Out 1 On	Sets GPI Output 1 on
GPI Out 1 Off	Sets GPI Output 1 off

GPI Out 2 On	Sets GPI Output 2 on
GPI Out 2 Off	Sets GPI Output 2 off
GPI Out 3 On	Sets GPI Output 3 on
GPI Out 3 Off	Sets GPI Output 3 off
GPI Out 4 On	Sets GPI Output 4 on
GPI Out 4 Off	Sets GPI Output 4 off
GPI Out 5 On	Sets GPI Output 5 on
GPI Out 5 Off	Sets GPI Output 5 off
GPI Out 6 On	Sets GPI Output 6 on
GPI Out 6 Off	Sets GPI Output 6 off
GPI Out 7 On	Sets GPI Output 7 on
GPI Out 7 Off	Sets GPI Output 7 off
GPI Out 8 On	Sets GPI Output 8 on
GPI Out 8 Off	Sets GPI Output 8 off
GPI Out 9 On	Sets GPI Output 9 on
GPI Out 9 Off	Sets GPI Output 9 off
GPI Out 10 On	Sets GPI Output 10 on
GPI Out 10 Off	Sets GPI Output 10 off
GPI Out 11 On	Sets GPI Output 11 on
GPI Out 11 Off	Sets GPI Output 11 off
GPI Out 12 On	Sets GPI Output 12 on
GPI Out 12 Off	Sets GPI Output 12 off
GPI Out 13 On	Sets GPI Output 13 on
GPI Out 13 Off	Sets GPI Output 13 off
GPI Out 14 On	Sets GPI Output 14 on
GPI Out 14 Off	Sets GPI Output 14 off
GPI Out 15 On	Sets GPI Output 15 on
GPI Out 15 Off	Sets GPI Output 15 off
Trigger Macro	
<macro name>	Sub-menus depend on the user-defined macro names. Selecting a macro causes it to be triggered.
Miscellaneous	
Emer To Air	Switches Emergency-to-Air on
Emer From Air	Switches Emergency-to-Air off
EAS On	EAS text is cut up to reveal the emergency alert text
EAS Off	EAS text is cut down to hide the emergency alert text
Setup	
Audio Setup	
Audio Metering	
Meters 1 – 4	Displays four audio metering channels on the front panel
Meters 5 – 8	Displays four audio metering channels on the front panel
Meters 9 – 12	Displays four audio metering channels on the front panel
Meters 13 – 16	Displays four audio metering channels on the front panel
Meters 17 – 20	Displays four audio metering channels on the front panel
Meters 21 – 24	Displays four audio metering channels on the front panel
Meters 25 – 28	Displays four audio metering channels on the front panel
Meters 29 – 32	Displays four audio metering channels on the front panel
Meters 33 – 36	Displays four audio metering channels on the front panel
Meters 37 – 40	Displays four audio metering channels on the front panel
Meters 41 – 44	Displays four audio metering channels on the front panel
Meters 45 – 48	Displays four audio metering channels on the front panel
Meters 1 & 2	Displays two audio metering channels on the front panel

Meters 3 & 4	Displays two audio metering channels on the front panel
Meters 5 & 6	Displays two audio metering channels on the front panel
Meters 7 & 8	Displays two audio metering channels on the front panel
Meters 9 & 10	Displays two audio metering channels on the front panel
Meters 11 & 12	Displays two audio metering channels on the front panel
Meters 13 & 14	Displays two audio metering channels on the front panel
Meters 15 & 16	Displays two audio metering channels on the front panel
Meters 17 & 18	Displays two audio metering channels on the front panel
Meters 19 & 20	Displays two audio metering channels on the front panel
Meters 21 & 22	Displays two audio metering channels on the front panel
Meters 23 & 24	Displays two audio metering channels on the front panel
Meters 25 & 26	Displays two audio metering channels on the front panel
Meters 27 & 28	Displays two audio metering channels on the front panel
Meters 29 & 30	Displays two audio metering channels on the front panel
Meters 31 & 32	Displays two audio metering channels on the front panel
Meters 33 & 34	Displays two audio metering channels on the front panel
Meters 35 & 36	Displays two audio metering channels on the front panel
Meters 37 & 38	Displays two audio metering channels on the front panel
Meters 39 & 40	Displays two audio metering channels on the front panel
Meters 41 & 42	Displays two audio metering channels on the front panel
Meters 43 & 44	Displays two audio metering channels on the front panel
Meters 45 & 46	Displays two audio metering channels on the front panel
Meters 47 & 48	Displays two audio metering channels on the front panel
Follow Video	
A/B Mix	Selects whether the audio A/B mixer follows video A/B mixer. If the video transition type is set as V-Fade then the audio will transition through silence at the half way point of the mix.
Fade-To-Black	Selects whether audio silence follows video fade-to-black of DSK 4 (the most downstream keyer)
Select Mixfile	Selects whether the Audio Graph is to be used for the audio engine and if not, which legacy mixfile will be used. There is a set of standard (pre-defined) mixfiles that is stored in /etc/mixes. Custom mixfiles are stored in /home/mixes. The Imagestore 750 must be restarted for the setting to take effect.
Delays	
Delay Bank 1	Sets the delay of audio bank 1
Delay Bank 2	Sets the delay of audio bank 2
Delay Bank 3	Sets the delay of audio bank 3
Delay Bank 4	Sets the delay of audio bank 4
Delay Bank 5	Sets the delay of audio bank 5
Delay Bank 6	Sets the delay of audio bank 6
Easyplay	
Stream 1–4	*Repeats for streams 1–4*
Play Follow Mode	
Off	No association between Easyplay and any video layer or voice-over. The Easyplay stream is driven independently by automation.
PGM Keyers	Easyplay follows video layer cuts/fades, loads/unloads from PGM keyers
PST Keyers	Easyplay follows video layer cuts/fades, loads/unloads from PST keyers
Assoc VO Queue 1	Easyplay queue follows the position of the associated voice-over. Playing the Easyplay stream will not drive the voice-over if this mode is selected
Assoc VO Queue 2	See "Assoc VO Queue 1" (above)
Assoc VO Queue 3	See "Assoc VO Queue 1" (above)
Assoc VO Queue 4	See "Assoc VO Queue 1" (above)
Load Follow Mode	
Off	Easyplay stream queues are loaded explicitly

PGM Keyers	Easyplay stream queues are loaded automatically following store loads of video media files. This is done by filename association
Assoc Voiceover	
No Association	No association between this Easyplay stream and any voice-over
Voiceover 1 PGM	Association between this Easyplay stream and PGM voice-over 1
Voiceover 1 PST	Association between this Easyplay stream and PST voice-over 1
Voiceover 2 PGM	Association between this Easyplay stream and PGM voice-over 2
Voiceover 2 PST	Association between this Easyplay stream and PST voice-over 2
Voiceover 3 PGM	Association between this Easyplay stream and PGM voice-over 3
Voiceover 3 PST	Association between this Easyplay stream and PST voice-over 3
Voiceover 4 PGM	Association between this Easyplay stream and PGM voice-over 4
Voiceover 4 PST	Association between this Easyplay stream and PST voice-over 4
Voiceover 5 PGM	Association between this Easyplay stream and PGM voice-over 5
Voiceover 5 PST	Association between this Easyplay stream and PST voice-over 5
Voiceover 6 PGM	Association between this Easyplay stream and PGM voice-over 6
Voiceover 6 PST	Association between this Easyplay stream and PST voice-over 6
Voiceover 7 PGM	Association between this Easyplay stream and PGM voice-over 7
Voiceover 7 PST	Association between this Easyplay stream and PST voice-over 7
Voiceover 8 PGM	Association between this Easyplay stream and PGM voice-over 8
Voiceover 8 PST	Association between this Easyplay stream and PST voice-over 8
Network	
Hostname	Sets the Hostname on the network
IP Address	Sets the IP Address on the network
Network Mask	Sets the Network Mask on the network. The mask number is set for Class B addresses and should only modified in consultation with your IT department.
Gateway Add	Sets the Gateway Server on the network. The factory default option is disabled and should only modified in consultation with your IT department.
NTP Server	Sets the Network Time Protocol server IP Address on the network. This option allows the clock in the Imagestore 750 to be set from a Network Time Protocol server located on the network. The clock is checked once every 1024 seconds; however if the clocks are seen to be drifting then the update period will be automatically reduced to a minimum of 64 seconds.
NIC Bonding	Sets whether the NIC is "Bonded" or "Independent". Independent NIC allows a separate IP addresses for automation and media.
2nd IP Address	Sets the secondary IP Address used for media, if the NIC is set as "independent"
2nd Net Mask	Sets the secondary Network Mask used for media, if the NIC is set as "independent"
2nd Gateway	Sets the secondary Gateway Server used for media, if the NIC is set as "independent"
Logging	
Logging Level	
Errors Only	Selects a logging level where only errors are listed in log files
Media/Keying	Selects a logging level where only errors, media operations and keyer transitions are listed in log files
Verbose	Selects a logging level where errors and all valid automation commands are listed in log files
Verbose+Oxsox	Selects a logging level where errors, all valid automation commands and all OxSox commands are listed in log files
Logging Server	Selects a server to be used for logging if required
Local Logging	
Disabled	Switches local logging on the unit itself off
Enabled	Switches local logging on the unit itself on
GPI	
GPI Inputs	
GPI In 0 On	Defines macro to action when GPI IN 0 switches on
GPI In 0 Of	Defines macro to action when GPI IN 0 switches off
GPI In 1 On	Defines macro to action when GPI IN 1 switches on

GPI In 1 Off	Defines macro to action when GPI IN 1 switches off
GPI In 2 On	Defines macro to action when GPI IN 2 switches on
GPI In 2 Off	Defines macro to action when GPI IN 2 switches off
GPI In 3 On	Defines macro to action when GPI IN 3 switches on
GPI In 3 Off	Defines macro to action when GPI IN 3 switches off
GPI In 4 On	Defines macro to action when GPI IN 4 switches on
GPI In 4 Off	Defines macro to action when GPI IN 4 switches off
GPI In 5 On	Defines macro to action when GPI IN 5 switches on
GPI In 5 Off	Defines macro to action when GPI IN 5 switches off
GPI In 6 On	Defines macro to action when GPI IN 6 switches on
GPI In 6 Off	Defines macro to action when GPI IN 6 switches off
GPI In 7 On	Defines macro to action when GPI IN 7 switches on
GPI In 7 Off	Defines macro to action when GPI IN 7 switches off
GPI In 8 On	Defines macro to action when GPI IN 8 switches on
GPI In 8 Of	Defines macro to action when GPI IN 8 switches off
GPI In 9 On	Defines macro to action when GPI IN 9 switches on
GPI In 9 Off	Defines macro to action when GPI IN 9 switches off
GPI In 10 On	Defines macro to action when GPI IN 10 switches on
GPI In 10 Off	Defines macro to action when GPI IN 10 switches off
GPI In 11 On	Defines macro to action when GPI IN 11 switches on
GPI In 11 Off	Defines macro to action when GPI IN 11 switches off
GPI In 12 On	Defines macro to action when GPI IN 12 switches on
GPI In 12 Off	Defines macro to action when GPI IN 12 switches off
GPI In 13 On	Defines macro to action when GPI IN 13 switches on
GPI In 13 Off	Defines macro to action when GPI IN 13 switches off
GPI In 14 On	Defines macro to action when GPI IN 14 switches on
GPI In 14 Off	Defines macro to action when GPI IN 14 switches off
GPI In 15 On	Defines macro to action when GPI IN 15 switches on
GPI In 15 Off	Defines macro to action when GPI IN 15 switches off
GPI Outputs	
GPI Out 0 On	Selects an event that will trigger GPI OUT 0 to switch on
GPI Out 0 Off	Selects an event that will trigger GPI OUT 0 to switch off
GPI Out 1 On	Selects an event that will trigger GPI OUT 1 to switch on
GPI Out 1 Off	Selects an event that will trigger GPI OUT 1 to switch off
GPI Out 2 On	Selects an event that will trigger GPI OUT 2 to switch on
GPI Out 2 Off	Selects an event that will trigger GPI OUT 2 to switch off
GPI Out 3 On	Selects an event that will trigger GPI OUT 3 to switch on
GPI Out 3 Off	Selects an event that will trigger GPI OUT 3 to switch off
GPI Out 4 On	Selects an event that will trigger GPI OUT 4 to switch on
GPI Out 4 Off	Selects an event that will trigger GPI OUT 4 to switch off
GPI Out 5 On	Selects an event that will trigger GPI OUT 5 to switch on
GPI Out 5 Off	Selects an event that will trigger GPI OUT 5 to switch off
GPI Out 6 On	Selects an event that will trigger GPI OUT 6 to switch on
GPI Out 6 Off	Selects an event that will trigger GPI OUT 6 to switch off
GPI Out 7 On	Selects an event that will trigger GPI OUT 7 to switch on
GPI Out 7 Off	Selects an event that will trigger GPI OUT 7 to switch off
GPI Out 8On	Selects an event that will trigger GPI OUT 8 to switch on
GPI Out 8 Off	Selects an event that will trigger GPI OUT 8 to switch off
GPI Out 9 On	Selects an event that will trigger GPI OUT 9 to switch on
GPI Out 9 Off	Selects an event that will trigger GPI OUT 9 to switch off
GPI Out 10 On	Selects an event that will trigger GPI OUT 10 to switch on
GPI Out 10 Off	Selects an event that will trigger GPI OUT 10 to switch off

GPI Out 11 On	Selects an event that will trigger GPI OUT 11 to switch on
GPI Out 11 Off	Selects an event that will trigger GPI OUT 11 to switch off
GPI Out 12 On	Selects an event that will trigger GPI OUT 12 to switch on
GPI Out 12 Off	Selects an event that will trigger GPI OUT 12 to switch off
GPI Out 13 On	Selects an event that will trigger GPI OUT 13 to switch on
GPI Out 13 Off	Selects an event that will trigger GPI OUT 13 to switch off
GPI Out 14 On	Selects an event that will trigger GPI OUT 14 to switch on
GPI Out 14 Off	Selects an event that will trigger GPI OUT 14 to switch off
GPI Out 15 On	Selects an event that will trigger GPI OUT 15 to switch on
GPI Out 15 Off	Selects an event that will trigger GPI_OUT_15ccccc to switch off
Show GPI IPs	Shows current state of GPI inputs/output pins
Timecode	
Timecode Source	
LTC	Selects LTC as the timeout source
VITC	Selects VITC as the timeout source
Timecde Status	"LTC" or "VITC" if valid timecode is present; otherwise "BAD-Internl"
	"DF" for dropframe; "ND" for no dropframe
	"Fwd" or "Bwd" shows LTC direction
Timecde Time	"Ext" if valid external time code; "Int" if using internal clock. Timecode time is then shown.
Date/Time	
Date	Sets the date (internal Real Time Clock date only). Preserved until next restart
Time	Sets the time (internal Real Time Clock time only). Preserved until next restart
Time Zone	Sets the time zone from GMT (+/-)
Serial Comms	
Serial Ports	
COM 1	
Baud Rate	Sets Baud rate for COM 1 (1200, 9600, 19200, 38400, 57600, 115200)
Protocol	Sets protocol for COM 1 (Oxtel Automation, Oxtel Slave, Presmaster Automation, ENDEC 1882, TFT EAS 911T, RCP Classic, ST61XX Thermometer)
Serial Type	Sets serial type for COM 1 (RS-232, RS-422)
COM 2	
Baud Rate	See "COM 1" (above)
Protocol	See "COM 1" (above)
Serial Type	See "COM 1" (above)
COM 3	
Baud Rate	See "COM 1" (above)
Protocol	See "COM 1" (above)
Serial Type	See "COM 1" (above)
COM 4	
Baud Rate	See "COM 1" (above)
Protocol	See "COM 1" (above)
Serial Type	See "COM 1" (above)
RS232 A	
Baud Rate	*Reserved for future use*
Protocol	*Reserved for future use*
Serial Type	*Reserved for future use*
RS232 B	
Baud Rate	*Reserved for future use*
Protocol	*Reserved for future use*
Serial Type	*Reserved for future use*

Serial Level	
Strict	Enforces strict serial communications from automation. The STX must always alternate between STX0 and STX1. If no ACK is received the message must be sent again with the same type of STX.
Relaxed	Allows relaxed serial communications from automation. The STX does not need to alternate between STX0 and STX1. Either value is always valid.
Video Standard	
625 Line	Selects 625i / 50 as the next video standard
525 Line	Selects 525i / 59.94 as the next video standard
1080i/59.94	Selects 1080i / 59.94 as the next video standard
1080i/50	Selects 1080i / 50 as the next video standard
720p/59.94	Selects 720p / 59.94 as the next video standard
720p/50	Selects 720p / 50 as the next video standard
Reference	
Offset	
Lines/Samples	Sets the Output Reference Offset in Lines and Samples
Lines/us	Sets the Output Reference Offset in Lines and microseconds (µs)
Stores	
Stores Memory	Sets the memory allocation for each available store. The system will need to be restarted for a new store allocation to take effect.
Video Delay	
PGM Input	Program input (post-A/B mix) delay in frames. Select 1 frame of delay when using a DVE in interlaced video standards and 2 frames of delay when using DVE in progressive video standards. When bypassing an external graphics device (such as Intuition XG) add further frames to compensate for the delay through this device.
PVW Input	Preview input (post-A/B mix) delay in frames. See "PGM Input" (above)
PGM Output	Program output delay in frames.
PVW Output	Preview output delay in frames.
CLF Output	Clean feed output delay in frames.
Slave	
Keyer Assign	
None	Disables automatic keyer management
DSK 1	Assigns DSK 1 for automatic keyer management
DSK 2	Assigns DSK 2 for automatic keyer management
DSK 3	Assigns DSK 3 for automatic keyer management
DSK 4	Assigns DSK 4 for automatic keyer management
Keyer Follow Up	
Disabled	The assigned keyer cut-up does not follow slave layer activity
Enabled	The assigned keyer cut-up follows the overall slave layers, so that the assigned keyer is cut up when one or more slave layers have been cut or faded up.
Keyer Follow Down	
Disabled	The assigned keyer cut-down does not follow slave layer activity
Enabled	The assigned keyer cut-down follows the overall slave layers, so that the assigned keyer is cut down when all slave layers have been cut or faded down.
Keyer Status	
Keyer Status	Displays Co-Processor layers for automatic keyer management
Fill&Key Input	
Fill-1/Key-1	Routes Fill-1/Key-1 inputs to the assigned keyer during automatic keyer management.
Fill-2/Key-2	Routes Fill-2/Key-2 inputs to the assigned keyer during automatic keyer management.
Fill-3/Key-3	Routes Fill-3/Key-3 inputs to the assigned keyer during automatic keyer management.
Slave Address	The slave IP address to use for command forwarding (if enabled) and media information. This is an alternative to command forwarding using a COM port.
Network Forward	

Disabled	Disables slave command forwarding via the slave IP address.
Enabled	Enables slave command forwarding via the slave IP address.
Slave type	
Int-XG	Dictates how store load/cue information is interpreted by the Imagestore 750
Not Int-XG	Dictates how store load/cue information is interpreted by the Imagestore 750
Miscellaneous	
Closed Cap	
Disabled	Allows keyed graphics to overwrite Closed Caption information in the active picture for NTSC
Enabled	Preserves Closed Caption information in active picture for NTSC
Send Wakeup	Sends a wake-up packet to all Oxtel protocol connections
File Ops	The File operations are used for basic library management via USB. Network transfer will often be preferred for management of image and sound files.
Load Image	Loads all .oxt or .oxa images from the inserted USB media to the hard disk image library.
Erase Image	Erases an image from hard storage
Load Audio	Loads all .oxe, .oxw, or .wav sound files from the inserted USB media to the hard disk sound library.
Erase Audio	Erases a sound file from hard storage
Conf To USB	Saves the active configuration file (config.xml) and GPI setup file (gpi.xml) to the inserted USB media.
Conf From USB	Copies a new configuration file (config.xml) and GPI setup file (gpi.xml) from the inserted USB media. If a configuration file is successfully copied from USB, then a restart is advised.
Diags Save	Copies the diagnostics file to the loaded media, including the log file from the current session (messages) and log file from the previous session (messages.old)
Load Licences	Copies new licence codes (syscodes.txt) from the inserted USB device, which enable software options on the Imagestore 750 after a restart.
Load Mixfile	Copies all .mix custom mixfiles from the inserted USB media to the hard disk mixfile library.
Erase Mixfile	Erases a custom mixfile from hard disk.
Active Preview	
Disabled	Switches off active preview mode for Presmaster
Enabled	Switches on active preview mode for Xpanel, Branding RCP or iMC panels
Self Tests	
DSK 1	
Image Border	Displays a test pattern showing 4-pixel width colored borders
Animation Fill	Loads a test animation and then runs the animation. Shows a continuously repeating progress bar, and is used to verify correct installation of the store memory modules. Unload the self test animation after completing the test.
DSK 2	
Image Border	See “DSK 1” above
Animation Fill	See “DSK 1” above
DSK 3	
Image Border	See “DSK 1” above
Animation Fill	See “DSK 1” above
DSK 4	
Image Border	See “DSK 1” above
Animation Fill	See “DSK 1” above
EAS	
Severity 1	Displays an EAS scrolling banner displaying ‘A Primary Entry Point System has issued an Emergency Action Notification for the United States beginning at 1:27 pm and ending at 2:27 pm (IMST)’ at severity level 1
Severity 2	Displays an EAS scrolling banner displaying ‘The Civil Authorities have issued a Severe Thunderstorm Watch for San Francisco, CA beginning at 1:31 pm and ending at 2:31 pm (IMST)’ at severity level 2
Severity 3	Displays an EAS displaying ‘A Broadcast station or cable system has issued a Required Weekly Test for Snohomish, WA beginning at 1:26 pm and ending at 2:26 pm (IMST) at severity level 3

Prod Tests	Enters Production Mode in which all functions of the Imagestore 750 halt. Warning: this must NOT be used when the output is live on air. The production tests are not recommended for general use; they are for hardware diagnosis only.
Soft Restart	Causes the software to restart. Use this, for example, after changing a setting that requests a restart (e.g. video standard). The system settings are restored after the restart depending on the Active Configuration
Hard Restart	Causes the hardware to reboot. A hard restart takes longer than a soft restart. The system settings are restored after the restart depending on the Active Configuration
Factory Reset	Resets the unit to the factory default configuration. Use this option with extreme care as all custom set parameters will be removed.
Safe Shutdown	Prepares the unit to be powered off. Use this command before removing power cables.
Test	
Test Pattern	
Off	Switches off the test pattern signal for PGM OUT and PVW OUT
On	Switches on the test pattern signal for PGM OUT and PVW OUT
Config Alarms	
Ext Reference	
Unlocked	
Alarm Level	Sets alarm level for 'External Reference Unlocked'
Trap Enable	Enables or disables the trap for this alarm
Mismatch	
Alarm Level	Sets alarm level for 'External Reference Mismatch'
Trap Enable	Enables or disables the trap for this alarm
A	
Video Loss	
Alarm Level	Sets alarm level for 'SDI A Video Loss'
Trap Enable	Enables or disables the trap for this alarm
Video Mismatch	
Alarm Level	Sets alarm level for 'SDI A Video Mismatch'
Trap Enable	Enables or disables the trap for this alarm
Input Timing	
Alarm Level	Sets alarm level for 'SDI A Video Input Timing'
Trap Enable	Enables or disables the trap for this alarm
B	
Video Loss	
Alarm Level	Sets alarm level for 'SDI B Video Loss'
Trap Enable	Enables or disables the trap for this alarm
Video Mismatch	
Alarm Level	Sets alarm level for 'SDI B Video Mismatch'
Trap Enable	Enables or disables the trap for this alarm
Input Timing	
Alarm Level	Sets alarm level for 'SDI B Video Input Timing'
Trap Enable	Enables or disables the trap for this alarm
C	
Video Loss	
Alarm Level	Sets alarm level for 'SDI C Video Loss'
Trap Enable	Enables or disables the trap for this alarm
Video Mismatch	
Alarm Level	Sets alarm level for 'SDI C Video Mismatch'
Trap Enable	Enables or disables the trap for this alarm
Input Timing	
Alarm Level	Sets alarm level for 'SDI C Video Input Timing'
Trap Enable	Enables or disables the trap for this alarm

D	
Video Loss	
Alarm Level	Sets alarm level for 'SDI D Video Loss'
Trap Enable	Enables or disables the trap for this alarm
Video Mismatch	
Alarm Level	Sets alarm level for 'SDI D Video Mismatch'
Trap Enable	Enables or disables the trap for this alarm
Input Timing	
Alarm Level	Sets alarm level for 'SDI D Video Input Timing'
Trap Enable	Enables or disables the trap for this alarm
Fill-1	
Video Loss	
Alarm Level	Sets alarm level for 'Fill-1 Video Loss'
Trap Enable	Enables or disables the trap for this alarm
Video Mismatch	
Alarm Level	Sets alarm level for 'Fill-1 Video Mismatch'
Trap Enable	Enables or disables the trap for this alarm
Input Timing	
Alarm Level	Sets alarm level for 'Fill-1 Video Input Timing'
Trap Enable	Enables or disables the trap for this alarm
Key-1	
Video Loss	
Alarm Level	Sets alarm level for 'Key-1 Video Loss'
Trap Enable	Enables or disables the trap for this alarm
Video Mismatch	
Alarm Level	Sets alarm level for 'Key-1 Video Mismatch'
Trap Enable	Enables or disables the trap for this alarm
Input Timing	
Alarm Level	Sets alarm level for 'Key-1 Video Input Timing'
Trap Enable	Enables or disables the trap for this alarm
Fill-2	
Video Loss	
Alarm Level	Sets alarm level for 'Fill-2 Video Loss'
Trap Enable	Enables or disables the trap for this alarm
Video Mismatch	
Alarm Level	Sets alarm level for 'Fill-2 Video Mismatch'
Trap Enable	Enables or disables the trap for this alarm
Input Timing	
Alarm Level	Sets alarm level for 'Fill-2 Video Input Timing'
Trap Enable	Enables or disables the trap for this alarm
Key-2	
Video Loss	
Alarm Level	Sets alarm level for 'Key-2 Video Loss'
Trap Enable	Enables or disables the trap for this alarm
Video Mismatch	
Alarm Level	Sets alarm level for 'Key-2 Video Mismatch'
Trap Enable	Enables or disables the trap for this alarm
Input Timing	
Alarm Level	Sets alarm level for 'Key-2 Video Input Timing'
Trap Enable	Enables or disables the trap for this alarm
Overall Timing	

Alarm Level	Sets alarm level for overall input timing
Trap Enable	Enables or disables the trap for this alarm
Embed Audio Ip	
Audio Feed 1	
Channel 1–16	*Repeats for channels 1–16*
Type Change	
Alarm Level	Sets alarm level for audio type change on this embedded audio feed and channel
Expected Type	Sets the expected audio type on this embedded audio feed and channel as PCM or Non-PCM
Trap Enable	Enables or disables the trap for this alarm
Audio Loss	
Alarm Level	Sets alarm level for audio loss on this embedded audio feed and channel
Trap Enable	Enables or disables the trap for this alarm
Audio Feed 2	
Channel 1–16	*Repeats for channels 1–16*
Type Change	
Alarm Level	Sets alarm level for audio type change on this embedded audio feed and channel
Expected Type	Sets the expected audio type on this embedded audio feed and channel as PCM or Non-PCM
Trap Enable	Enables or disables the trap for this alarm
Audio Loss	
Alarm Level	Sets alarm level for audio loss on this embedded audio feed and channel
Trap Enable	Enables or disables the trap for this alarm
Audio Feed 3	
Channel 1–16	*Repeats for channels 1–16*
Type Change	
Alarm Level	Sets alarm level for audio type change on this embedded audio feed and channel
Expected Type	Sets the expected audio type on this embedded audio feed and channel as PCM or Non-PCM
Trap Enable	Enables or disables the trap for this alarm
Audio Loss	
Alarm Level	Sets alarm level for audio loss on this embedded audio feed and channel
Trap Enable	Enables or disables the trap for this alarm
Audio Feed 4	
Channel 1–16	*Repeats for channels 1–16*
Type Change	
Alarm Level	Sets alarm level for audio type change on this embedded audio feed and channel
Expected Type	Sets the expected audio type on this embedded audio feed and channel as PCM or Non-PCM
Trap Enable	Enables or disables the trap for this alarm
Audio Loss	
Alarm Level	Sets alarm level for audio loss on this embedded audio feed and channel
Trap Enable	Enables or disables the trap for this alarm
AES Audio Ip	
Pair 1–16	*Repeats for pairs 1–16*
Channel 1	
Type Change	
Alarm Level	Sets alarm level for audio type change on this embedded audio feed and channel
Expected Type	Sets the expected audio type on this embedded audio feed and channel as PCM or Non-PCM
Trap Enable	Enables or disables the trap for this alarm
Audio Loss	
Alarm Level	Sets alarm level for audio loss on this embedded audio feed and channel
Trap Enable	Enables or disables the trap for this alarm
Channel 2	
Type Change	
Alarm Level	Sets alarm level for audio type change on this embedded audio feed and channel

Expected Type	Sets the expected audio type on this embedded audio feed and channel as PCM or Non-PCM
Trap Enable	Enables or disables the trap for this alarm
Audio Loss	
Alarm Level	Sets alarm level for audio loss on this embedded audio feed and channel
Trap Enable	Enables or disables the trap for this alarm
Temp Fail	
Alarm Level	Sets alarm level for temperature failure
Trap Enable	Enables or disables the trap for this alarm
Voltage Fail	
Alarm Level	Sets alarm level for voltage failure
Trap Enable	Enables or disables the trap for this alarm
PSU A	
PSU Fail	
Alarm Level	Sets alarm level for power supply A failure
Trap Enable	Enables or disables the trap for this alarm
PSU B	
PSU Fail	
Alarm Level	Sets alarm level for power supply B failure
Trap Enable	Enables or disables the trap for this alarm
Fan Fail	
Alarm Level	Sets alarm level for fan failure
Trap Enable	Enables or disables the trap for this alarm
Slave Connection	
Alarm Level	Sets alarm level for slave connection failure
Trap Enable	Enables or disables the trap for this alarm
Router Connection	
Alarm Level	Sets alarm level for router connection failure
Trap Enable	Enables or disables the trap for this alarm
Network Link	
Alarm Level	Sets alarm level for network link failure
Trap Enable	Enables or disables the trap for this alarm
Disk Usage	
Alarm Level	Sets alarm level for high disk usage
Trap Enable	Enables or disables the trap for this alarm
Video FTB	
Alarm Level	Sets alarm level for most downstream keyer FTB
Trap Enable	Enables or disables the trap for this alarm
Audio FTS	
Alarm Level	Sets alarm level for audio FTS
Trap Enable	Enables or disables the trap for this alarm
GPIO	
Line 0–15	*Repeats for lines 0–15*
Direction Change	
Alarm Level	Sets alarm level for GPIO line direction change
Trap Enable	Enables or disables the trap for this alarm
Status Change	
Alarm Level	Sets alarm level for GPIO line status change
Trap Enable	Enables or disables the trap for this alarm
User Presets	
Import	Imports a configuration file (requires restart)
Export	Exports the active configuration

Last	Shows the name of the last configuration file that was imported
Erase	Erases a configuration file
Options	Displays the enabled options
Version	Displays the software version

Page Intentionally blank

B GPI Event Types

Appendix B lists GPI event types.

GPI Output Event	Description
> None <	No event is selected
Ext Ref Unlocked	External reference is unlocked
Ext Ref Locked	External reference is locked
Ext Ref Mismatch	External reference mismatch with output video standard
Ext Ref Match	External reference matches output video standard
A Video Loss	SDI A video loss
A Video Present	SDI A video present
A Video Mismatch	SDI A video mismatch with output video standard
A Video Match	SDI A video matches output video standard
A Video Timing Out Of Range	SDI A timing is out of range (< –1 line with respect to PGM OUT)
A Video Timing In Range	SDI A timing is within range
B Video Loss	SDI B video loss
B Video Present	SDI B video present
B Video Mismatch	SDI B video mismatch with output video standard
B Video Match	SDI B video matches output video standard
B Video Timing Out Of Range	SDI B timing is out of range (< –1 line with respect to PGM OUT)
B Video Timing In Range	SDI B timing is within range
C Video Loss	SDI C video loss
C Video Present	SDI C video present
C Video Mismatch	SDI C video mismatch with output video standard
C Video Match	SDI C video matches output video standard
C Video Timing Out Of Range	SDI C timing is out of range (< –1 line with respect to PGM OUT)
C Video Timing In Range	SDI C timing is within range
D Video Loss	SDI D video loss
D Video Present	SDI D video present
D Video Mismatch	SDI D video mismatch with output video standard
D Video Match	SDI D video matches output video standard
D Video Timing Out Of Range	SDI D timing is out of range (< –1 line with respect to PGM OUT)
D Video Timing In Range	SDI D timing is within range

GPI Output Event	Description
Fill-1 Video Loss	SDI Fill 1 video loss
Fill-1 Video Present	SDI Fill 1 video present
Fill-1 Video Mismatch	SDI Fill 1 video mismatch with output video standard
Fill-1 Video Match	SDI Fill 1 video matches output video standard
Fill-1 Video Timing Out Of Range	SDI Fill 1 timing is out of range (< –1 line with respect to PGM OUT)
Fill-1 Video Timing In Range	SDI Fill 1 timing is within range
Key-1 Video Loss	SDI Key 1 video loss
Key-1 Video Present	SDI Key 1 video present
Key-1 Video Mismatch	SDI Key 1 video mismatch with output video standard
Key-1 Video Match	SDI Key 1 video matches output video standard
Key-1 Video Timing Out Of Range	SDI Key 1 timing is out of range (< –1 line with respect to PGM OUT)
Key-1 Video Timing In Range	SDI Key 1 timing is within range
Fill-2 Video Loss	SDI Fill 2 video loss
Fill-2 Video Present	SDI Fill 2 video present
Fill-2 Video Mismatch	SDI Fill 2 video mismatch with output video standard
Fill-2 Video Match	SDI Fill 2 video matches output video standard
Fill-2 Video Timing Out Of Range	SDI Fill 2 timing is out of range (< –1 line with respect to PGM OUT)
Fill-2 Video Timing In Range	SDI Fill 2 timing is within range
Key-2 Video Loss	SDI Key 2 video loss
Key-2 Video Present	SDI Key 2 video present
Key-2 Video Mismatch	SDI Key 2 video mismatch with output video standard
Key-2 Video Match	SDI Key 2 video matches output video standard
Key-2 Video Timing Out Of Range	SDI Key 2 timing is out of range (< –1 line with respect to PGM OUT)
Key-2 Video Timing In Range	SDI Key 2 timing is within range
Overall Video Timing Out Of Range	At least one of the “Video Timing Out Of Range” values is true
Overall Video Timing In Range	None of the “Video Timing Out Of Range” values is true
Temperature Failure	FPGA temperature Š 80°C
Temperature OK	FPGA temperature < 80°C
Voltage Failure	At least one of the voltages supplies are out of range
Voltage OK	All voltages are within range
PSU A Failure	Power supply A has failed
PSU A OK	Power supply A has not failed
PSU B Failure	Power supply B has failed
PSU B OK	Power supply B has not failed
Fans Failure	At least one of the fan speeds is out of range

GPI Output Event	Description
Fans OK	All fan speeds are within range
Slave Connection Missing	Slave connection is missing
Slave Connection OK	Slave connection is OK
Router Connection Missing	Router connection is missing
Router Connection OK	Router connection is OK
Network Interface Down	The network interface is down
Network Interface Up	The network interface is up
Disk Usage High	Disk capacity Š 80%
Disk Usage OK	Disk capacity < 80%
Mixer At A	AB Mixer is at A
Mixer At B	AB Mixer is at B
DSK1 FTB Off	DSK1 Fade-to-Black is Off
DSK1 FTB On	DSK1 Fade-to-Black is On
DSK2 FTB Off	DSK2 Fade-to-Black is Off
DSK2 FTB On	DSK2 Fade-to-Black is On
DSK3 FTB Off	DSK3 Fade-to-Black is Off
DSK3 Fey On	DSK3 Fade-to-Black is On
DSK4 Fey Off	DSK4 Fade-to-Black is Off
DSK4 Fey On	DSK4 Fade-to-Black is On
DSK1 Key Off	DSK1 Keyer is Off
DSK1 Key On	DSK1 Keyer is On
DSK2 Key Off	DSK2 Keyer is Off
DSK2 Key On	DSK2 Keyer is On
DSK3 Key Off	DSK3 Keyer is Off
DSK3 Key On	DSK3 Keyer is On
DSK4 Key Off	DSK4 Keyer is Off
DSK4 Key On	DSK4 Keyer is On
DSK1 Tmr 0	DSK1 Bugclock is at zero
DSK1 Tmr Non 0	DSK1 Bugclock is not at zero
DSK2 Tmr 0	DSK2 Bugclock is at zero
DSK2 Tmr Non 0	DSK2 Bugclock is not at zero
DSK3 Tmr 0	DSK3 Bugclock is at zero
DSK3 Tmr Non 0	DSK3 Bugclock is not at zero
DSK4 Tmr 0	DSK4 Bugclock is at zero
DSK4 Tmr Non 0	DSK4 Bugclock is not at zero
DSK1 Img Busy	DSK1 image load is incomplete
DSK1 Img Ready	DSK1 image load is complete
DSK2 Img Busy	DSK2 image load is incomplete
DSK2 Img Ready	DSK2 image load is complete

GPI Output Event	Description
DSK3 Img Busy	DSK3 image load is incomplete
DSK3 Img Ready	DSK3 image load is complete
DSK4 Img Busy	DSK4 image load is incomplete
DSK4 Img Ready	DSK4 image load is complete
DVE (PGM) Enabled	DVE (PGM) is enabled
DVE (PGM) Disabled	DVE (PGM) is disabled
DVE (PGM) Run	DVE (PGM) is running
DVE (PGM) Stop	DVE (PGM) is stopped
DVE (PVW) Enabled	DVE (PVW) is enabled
DVE (PVW) Disabled	DVE (PVW) is disabled
DVE (PVW) Run	DVE (PVW) is running
DVE (PVW) Stop	DVE (PVW) is stopped
EAS Running	Emergency Alert System (EAS) text strap is running
EAS Stopped	Emergency Alert System (EAS) text strap is stopped
Audio AB At A	Audio A/B Mixer is at A
Audio AB At B	Audio A/B Mixer is at B
Follow AB Off	Audio A/B mix follows video A/B mix is off
Follow AB On	Audio A/B mix follows video A/B mix is on
Audio FTS Off	Audio silence is off
Audio FTS On	Audio silence is on
VO1 Begin Off	Voice-over 1 starting to fade off
VO1 Begin On	Voice-over 1 starting to fade on
VO2 Begin Off	Voice-over 2 starting to fade off
VO2 Begin On	Voice-over 2 starting to fade on
VO1 At Off	Voice-over 1 completed fade off
VO1 At On	Voice-over 1 completed fade on
VO2 At Off	Voice-over 2 completed fade off
VO2 At On	Voice-over 2 completed fade on
Follow FTB Off	Audio silence follows video fade-to-black is off
Follow FTB On	Audio silence follows video fade-to-black is on
Embed Audio Loss Feed 1 Channel 1	Loss of embedded audio on this feed and channel
Embed Audio Present Feed 1 Channel 1	Presence of embedded audio on this feed and channel
…	Repeat for Feed 1 Channels 2 to 16
Embed Audio Loss Feed 2 Channel 1	Loss of embedded audio on this feed and channel
Embed Audio Present Feed 2 Channel 1	Presence of embedded audio on this feed and channel
…	Repeat for Feed 2 Channels 2 to 16
Embed Audio Loss Feed 3 Channel 1	Loss of embedded audio on this feed and channel
Embed Audio Present Feed 3 Channel 1	Presence of embedded audio on this feed and channel
…	Repeat for Feed 3 Channels 2 to 16

GPI Output Event	Description
Embed Audio Loss Feed 4 Channel 1	Loss of embedded audio on this feed and channel
Embed Audio Present Feed 4 Channel 1	Presence of embedded audio on this feed and channel
…	Repeat for Feed 4 Channels 2 to 16
Embed Audio Unexpected Type Feed 1 Channel 1	Unexpected audio type on this embedded feed and channel
Embed Audio Expected Type Feed 1 Channel 1	Expected audio type on this embedded feed and channel
…	Repeat for Feed 1 Channels 2 to 16
Embed Audio Unexpected Type Feed 2 Channel 1	Unexpected audio type on this embedded feed and channel
Embed Audio Expected Type Feed 2 Channel 1	Expected audio type on this embedded feed and channel
…	Repeat for Feed 2 Channels 2 to 16
Embed Audio Unexpected Type Feed 3 Channel 1	Unexpected audio type on this embedded feed and channel
Embed Audio Expected Type Feed 3 Channel 1	Expected audio type on this embedded feed and channel
…	Repeat for Feed 3 Channels 2 to 16
Embed Audio Unexpected Type Feed 4 Channel 1	Unexpected audio type on this embedded feed and channel
Embed Audio Expected Type Feed 4 Channel 1	Expected audio type on this embedded feed and channel
…	Repeat for Feed 4 Channels 2 to 16
AES Audio Loss Pair 1 Channel 1	Loss of AES audio on this pair and channel 1
AES Audio Present Pair 1 Channel 1	Presence of AES audio on this pair and channel 1
AES Audio Loss Pair 1 Channel 2	Loss of AES audio on this pair and channel 2
AES Audio Present Pair 1 Channel 2	Presence of AES audio on this pair and channel 2
…	Repeat for AES pairs 2 to 16
AES Audio Unexpected Type Pair 1 Channel 1	Unexpected audio type on this AES pair and channel 1
AES Audio Expected Type Pair 1 Channel 1	Expected audio type on this AES pair and channel 1
AES Audio Unexpected Type Pair 1 Channel 2	Unexpected audio type on this AES pair and channel 2
AES Audio Expected Type Pair 1 Channel 2	Expected audio type on this AES pair and channel 2
…	Repeat for AES pairs 2 to 16

Page Intentionally blank

C

Imagestore 750 Hardware Revisions

Appendix C makes a brief statement about Imagestore 750 versions.

The Imagestore 750 hardware platform underwent a hardware maintenance revision at the end of September 2011.

The internal CPU module was replaced with a more modern one; although the form, fit, and function of the Imagestore 750 are unchanged and there are no new product features (since version 4.1).

Such revisions of the Imagestore 750 are designated “IS-750 R2”, which is evident on the user front panel and on the serial number plate (on the side of the Imagestore 750, at the rear).

The IS-750 R2 units require software release 4.2.1, or later revisions, to operate. This software will work on both IS-750 R2 and earlier Imagestore 750s.

Warning: Do not down-grade IS-750 R2 units to software earlier than 4.2.1.

Page Intentionally blank

Glossary

ADC	Analog-to-digital converter
AES	Audio Engineering Society
CGT	Clip, gain, and transparency
DAC	Digital-to-analog converter
DSK	Downstream keyer (as opposed to an upstream keyer)
EAS	Emergency Alert System
EBU	European Broadcasting Union
FIFO	First in, first out (usually refers to a data buffer)
FTB	Fade to black
Gb/s	Gigabits per second (10^9 bits per second)
GHz	Gigahertz (10^9 cycles per second)
GPI	General-purpose interface
HD-SDI	High-definition serial digital interface (SMPTE 292M)
HDTV	High-definition television
Hz	Hertz (cycles per second)
JPEG	Joint Photographic Experts Group
kbps	kilobits per second (10^3 bits per second)
kHz	kilohertz (10^3 cycles per second)
LTC	Linear (longitudinal) time code
Mb/s	Megabits per second (10^6 bits per second)
MHz	Megahertz (10^6 cycles per second)
mV	Millivolt (10^{-3} volt)
NTSC	National Television Standards Committee; color TV system used in the USA, Canada, Mexico and Japan
PAL	Phase Alternate Line
PCB	Printed circuit board
PGM	Program (bus)
PLL	Phase-locked loop
PST	Preset (bus)
PVW	Preview (bus)
RCP	Remote control panel
RS-422, RS-232	Two serial data communication standards

SDI	Serial digital interface
SD-SDI	Standard-definition serial digital interface
SMPTE	Society of Motion Picture and Television Engineers
SPL	Sound pressure level
TARGA	An image file format developed by Truevision Inc.
VITC	Vertical-interval time code

Index

Symbols

0–9

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

R

S

T

U

V

W

X

Contact Us

Miranda Technical Support

For technical assistance, please contact the Miranda Technical Support center nearest you:

Americas

Office hours: 9:00 a.m. – 9:00 p.m. (EST)
Telephone: 1-800-224-7882
Fax: +1 514 335 1614
E-mail: support@miranda.com

Asia

Office hours: 9:00 a.m. – 5:00 p.m. (GMT+8)
Telephone: +852 2539 6987
Fax: +852 2539 0804
E-mail: asiatech@miranda.com

Europe, Middle East, Africa, UK

Office hours: 9:00 a.m. – 6:00 p.m. (GMT)
Telephone: +44 118 952 3444
Fax: +44 118 952 3401
E-mail: eurotech@miranda.com

China

Telephone: +86 10 5873 1814
E-mail: asiatech@miranda.com

France

Office hours: 9:00 a.m. – 5:00 p.m. (GMT+1)
Telephone: +33 1 55 86 87 88
Fax: +33 1 55 86 00 29
E-mail: eurotech@miranda.com

EMERGENCY After Hours (Global)

Toll Free: 1-800-224-7882 (US and Canada)
Telephone: +1 514 333 1772

Corporate Head Office

Miranda Technologies Inc.
3499 Douglas-B.-Floreani, St-Laurent, Quebec, Canada H4S 2C6
Telephone: +1 514 333 1772
Fax: +1 514 333 9828
Web: www.miranda.com