HARRIS
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6800 PLUS™

XHD6801+
Broadcast-Quality Up/Cross/Downconverter

Installation and Operation Manual

Edition A
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XHD6801+

Broadcast-Quality Up/Cross/Downconverter

Installation and Operation Manual

Edition A
June 2008

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Warranty Information

The Limited Warranty Policy provides a complete description of your warranty coverage, limitations, and exclusions, as well as procedures for obtaining warranty service. To view the complete warranty, visit our website.

This publication is provided “as is” without warranty of any kind, either express or implied, including, but not limited to, the implied warranties of merchantability, fitness for a particular purpose, or non-infringement.

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Chapter 3: Configuration and Operation

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Appendix A: Communication and Control Troubleshooting Tips

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Preface

Manual Information

Purpose

This manual details the features, installation, operation, maintenance, and specifications for the XHD6801✚ broadcast-quality up/cross/down-converter.

Audience

This manual is written for engineers, technicians, and operators responsible for installation, setup, maintenance, and/or operation of the XHD6801✚ broadcast-quality up/cross/downconverter.

Revision History

Table P-1. Revision History of Manual

Edition	Date	Comments
A	June 2008	Initial release

Writing Conventions

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

Table P-2. Writing Conventions

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

Obtaining Documents

Product support documents can be viewed or downloaded from our Web site. Alternatively, contact your Customer Service representative to request a document.

Unpacking/Shipping Information

Unpacking a Product

This product was carefully inspected, tested, and calibrated before shipment to ensure years of stable and trouble-free service.

1. Check equipment for any visible damage that may have occurred during transit.
2. Confirm that you have received all items listed on the packing list.
3. Contact your dealer if any item on the packing list is missing.
4. Contact the carrier if any item is damaged.
5. Remove all packaging material from the product and its associated components before you install the unit.

Keep at least one set of original packaging, in the event that you need to return a product for servicing.

Product Servicing

Except for firmware upgrades, XHD6801✚ modules are not designed for field servicing. All hardware upgrades, modifications, or repairs require you to return the modules to the Customer Service center.

Returning a Product

In the unlikely event that your product fails to operate properly, please contact Customer Service to obtain a Return Authorization (RA) number, then send the unit back for servicing.

Keep at least one set of original packaging in the event that a product needs to be returned for service. If the original package is not available, you can supply your own packaging as long as it meets the following criteria:

- The packaging must be able to withstand the product's weight.
- The product must be held rigid within the packaging.
- There must be at least 2 in. (5 cm) of space between the product and the container.
- The corners of the product must be protected.

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

Restriction on Hazardous Substances (RoHS) Compliance

Directive 2002/95/EC—commonly known as the European Union (EU) Restriction on Hazardous Substances (RoHS)—sets limits on the use of certain substances found in electrical and electronic equipment. The intent of this legislation is to reduce the amount of hazardous chemicals that may leach out of landfill sites or otherwise contaminate the environment during end-of-life recycling. The Directive, which took effect on July 1, 2006, refers to the following hazardous substances:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent Chromium (Cr-V1)
- Polybrominated Biphenyls (PBB)
- Polybrominated Diphenyl Ethers (PBDE)

According to this EU Directive, all products sold in the European Union will be fully RoHS-compliant and "lead-free." (See our website for more information.) Spare parts supplied for the repair and upgrade of equipment sold before July 1, 2006 are exempt from the legislation. Equipment that complies with the EU directive is marked with a RoHS-compliant emblem, as shown in Figure P-1.

Figure P-1. RoHS Compliance Emblem

Waste from Electrical and Electronic Equipment (WEEE) Compliance

The European Union (EU) Directive 2002/96/EC on Waste from Electrical and Electronic Equipment (WEEE) deals with the collection, treatment, recovery, and recycling of electrical and electronic waste products. The objective of the WEEE Directive is to assign the responsibility for the disposal of associated hazardous waste to either the producers or users of these products. As of August 13, 2005, producers or users are required to recycle electrical and electronic equipment at end of its useful life, and may not dispose of the equipment in landfills or by using other unapproved methods. (Some EU member states may have different deadlines.)

In accordance with this EU Directive, companies selling electric or electronic devices in the EU are affixing labels that indicate such products must be properly recycled. (See our website for more information.) Contact your local sales representative for information on returning these products for recycling. Equipment that complies with the EU directive is marked with a WEEE-compliant emblem, as shown in Figure P-2.

Figure P-2. WEEE Compliance Emblem

Safety

Carefully review all safety precautions to avoid injury and prevent damage to this product or any products connected to it. If this product is rack-mountable, it should be mounted in an appropriate rack using the rack-mounting positions and rear support guides provided. It is recommended that each frame be connected to a separate electrical circuit for protection against circuit overloading. If this product relies on forced air cooling, it is recommended that all obstructions to the air flow be removed prior to mounting the frame in the rack.

If this product has a provision for external earth grounding, it is recommended that the frame be grounded to earth via the protective earth ground on the rear panel.

IMPORTANT! Only qualified personnel should perform service procedures.

Safety Terms and Symbols in this Manual

WARNING

Statements identifying conditions or practices that may result in personal injury or loss of life. High voltage is present.

CAUTION

Statements identifying conditions or practices that can result in damage to the equipment or other property.

Chapter 1

Introduction

Overview

XHD6801✚ modules offer broadcast-quality HD/SD-SDI upconversion, crossconversion, and downconversion with aspect ratio conversion (ARC), and closed-captioning support. There are three basic varieties available:

- XHD6801✚UCT up/crossconverter
- XHD6801✚DT downconverter
- XHD6801✚UCDT up/cross/down converter

XHD6801✚UC and XHD6801✚D and can be upgraded in the field to full up/cross/down converter functionality.

This chapter includes the following topics:

Note

XHD6801✚ modules must be installed in frames with fans. FR6802✚DM and 6800/7000 series frames also do not support these products.

Product Description

XHD6801✚ modules provide conversion between SD-SDI and HD-SDI video. They include aspect ratio conversion (ARC) capabilities, and can accept both embedded audio and ANC data.

The SDI input has error monitoring capabilities in the SD mode (EDH) and in HD mode (CRC), and supports external or midplane genlock sources.

You can control XHD6801✚ modules using the following methods:

- Card edge controls
- ✚Pilot Lite
- CCS-enabled hardware and software control products

Additionally, you can use SNMP control systems and HTTP (Internet) browsers if you purchase the required licenses. Contact your Customer Service representative for more details.

Main Features

Important XHD6801✚ features include the following:

- Upconversion of SD-SDI video to broadcast-quality HD-SDI video (XHD6801✚UCT and XHD6801✚UCDT)
- Crossconversion of HD-SDI video (XHD6801✚UCT and XHD6801✚UCDT)
- Downconversion of HD-SDI video to SD-SDI video (XHD6801✚DT and XHD6801✚UCDT)
- Inputs
    - Auto-sensing HD/SD-SDI input with embedded audio data, error monitoring, VANC data such as WSS/VI/AFD and optional closed captioning and teletext
    - Analog composite genlock input with support for tri- and bi-level sync

- Outputs
  - Four equalized and reclocked HD/SD-SDI outputs of the SDI input that can be configured to be frame synchronized
  - Two HD/SD-SDI outputs carrying the converted program signal with:
    - Embedded audio
    - Video Ancillary Data Space (VANC) data, including Wide Screen Signalling (WSS), Video Index (VI), and Active Format Description (AFD)
    - Closed captioning and teletext capabilities
  - Two configurable HD/SD-SDI outputs carrying either the converted program signal or the key or monitor signal (with OSD for displaying control parameter settings)
  - User-selectable input/output standards and formats
- Video Processing
  - 10-bit up-, down-, cross-, and aspect ratio conversion with motion adaptive de-interlacing
  - Color-space conversion between SD-SDI (601) and HD-SDI (709)
  - User-configurable aspect ratio conversion (H/V size and position) for picture resizing, with eight selectable internally-generated color ARC backgrounds
  - Variable aspect ratio conversion with five user presets and fixed preset aspect ratios that include 16:9 anamorphic, 16:9 middle cut, 14:9, 4:3, and pixel true
  - Aspect ratio adjustment according to embedded WSS/VI/AFD information
  - User-selectable video frame delay of up to eight frames
  - Video frame delay of up to eight frames through the entire video path
  - Clean cut transition during aspect ratio change

- ANC Processing
  - WSS, VI, and AFD detection, insertion, or re-insertion
  - Automatic correction of AFD codes if incoming AFD information is incorrect
- 24-bit audio processing
  - Embedded audio processing (demultiplexing from SDI, delay/sync, sample rate conversion, and remultiplexing into SDI)
  - Support for 4 groups (16 channels) of embedded audio
  - Support for compressed and linear PCM audio data in the same audio group
  - Mono level swapping of audio channels
  - Handling of any embedded compressed audio with fixed delay
  - Audio delay that matches video propagation plus additional user delay of up to 1.2 seconds
- Store and recall of ARC presets through SNMP and CCS-enabled hardware and software controls
- Loss of video (LOV) modes, including pass, freeze, and black
- Built-in HD/SD-SDI test generator containing white, black, frequency sweep, cross-hatch pattern, color bars signal, and Safe Area Graticles (SAG) key
- Support for Q-SEE compliant thumbnails when installed in a FR6802✚QXF frame
- Soft edge rectangle key output of non-picture area

Software Key Options

The following software option keys are available:

- XHD68✚D-UG-UCD software key converts a XHD6801✚DT to a full XHD6801✚UCDT up/cross/down converter.
- XHD68✚UC-UG-UCD software key converts a XHD6801✚UCT to a full XHD6801✚UCDT up/cross/down converter.

Applications

The XHD6801✚ modules are suitable for the following applications:

- Final conversion to a high- or standard-definition output, regardless of input format
- Bridging between high-definition and standard-definition installations in a mixed signal facility
- Bridging between 720p and 1080p high-definition installations
- Transitioning small market broadcasters requiring high-quality conversion
- Ingestion of high-definition or standard-definition signal into a facility running either video standard

Module Description

Front Module

Figure 1-1 shows the position of the LEDs and module controls on the front of the XHD6801✚ modules.

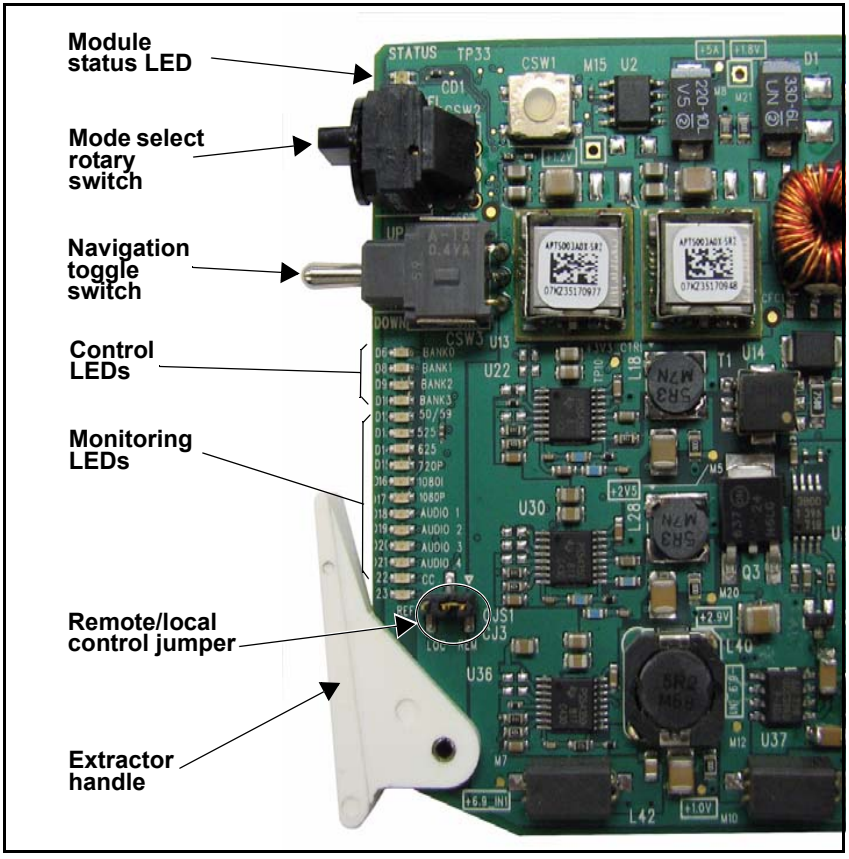


Figure 1-1. Typical 6800✚ Module

Table 1-1 on page 7 briefly describes generic 6800✚ LEDs, switches, and jumpers.

Table 1-1. Generic 6800✚ Module Features

Feature	Description
Module status LEDs	Various color and lighting combinations of these LEDs indicate the module state. See "LEDs and Alarms" on page 69 for more information.
Mode select rotary switch	This switch selects between various control and feedback parameters.
Navigation toggle switch	This switch navigates up and down through the available control parameters: • **Down**: Moves down through the parameters • **Up**: Moves up through the parameters
Control LEDs	Various lighting combinations of these Control LEDs (sometimes referred to as "Bank Select LEDs") indicate the currently selected bank. See "Bank Select LEDs" on page 34 for more information.
Monitoring LEDs	Each 6800✚ module has a number of LEDs assigned to indicate varying states/functions. See "Monitoring LEDs" on page 69 for a description of these LEDs.
Local/remote control jumper	• **Local**: Locks out external control panels and allows card-edge control only; limits the functionality of remote software applications to monitoring • **Remote**: Allows remote or local (card-edge) configuration, operation, and monitoring of the XHD6801✚ See page 14 for more information on jumpers.

Back Module

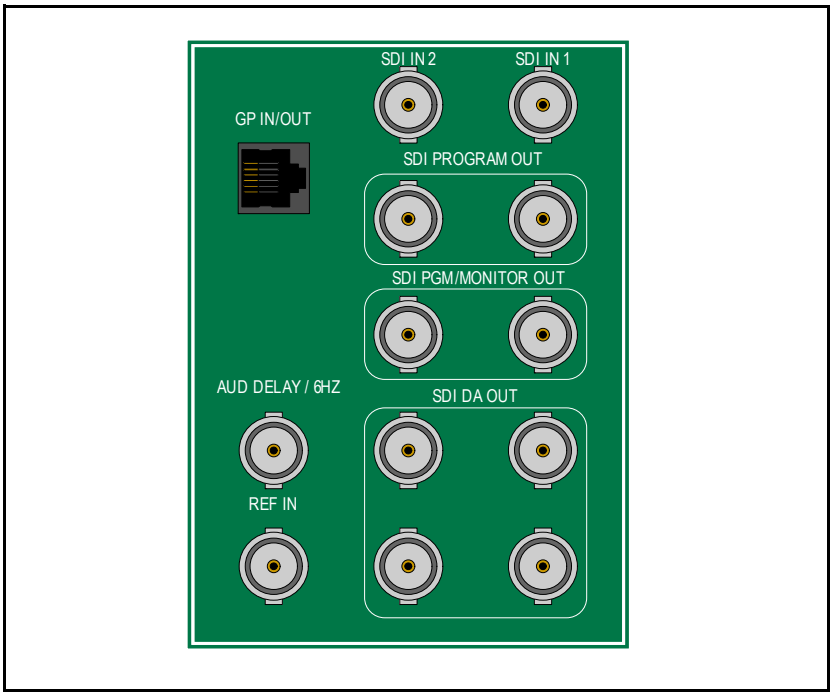


Figure 1-2. XHD6801✚ Back Module

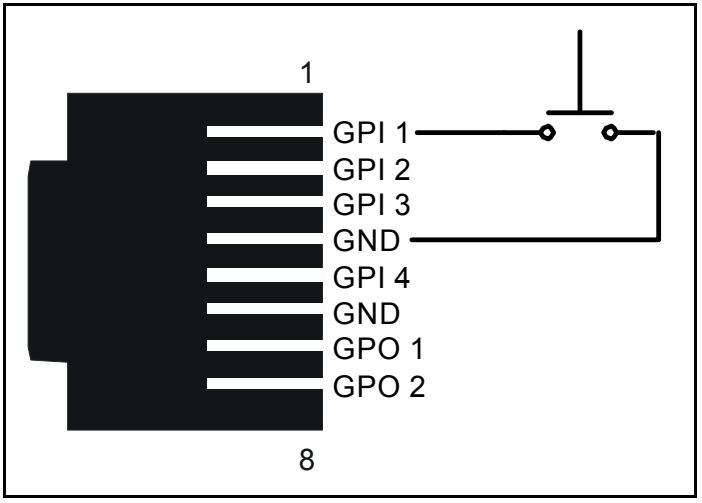


Figure 1-3. GPI In/Out Pinouts

Table 1-2 describes each back module connector.

Table 1-2. Back Module Connector Descriptions

Back Module Label	Description
SDI In 1 and SDI In 2	Inputs HD/SD-SDI video for up, down, or cross-conversion or reclocking; HD/SD-SDI signals can also be input for reclocking.
SDI DA Out (4)	Outputs SD or HD reclocked video output signals; video from these outputs by-passes the module's scalar processor; configurable for either reclocked or frame sync outputs
SDI Program Out (2)	Outputs HD/SD-SDI converted video
Audio Delay / 6 HZ	Outputs the output audio delay signal
SDI Program/Monitor Out (2)	Outputs a program signal for monitoring purposes; an on-screen display of XHD6801✚ control parameters can be enabled on these outputs
Reference In	Inputs a bi-level (NTSC/PAL-B) or tri-level sync (1080i/1080p) external video reference source that can be internally terminated using a jumper (see page 75 for the video standards supported)
GPI In/Out	Provides four GPI inputs and two GPI outputs for automation (these are open collector style inputs with approximately 10 KΩ pull-ups to +5V that can use "contact closure-to-ground" switches)

Signal Flow

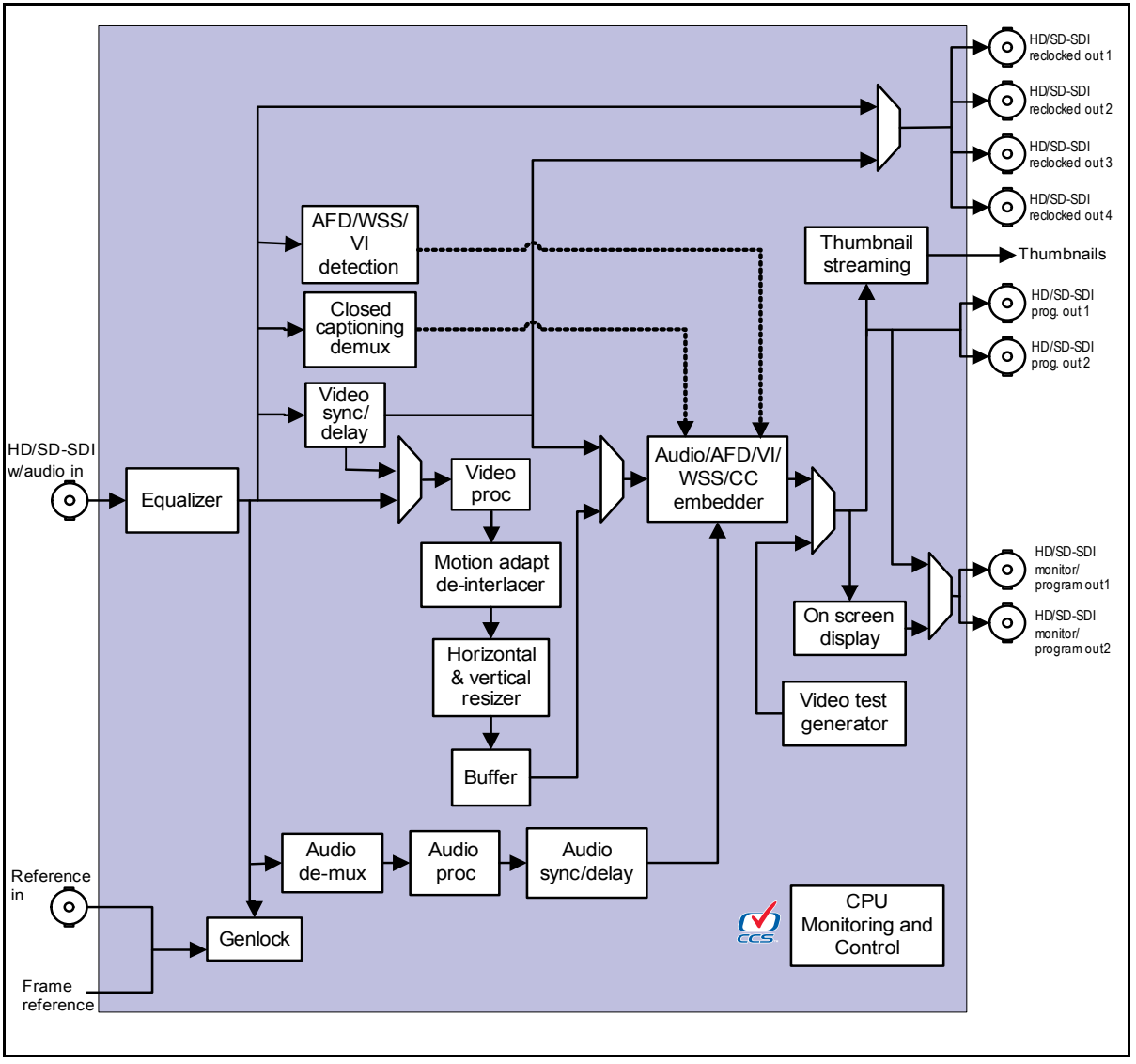


Figure 1-4. XHD6801+ Signal Flow Diagram

Chapter 2

Installation

Overview

This chapter describes the XHD6801✚ installation process, including the following topics:

Caution

Before installing this product, read the *6800✚ Series Safety Instructions and Standards Manual* shipped with every frame installation and operation manual. This information is also available on our website. The safety manual contains important information about the safe installation and operation of 6800✚ series products.

See your frame installation and operation manual for information about installing and operating an FR6802✚ frame and its components.

Maximum 6800+ Frame Power Ratings

The power consumption for one XHD6801+ module is 17.5 W. Table 2-1 shows the maximum allowable power ratings for 6800+ frames. Note the given maximums before installing any 6800+ modules in your frame.

Due to high levels of heat dissipation, XHD6801+ modules should not be installed in frames without fans. The modules cannot be installed in FR6802+DM and 6800/7000 series frames.

Note

To maintain proper temperatures, ensure that the front panel is closed at all times, and that the fan module is fully operational.

Table 2-1. Maximum Power Ratings for 6800+ Frames

6800+ Frame Type	Max. Frame Power Dissipation	Max. Number of XHD6801+ Modules	Max Power Dissipation for Three Slots*
FR6802+QXF (frame with AC or DC power supply)	120 W	6	18 W
FR6802+XF (frame with AC power supply)	120 W	6	18 W
FR6802+XF48 (frame with DC power supply)	105 W	5	15.75 W**

* Each front module requires three slots.

** Although XHD6801+ modules require more than 15.75 Watts over three slots, the actual consumption is considered acceptable if no more than 5 modules are installed.

Unpacking the Module

Preparing the Product for Installation

Before you install the XHD6801✚, perform the following:

- Check the equipment for any visible damage that may have occurred during transit.
- Confirm receipt of all items on the packing list. See "Checking the Packing List" below for more information.

Note

Contact your Customer Service representative if parts are missing or damaged.

- Remove the anti-static shipping pouch, if present, and all other packaging material.
- Retain the original packaging materials for possible re-use.

See "Unpacking/Shipping Information" on page ix for information about returning a product for servicing.

Checking the Packing List

Table 2-2. Available Product Packages

Ordered Product	Content Description
• XHD6801✚UC up/ crossconverter • XHD6801✚D downconverter • XHD6801✚UCD up/ cross/downconverter	• One front module • One back module • One XHD6801✚ *Broadcast-Quality Up/ Cross/Downconverter Installation and Operation Manual*

Setting Jumpers

The XHD6801✚ module has the following jumper settings:

- "Local/Remote Jumper" on page 14
- "External Reference Termination Jumper" on page 15
- "Input/Output Audio Delay/6 Hz Jumper" on page 16

Figure 2-1 shows the location of the jumpers.

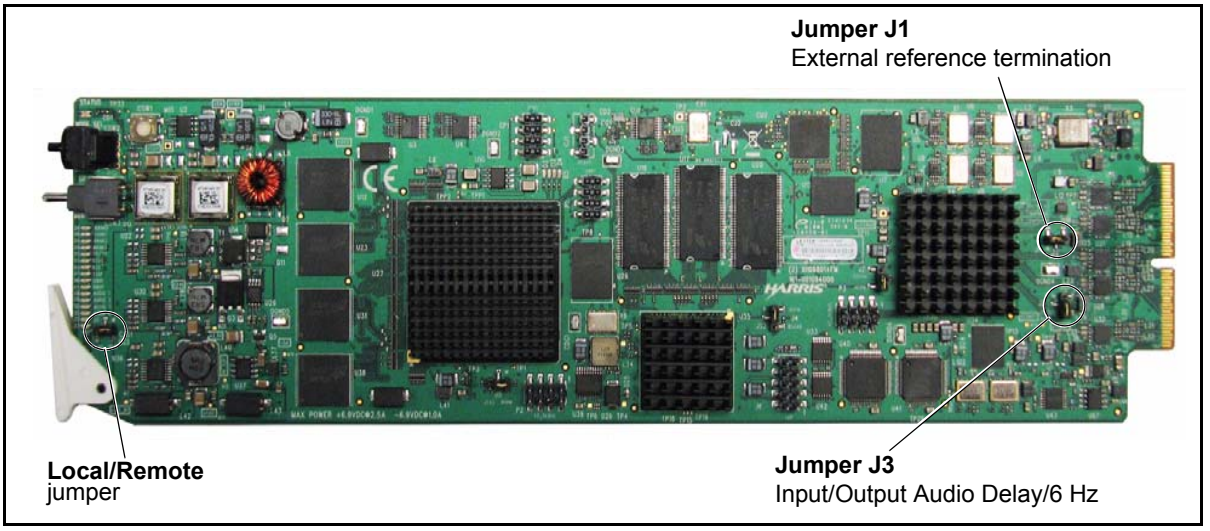


Figure 2-1. XHD6800✚ Jumpers

Local/Remote Jumper

Follow this procedure to set the **LOC/REM** jumper for either local or remote control:

1. Locate the **LOC/REM** control jumper on the module (beside the mode select rotary switch). Figure 2-1 on page 14 shows the standard location of the **LOC/REM** jumper.

2. Place a jumper on pins **1** and **2** to set the module for Remote control, or pins **2** and **3** to set the module for Local control. See Figure 2-2.

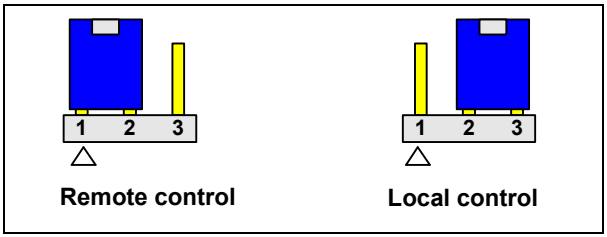


Figure 2-2. Remote/Local Control Settings

Note

You must configure modules for local or remote operation *prior* to power-up. To change the configuration, first remove power from the module, reset the jumper, and then reapply power. The white triangle near the jumper pins on the module indicates pin **1**.

See Table 1-1 on page 7 for more information on local/remote control jumper functionality.

External Reference Termination Jumper

Follow this procedure to set the external **Reference Input Termination** jumper:

1. Locate jumper **J1** on the module.

   (Figure 2-1 on page 14 shows the location of the jumper.)

2. Place a jumper on pins **1** and **2** to set the module for **75Ω Termination**, or pins **2** and **3** for **No Termination** (see Figure 2-3).

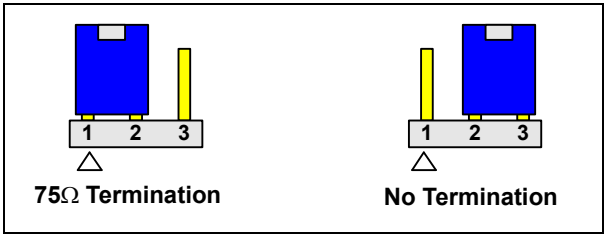


Figure 2-3. Genlock Termination Settings

Input/Output Audio Delay/6 Hz Jumper

Follow this procedure to set the **Input/Output Audio Delay/6 Hz** jumper:

1. Locate jumper **J3** on the module**.**

   (Figure 2-1 on page 14 shows the location of the jumper.)

2. Place a jumper on pins **1** and **2** to set the module for 6 Hz input, or pins **2** and **3** to set input/output audio delay output (see Figure 2-3).

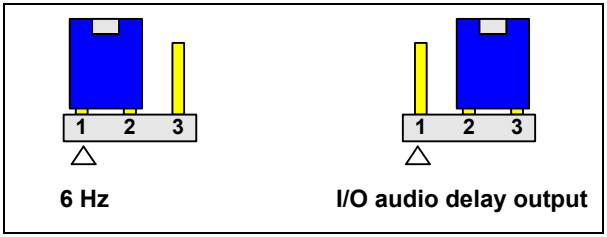


Figure 2-4. Genlock Termination Settings

Installing XHD6801+ Modules

XHD6801✚ products have triple-width back modules. These products cannot be installed in frames without fans, or in FR6802✚DM and 6800/7000 series frames.

See the *FR6802✚ Frames Installation and Operation Manual* for information about installing and operating an FR6802✚ frame and its components.

XHD6801+ License Keys

Table 2-3 lists the available XHD6801✚ feature upgrade license keys.

Table 2-3. Available License Keys

License Key Order Number	Feature Upgrade
XHD6801✚D-UCD	Downconverter upgraded to full up/cross/ downconversion capability
XHD6801✚UC-UCD	Up/crossconverter upgraded to full up/cross/ downconversion capability

To enter a license key, you must use a NUCLEUS control panel, or a CCS software application, such as CCS ✚ Pilot Lite, Pilot, or Navigator. See page 36 for information about entering license keys.

Upgrading Module Firmware

Firmware upgrading is a routine procedure that you must perform to install newer versions of software on 6800✚ modules. CCS Pilot, Co-Pilot, or Navigator software version 3.1.1 or later is required for this procedure. The frame must contain or be connected to another frame that contains an ICE6800✚ or a 6800✚ETH module. During the upgrade procedure, the affected modules are automatically rebooted.

In the unlikely event that the upgrade fails (because of such situations as network interruptions, power failures, etc.), the module may not respond to controls and will appear to be non-functional. In that event, follow the procedures described in "Correcting a Failed Upgrading Procedure" on page 21.

Upgrading the Firmware

You can upgrade your 6800✚ module's firmware using the Software Upgrade tool. This tool is included with CCS Pilot, Co-Pilot, or Navigator software version 3.1.1 or later.

Caution

The **File Transfer** tab is not meant to be used for firmware upgrades. Use the Software Upgrade tool to upgrade module firmware.

To upgrade your module's firmware, follow these steps:

1. Download the most recent appropriate upgrade package from our website or from your CD-ROM.
2. If the affected module has not been discovered, perform the Discovery operation, as described in "Discovering an XHD6801+ Module" on page 28.

Note

Information about discovering modules can also be found in your CCS software application manual or online help. (If you cannot discover the device, see "Manually Adding a Device to the Discovery or Network Folder" on page 22.)

3. From the **Tools** menu, select **Software Upgrade**.

   The **Software Upgrade** window opens or is brought to the foreground.

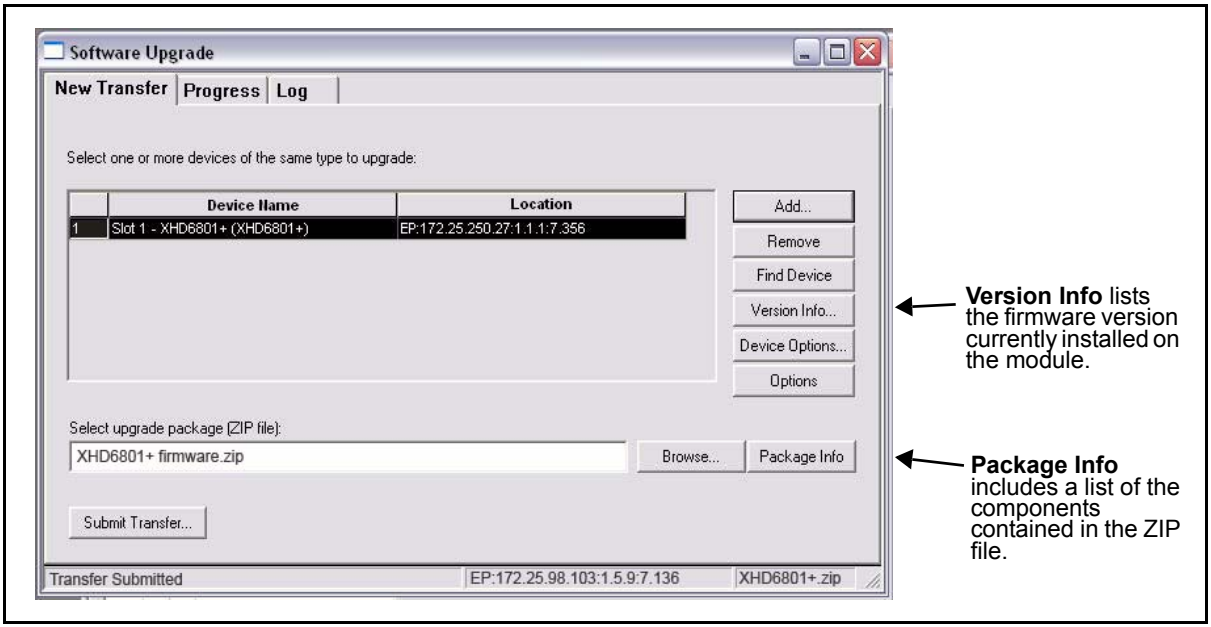


Figure 2-5. Software Upgrade Tool's New Transfer Tab

4. On the **New Transfer** tab, click **Add**.

   The **Device Selection** dialog box opens.

5. Select one or more devices, and then click **OK** to close the **Add Device** dialog box.

   Note

   You can only add one device from each IP address. All items in a frame have the same IP address.

   The selected devices appear in the table under **Device Name**. These devices will receive the same upgrade package.

6. Before proceeding with the firmware upgrade, you can—

   - Highlight the module's position in the Navigation window by clicking **Find Device**.

- View the firmware version currently installed on the module by clicking **Version Info**.

7. Press **Browse...** to select the firmware upgrade package (ZIP file).

   A standard **Windows File Selection** dialog opens.

8. Choose the upgrade ZIP file on a local or network drive.

   The selected file's path name is displayed in the edit box to the left of the **Browse…** button.

Note

The extraction process of the ZIP file is handled as part of the upgrade process. You do not need to extract the files yourself. You can view the contents of the ZIP file by clicking **Package Info.**

9. Press **Submit Transfer...**

   A dialog box opens, requesting confirmation that you want to proceed with the request. If you have multiple devices selected, multiple transfer tasks are submitted—one per device.

   The transfer now progresses. You may minimize the **Software Upgrade** window, continue with other tasks, or switch to the **Progress** tab to view the status of the transfers.

Note

Closing the **Software Upgrade** window does not effect any of the transfer processes that may be running in the background. If you try to log off or exit the CCS software while a transfer is underway, a notification window will alert you that processes are still active and will ask if you want to terminate these processes.

10. To monitor the progress of the firmware upgrade procedure, click the **Progress** tab. When the firmware upgrade is complete, **Completed** is displayed in the **Transfer Status** column.

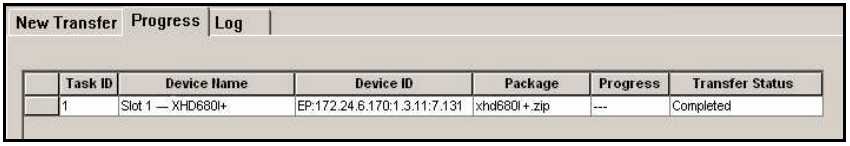


Figure 2-6. Firmware Upgrade Complete

Correcting a Failed Upgrading Procedure

Firmware upgrades may fail in the event of network interruptions, power failures, or if the wrong upgrade package was transferred to the module. These problems can be corrected by upgrading the firmware while the module is in Boot Loader mode. The upgrade won't work unless you put the module in Boot Loader mode.

Note

If you have not already downloaded the most recent appropriate upgrade package from our website or from your CD-ROM, do so now.

Putting the Module in Boot Loader Mode

Follow these steps to put your the module in Boot Loader mode:

1. Remove the affected module from the 6800✚ frame.

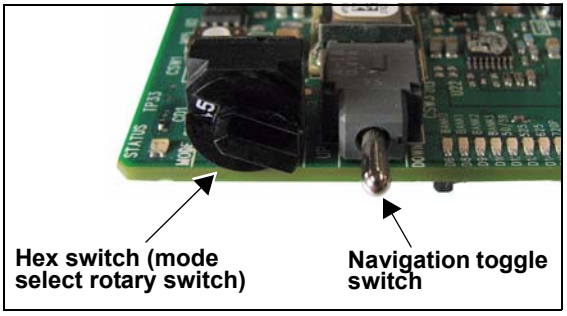


Figure 2-7. Buttons on a Typical Card Edge

2. Set the hex switch to **F**.
3. While pressing the Navigation toggle switch down, reinsert the module into the frame.

If your device is listed in the **Discovery** or **Network** folder, you can continue the firmware upgrade as described in "Upgrading the Firmware" begining with step **3** page 18. If not, you must manually add the device to the **Discovery** or **Network** folder. To do this, see the next section.

Manually Adding a Device to the Discovery or Network Folder

If your device is not listed in the **Discovery** or **Network** folder, you must manually add it to these folders. After you add the device, you can use the **Software Upgrade** dialog box to continue with the module firmware upgrade.

To manually add a device to the **Discovery** or **Network** folder, follow these steps:

1. Enter Build mode, and then drag or copy and paste the module's device icon from the **Catalog** folder into the **Network** or **Discovery** folder.
2. Right-click the device icon, and then select **Properties**.
3. On the **Device** tab of the **Navigation Properties** box, enter the IP address of the frame that holds the module. (See Figure 2-8.)

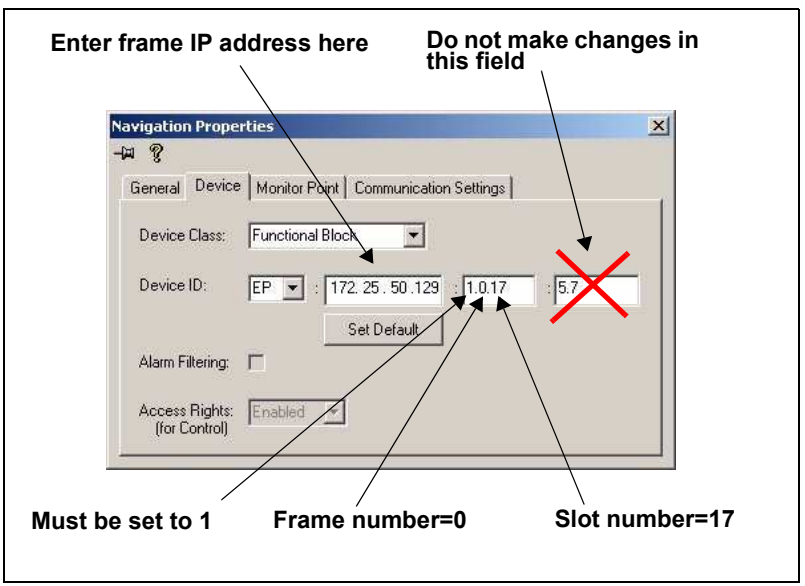


Figure 2-8. Navigation Properties Box

Caution

Do not make changes in the last field (located above and to the right of the **Set Default** button). If you do, you will need to begin the process of adding devices to the **Discovery** or **Network** folder again.

4. In the third field, enter

   `1.0.[slotnumber]`

   (where, for example, 1.0.5 would refer to the module in slot 5 of the frame number 0).

5. Close the window.

6. You can now continue your firmware upgrade as described in "Upgrading the Firmware" begining with step **3** on page 18.

Chapter 3

Configuration and Operation

Overview

This chapter describes how to operate the XHD6801✚ using card-edge controls or by using a CCS software and hardware controls application such as ✚ Pilot Lite, Pilot, or Navigator.

See the following documents for detailed information on how to operate this product remotely:

- ✚ *Pilot Lite User Manual* for serial interface
- CCS Pilot, CoPilot, Navigator, or NUCLEUS Network Control Panel, LCP-3901-1U/RCP-CCS-1U manuals for Ethernet interface

The following topics are discussed in this chapter:

Operating Notes

When setting the control parameters on the XHD6801✚, observe the following:

- When you change a parameter, the effect is immediate. However, the module requires up to 20 seconds to save the latest change. After 20 seconds, the new settings are saved and will be restored if the module loses power and must be restarted.
- For proper operation, the output HD standard frame rate should match or double the reference standard frame rate.
- The manufacturer recommends that you terminate any unused coaxial output connectors with a 75Ω connector.

Video Processing Modes

The XHD6801✚ operates in three fundamental video processing modes. Each of these modes is available in all three XHD6801✚ versions (XHD6801✚UC, XHD6801✚D and XHD6801✚UCD).

Note

Some user controls such as input and output video standard, phasing, and LOV may operate differently between these processing modes. Also, there are some requirements on the video format on each of the outputs, and these requirements vary between each processing mode.

Mode 1: Scaled Outputs with Re-clocked Inputs

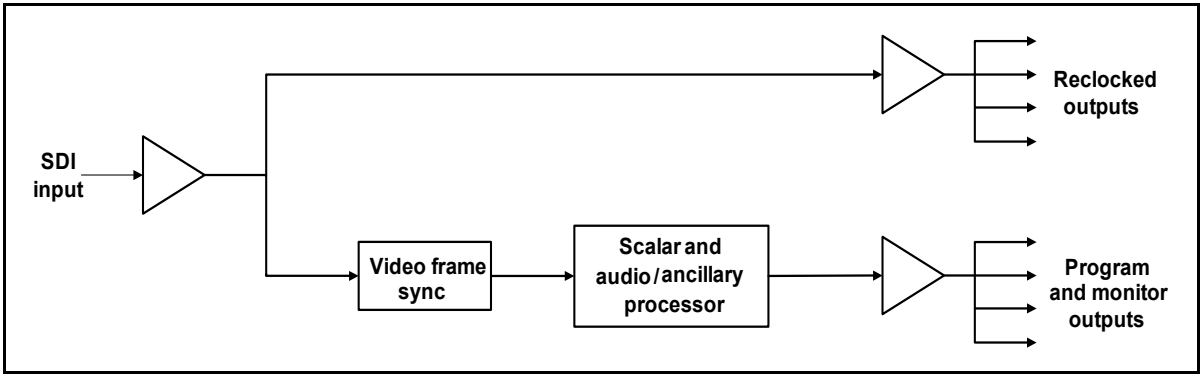


Figure 3-1. Scaled Outputs with Re-clocked Inputs

This mode is active when you select **Reclock** in **Video > Output > DA Output Select.**

Four re-clocked outputs of the input video with four scaled outputs are available in this mode. This makes it possible to configure the XHD6801✚ as a combined four-output DA and a four-output up/cross/downconverter. The following special features and limitations apply to this video processing mode:

- The input video standard control (**Video > Input > SDI Input Standard Set**) applies to the video frame synchronizer only and has no effect on the re-clocked outputs. If the input video format does

not match the input standard control setting or if the input video is lost, both frame synchronizer and the scalar processor will operate in LOV mode.

- The output video standard of the scalar is selectable through the scalar output video standard control (**Video > Output > Output Video Standard Select)**. However, the video format of the re-clocked outputs is not controllable and is always the same as the input video format.
- The horizontal and vertical phasing controls will apply to both video frame synchronizer and scalar processing as a single block. The phasing controls (**Video > Processing > Synchronizer**) have no effect on the re-clocked outputs.
- If the input video format does not match the input standard control setting or if the input video is lost, the program and monitor outputs will either be frozen, undetermined (pass mode), or black—according to the LOV mode setting (**Video > Output > Primary LOV Mode**). However, the LOV mode does not apply to re-clocked outputs. The re-clocked outputs will be undetermined if the input video format is not supported, or if the input video is lost.

Mode 2: Independent Scaled Outputs and Frame Sync Outputs

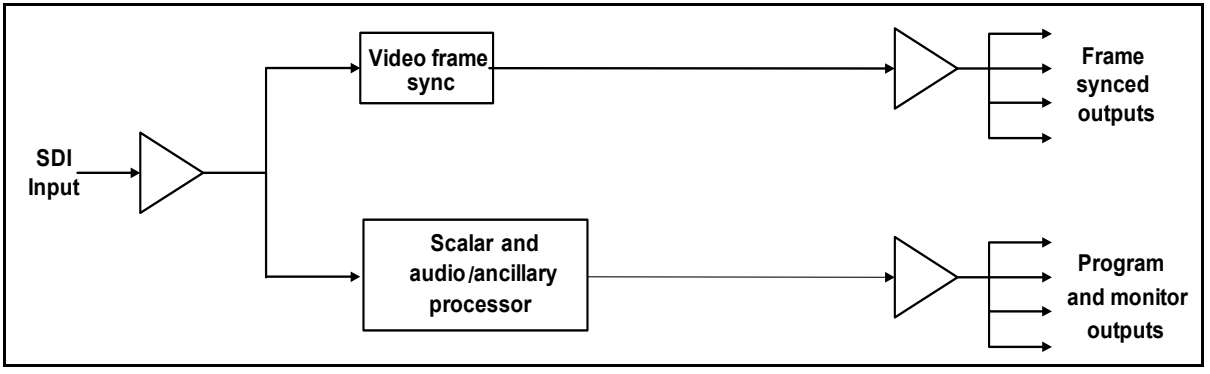


Figure 3-2. Independent Scaled Outputs and Frame Sync Outputs

This mode is active when you select **Frame Sync: Dual Channel** in **Video > Output > DA Output Select.**

Four frame synchronized outputs of the input video and four scaled outputs are available in this mode. The frame synchronizer and the scalar processor are on separate paths. This makes it possible for you to configure the XHD6801✚ as an independent four-output frame synchronizer and a four-output up/cross/downconverter. The following special features and limitations apply to this video processing mode:

- The input video standard control for the frame synchronizer in effect also controls the output video standard of the frame synchronizer.
- The output video standard of the scalar is selectable through the scalar output video standard control (**Video > Output > Output Video Standard Select)**. However, the video format of the frame synchronizer outputs is controlled by the frame synchronizer input video standard control.
- Two independent sets of horizontal and vertical phasing controls are available to both video frame synchronizer and scalar processor (**Video > Processing > Synchronizer**). This makes it possible for you to adjust the phasing of the frame-synchronized outputs and the scalar outputs independently with respect to the reference.
- The LOV parameter (**Video > Output > Primary LOV Mode**) controls the behavior of both the frame synchronizer outputs and the scalar processor outputs.
- Since the scalar processor resides on a path different than the frame synchronizer, the frame delay induced by the frame synchronizer will not be added to the scalar processing path and therefore the maximum frame delay through the scalar processing path is limited to two frames (the amount of propagation delay through the scalar processor). This setting is available in **Audio > Other> I/O Delay Configuration**. Also, there are some problems on the scalar processor when handling “dirty” video input. Without the frame synchronizer acting as a filter at the scalar video input, the scalar outputs may not be perfectly clean when there are glitches at the input video (for example, when the video format is changed).

Mode 3: Frame Sync and Scaled Outputs

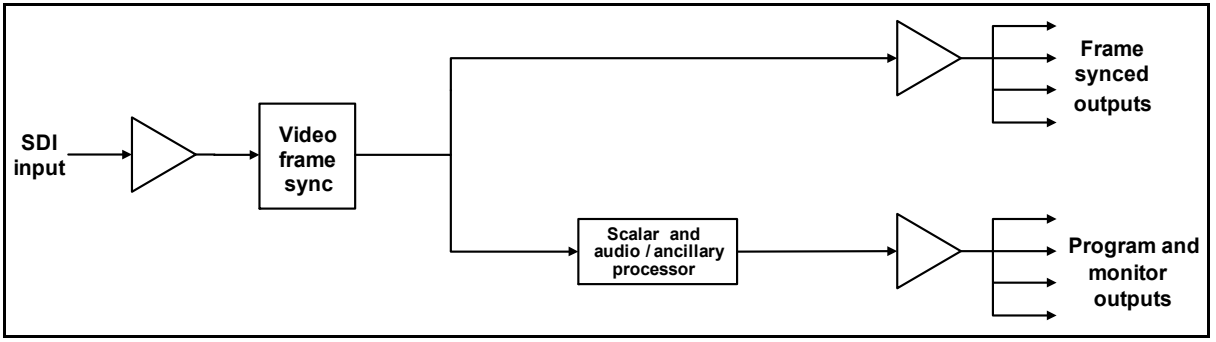


Figure 3-3. Frame Sync and Scaled Outputs

This mode is active when you select **FS: Single Chan** in **Video > Output > DA Output Select**.

In this mode, there are four frame synchronized outputs of the input video and four scaled outputs available. The scalar processor is located after the video frame synchronizer on the same path. However, putting both the frame synchronizer and the scalar on the same path prevents you from changing the phase relationship between the frame synchronized outputs and the scalar outputs. The following special features and limitations apply to this video processing mode:

- The input video standard control applies to both the video frame synchronizer and the scalar processor (**Video > Input > SDI Input Standard Set**). If the input video format does not match the input standard control setting, or if the input video is lost, both the frame synchronizer and the scalar processor will operate in the LOV mode.
- The output format of the scalar is selectable through the scalar output video standard control (**Video > Output > Output Video Standard Select)**. However, the output video format of the frame synchronized outputs is controlled by the input video standard control.
- The horizontal and vertical phasing will apply to both video frame synchronizer and scalar processing as a single block (**Video > Processing > Synchronizer**). In other words, you cannot adjust the phase relationship between the frame synchronizer outputs and the

scalar outputs. The scalar outputs will always lag the frame synchronizer outputs by a fixed number of video frames (the amount of propagation delay through the scalar processor).

- If the input video format does not match the input standard control setting or if the input video is lost, the program and monitor outputs will either be frozen, undetermined (pass mode), black, or test pattern—according to the LOV mode setting (**Video > Output > Primary LOV Mode**). The frame synchronizer outputs will also either be frozen, undetermined (pass mode), or black.

Q-SEE Compliant Thumbnails

The XHD6801✚ supports Q-SEE compliant thumbnails. To use Q-SEE compliant features, you must install the XHD6801✚ in an FR6802✚QXF frame that also contains a 6800✚ETH module.

When you open a **Control** window in Pilot or Navigator for the 6800✚ETH module, all Q-SEE compliant modules provide thumbnails on a **Video Streaming** tab. In addition, the XHD6801✚ module's **Control** windows have a **Streaming** tab where a thumbnail, updated at up to three frames per second, is displayed.

For more information on Q-SEE compliant thumbnails, see your *FR6802✚QXF Frames Installation and Operation Manual.*

Changing Parameter Settings

There are two ways to change the parameters that control your module's operation: CCS software applications and card-edge controls.

Using CCS software applications, such as ✚ Pilot Lite, Pilot, or Navigator, you can view, set, and confirm your module's parameter settings from your computer's monitor. Using the card-edge controls, you can set parameters using the module's rotary hex and navigation switches.

You can use the information in this chapter to configure and operate your XHD6801✚ using a CCS software application or the module's card-edge controls. For more information about setting parameters using CCS software application or by using the module's card-edge control, see "Changing Parameters Using CCS Software" on page 32 and "Changing Parameter Settings Using Card-Edge Controls" on page 33 respectively.

A complete list of XHD6801✚ control parameters can be found in Chapter 4: "Parameters, LEDs, and Alarms" on page 59.

Changing Parameters Using CCS Software

Before using CCS software applications or hardware controls to change your module's parameter settings, you must refresh (✚ Pilot Lite) or discover (Pilot and Navigator) the module. Refresh and Discovery are the processes by which your CCS software finds, and then connects to your module.

Refreshing Your Module Using ✚ Pilot Lite

When using ✚ Pilot Lite to change your XHD6801✚ control parameters, you must "refresh" the control connection between your 6800✚ frame and PC. To refresh the connection, from the ✚ Pilot Lite menu bar, select **File** > **Refresh**. For information about controlling a device using ✚ Pilot Lite, see your ✚ Pilot Lite *User Manual*.

Discovering an XHD6801✚ Module

To discover your module, your Pilot or Navigator software must be in Build mode. Follow these steps:

1. If the Discovery window is not open, click **Tools** > **Discovery** in the main menu.

   A **Discovery** window opens, most likely in the bottom left corner of the screen.

2. Click **Options**, and then click **Add**.
3. Enter the IP address of the frame that contains your module, the frame that contains your ICE6800✚ module, or the frame that contains a 6800✚ETH module that provides access to your module.
4. Click **OK** to close the **Add IP address** window, and then **OK** again to close the **Discovery Options** window.
5. Click **Start**.

   This triggers Pilot or Navigator to run a discovery.

6. When your discovery is complete, **Discovery Completed** is displayed in the **Discovery** window.
7. To continue, click **Save**, to save the contents of your discovery to the **Discovery** folder of the **Navigation** pane.

You can now switch to Control mode by selecting **Operational Mode** > **Control**. Double-click XHD6801✚ in the Navigation pane. The **Control** window opens and displays the module's controls.

Changing Parameter Settings Using Card-Edge Controls

Using the module's rotary and navigation switches, you can change XHD6801✚ parameter settings at the card-edge. You can view and confirm your changes using the On-screen display feature (see "Enabling On-Screen Display" on page 35).

Follow these steps to change the parameter settings at the card edge:

1. Rotate the mode select rotary switch (hex switch) to **0**.

2. Once the hex switch is set to **0**, toggle the navigation switch up or down to select a bank.

   View the control LEDs next to the navigation toggle switch. A lit LED indicates which bank is currently selected.

Table 3-1. Bank Select LEDs

Bank Number	Bank 0 LED (first top LED)	Bank 1 LED (second top LED)	Bank 2 LED (third top LED)	Bank 3 LED (fourth top LED)
0	Off	Off	Off	Off
1	On	Off	Off	Off
2	Off	On	Off	Off
3	On	On	Off	Off
4	Off	Off	On	Off
5	On	Off	On	Off
6	Off	On	On	Off
7	On	On	On	Off
8	Off	Off	Off	On
9	On	Off	Off	On
10	Off	On	Off	On
11	On	On	Off	On
12	Off	Off	On	On
13	On	Off	On	On
14	Off	On	On	On
15	On	On	On	On

3. Rotate the hex switch to the parameter number (**1** to **9**) or letter (**A** to **F**) of the option you want to set.
4. Toggle the navigation switch to select and set the value of the chosen parameter.

5. Rotate the hex switch to another parameter number/letter in the current bank, and then repeat step 4.

   or

   Rotate the hex switch to **0** again to select a different bank, and then repeat steps 3 and 4.

Note

Harris recommends that you use the software controls to aid in viewing, setting, and confirming parameter values.

Enabling On-Screen Display

You can use the On-screen Display (OSD) monitoring feature to view the current parameter selections on your output display. When the **On-Screen Display** parameter is turned on, the current parameter selections are displayed on the module's **SDI Program/Monitor Out 1** and **SDI Program/Monitor Out 2** outputs. This features makes configuring the XHD6801✚ using the card-edge controls much easier.

To enable OSD monitoring, select **Video > Output > Config > On-Screen Display**. To change the transparency of the OSD, select **Video > Output > Config > OSD Transparency.**

OSD can be turned **On/Off** at the card edge, using Bank **0**, Switch **2** (**0,2**).

Recalling Default Parameter Settings

You can use the module's **Factory Recall** parameter to return all of the module's parameters to factory default settings. To return this module to its default settings, select **Other > Factory Default > Yes**.

Reading Software and Hardware Versions

You can see the current software and hardware versions of the XHD6801✚ by checking the **Hardware Version** and **Firmware Version** read-only parameters near the end of the parameter list (see "Control Parameters" on page 60). These parameters appear in the on-screen display and in CCS software applications.

Entering License Keys

Optional license keys are available to add new capabilities to your existing module. (Contact your product sales representative for details.)

Before you purchase a license key, you must obtain your module's serial number. Select **Other > Serial Number**. The module's current capabilities are shown when you select **Other > Options**.

Table 3-2 lists the available XHD6801✚ upgrade licence keys.

Table 3-2. Available Upgrade License Keys

Module Type Before Upgrade	License Key Upgrade	Module Type After Upgrade
XHD6801✚UCT	Up/cross/downconversion (XHD68✚-UC-UG-UCD)	XHD6801✚UCDT
XHD6801✚DT	Up/cross/downconversion (XHD68✚-D-UG-UCD)	XHD6801✚UCDT

You can use a CCS software application, such as CCS ✚Pilot Lite, Pilot, and Navigator, as well as NUCLEUS control panels to enter license keys. Additionally, you can enter the license keys with a web browser if your module is in a frame with (or connected to a frame with) a 6800✚ETH✚HTTP module. License keys cannot be entered at the module's card edge, but you can view the **License Key** parameter if the **On Screen Display** parameter is enabled.

Using CCS, you can enter your license key by selecting **Other > License Key**.

To confirm that your license key has been accepted and activated, select **Other > Options.**

Note

Before you can enter and activate your upgrade license key, you must either Refresh or Discover your XHD6801✚ module as described in "Refreshing Your Module Using ✚ Pilot Lite" on page 32 and "Discovering an XHD6801✚ Module" on page 33.

Aspect Ratio Conversion

For the module output, you can select either a *standard* ARC setting, or one of 10 of your own customized *preset* ARC settings. When using the ARC function, ensure that you select the correct output in **Out Aspect Ratio** (**Video > Processing > ARC > Out Aspect Ratio**).

Setting a Standard Aspect Ratio

To select a standard aspect ratio for the output image, select **ARC Preset Up**, **ARC Preset Cross**, **ARC Preset Down**, **or ARC Preset SD-ARC** (found at **Video > Processing > ARC**). Each of these parameters corresponds to one of the four conversion modes (up, cross, down, and SD-ARC.) As the module changes between conversion modes—based on either an output format change or an input format change— the corresponding ARC preset will be applied.

The available standard aspect ratios depend upon the operating mode of the XHD6801✚. In other words, for example, an ARC setting that is visible in upconversion may not be visible in downconversion.

In some modes, **Pixel True** is offered as an option. There is no actual scaling performed in **Pixel True**. Instead, each input pixel is mapped directly to one output pixel; you can use this preset to transport an SD picture embedded inside an HD stream.

The following standard ARC options are available:

- Anamorphic
- 4:3 Pillar Box
- 14:9 Pillar Box
- 16:9 Cut
- 4:3->21:9 Ltr
- 16:9 Letter Box
- 14:9 Letter Box
- 4:3 Cut
- 16:9->21:9 Ltr
- PixelTrue
- Preset 1-Preset 10
- AFD
- AFD - ALTR

- VI
- VI - ALTR
- WSS
- WSS - ALTR
- Custom

Active Format Description (AFD) is a useful option that transmits data in the VANC portion of the SDI signal, enabling both 4:3 and 16:9 television monitors to optimally present video with preset ARC and safe area information.

Additional information on active format description begins on page 40.

Setting a Custom Aspect Ratio

You can scale and pan the output image to any size and location by using the various parameters of the custom aspect ratio feature. To use this feature, see the options in **ARC Preset Up**, **ARC Preset Cross**, **ARC Preset Down**, **or ARC Preset SD-ARC** (found at **Video > Processing > ARC**). This procedure is optional, but recommended, as it has the effect of making the custom ARC settings "live." In other words, changes to these parameters will immediately appear on the program output. Use **Horizontal Scale**, **Vertical Scale**, **Horizontal Offset**, and **Vertical Offset** (found in **Video > Processing > ARC**) to set the size and position that you need.

Saving, Selecting and Recalling Custom Aspect Ratios

You can save, select, and recall custom aspect ratios in the XHD6801✚ modules. These controls are all found in the **Video > Processing > ARC** section.

Saving a Custom Aspect Ratio

To save a custom aspect ratio, follow these steps:

1. Ensure the **Horizontal Scale**, **Vertical Scale**, **Horizontal Offset**, and **Vertical Offset** parameters have been set to your desired values.
2. In the **ARC Preset Save** parameter, select one of the aspect ratio preset slots for storage.

Selecting a Saved Custom Aspect Ratio

To select one of the custom saved aspect ratios for the output image, follow these steps:

1. Select **ARC Preset Up**, **ARC Preset Cross**, **ARC Preset Down**, or **ARC Preset SD-ARC**.
2. Select one of the ten **Presets**.

Recalling a Saved Custom Aspect Ratio

By selecting the **ARC Preset Recall** parameter, you can also recall any built-in standard or custom saved aspect ratio settings into the custom aspect ratio controls. This operation will not affect the output image unless you have selected **Custom** in **ARC Preset Up**, **ARC Preset Cross**, **ARC Preset Down**, or **ARC Preset SD-ARC** .

The **ARC Preset Recall** operation will overwrite the current settings of **Horizontal Scale**, **Vertical Scale**, **Horizontal Offset**, and **Vertical Offset**. If you perform an aspect ratio recall when you have selected **Custom** in **ARC Preset Up**, **ARC Preset Cross**, **ARC Preset Down**, or **ARC Preset SD-ARC**, the output image aspect ratio will change to reflect the newly recalled ARC values.

Overscan Mode

The overscan mode is similar to a zoom mode. When enabled, it discards a specified number of lines and columns of pixels around the borders of the input image active picture region before processing.

For example, the active picture region for 525 standard starts on line 21 and ends at line 262. Therefore, an overscan setting of one line implies that upconversion starts at line 22 and ends at line 261. In addition to the two discarded lines, the first and last pixel of each remaining line in the active picture region are discarded.

Note

VBI is not passed with the XHD6801✚. Teletext and WSS can be re-embedded on the output side of the module.

The overscan mode prevents data embedded in the active picture region (usually line 21), such as closed captioning, from being converted.

To enable the overscan mode, select **Overscan Lines** parameter **(Video > Processing > ARC > Overscan Lines**) and then select the number of rows and columns for cropping.

Using the overscan control you can also discard picture ramp-up and ramp-down regions commonly present in material digitized from analog video sources.

If you are using an XHD6801✚ with a downstream keyer, and the keyed image appears with a dark border around it, the border is caused by this shaping of the incoming video frame. Use the **Overscan Lines** parameter to minimize this border effect.

Active Format Description

Active Format Description (AFD) transmits data in the VANC portion of the SDI signal, enabling both 4:3 and 16:9 television monitors to optimally present video with preset ARC and safe area information. Without AFD, converted video may appear distorted or “cut off” when it appears on different monitors. The XHD6801✚ can encode or decode AFD; it can also encode or decode earlier Video Index (VI) and Wide Screen Signalling (WSS) formats.

The AFD feature of the XHD6801✚ complies with SMPTE 2016 and includes nine possible 4:3 configurations and eight possible configurations in 16:9. Figure 3-7 on page 46 describes the 4:3 AFD configurations; Figure 3-8 on page 47 describes the 16:9 AFD configurations.Figure 3-4 shows two comparisons of a signal that is encoded with AFD and without AFD.

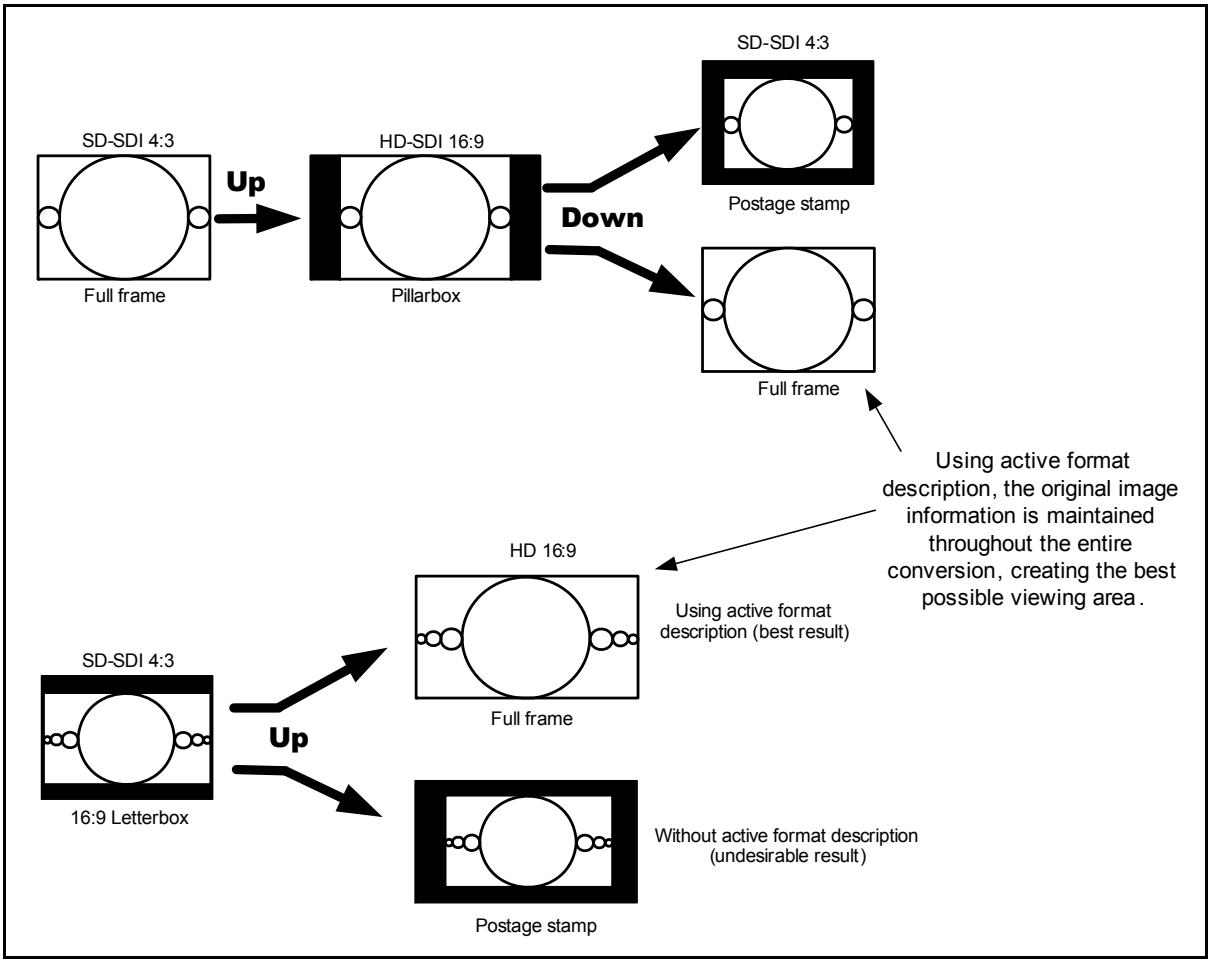


Figure 3-4. AFD/Non-AFD Comparisons

Figure 3-5 shows different applications of AFD insertion and decoding.

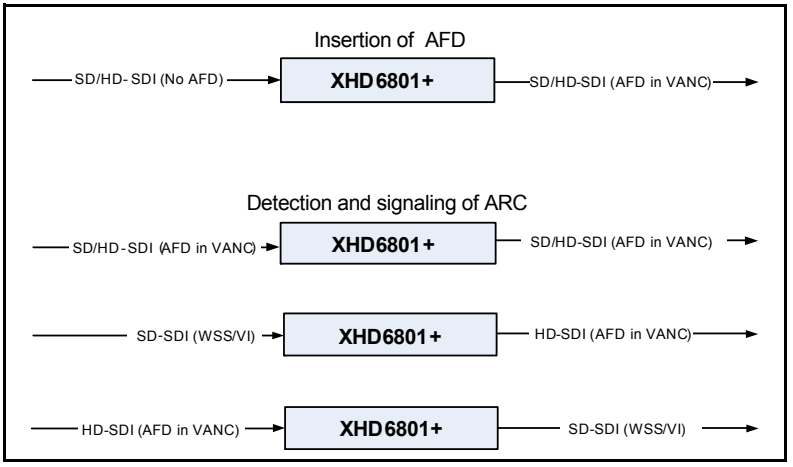


Figure 3-5. AFD Block Diagram

The AFD feature of the XHD6801✚ includes nine possible SD-SDI configurations and eight possible configurations in HD-SDI. Figure 3-9 on page 48 describes the SD-SDI AFD configurations; Figure 3-10 on page 49 describes the HD-SDI AFD configurations.

AFD, VI, and WSS Detection

AFD, VI, and WSS data that is embedded in the incoming video can be detected by the XHD6801✚, and read from the following input parameters that are found in the **Video** > **Input** > **De-embedder** path:

- AFD Present
- VI Scan Present (Use the **VI Detect Line Field 1** and **VI Detect Line Field 2** parameters to determine where in the video signal to look for VI information)
- VI AFD Present
- WSS Present (Use the **WSS Detect Line** parameter to determine where in the video signal to look for WSS information)

AFD, VI, and WSS Processing

Incoming AFD, VI, and WSS data can be used for automatic aspect ratio control when the **ARC Preset** parameter is set to one of these values in the **Video** > **Output > Embedder** path:

- AFD
- AFD (ALTR)
- VI
- WSS
- WSS (ALTR)

See Figure 3-9 on page 48, Figure 3-10 on page 49, Figure 3-11 on page 50, and Figure 3-12 on page 51 for descriptions of how the automatic ARC control will act when given an AFD, VI, or WSS code input.

AFD, VI, and WSS Output

AFD, VI, and WSS data can be inserted into an output video stream either manually or automatically. This function is controlled by the **AFD Control**, **VI Control**, and **WSS Control** parameters located in the **Video** > **Output > Embedder** path.

The **Insert Auto** option of the **AFD Control**, **VI Control**, and **WSS Control** parameters will embed the data that is automatically selected by the module, based on one of the following:

- The current ARC settings (via **Video > Processing** > **ARC**)
- The current AFD/VI/WSS code input that is detected in the incoming video signal
- A selected option in the **ARC Preset Up**, **ARC Preset Cross**, **ARC Preset Down**, or **ARC Preset SD-ARC** parameters (via **Video** > **Processing** > **ARC**)

If you select **Custom** instead of **Insert Auto** in the **AFD Control**, **VI Control**, and **WSS Control** parameters, you can change the output code by selecting a different option in **AFD Select**, **VI Select**, or **WSS Select**. These parameters are also located in the **Video** > **Output > Embedder** path (in Table 4-1 on page 63).

Additionally, if you are using VI according to the SMPTE Proposed RP-186+ standard as of January 11, 2007, you must ensure you have enabled the standard by following this path: **Video > Output > Embedder > SDI Out VI with AFD** (default setting is **Yes**).

In the event that the current ARC is controlled by AFD, VI, or WSS, and this data disappears from the input signal, the XHD6801✚ provides you with two options:

- Keep the current aspect ratio as set by the last AFD, VI, or WSS data.
- Reset to the aspect ratio settings that were in use before the AFD, VI, or WSS data took control.

The **Auto Arc Reset** parameter controls this feature. Select **Yes** to have the module reset to older values in the event of a loss of data; select **No** (the default) to retain the current ARC settings in the event of a loss of data.

At this time, **Bar Data** and **Pan-Scan** for VI and AFD are not supported.

AFD Descriptions

In the following pages, Figures 3-7 to 3-12 show the different AFD code descriptions. Comparable WSS and VI templates are included in the SD-SDI descriptions.

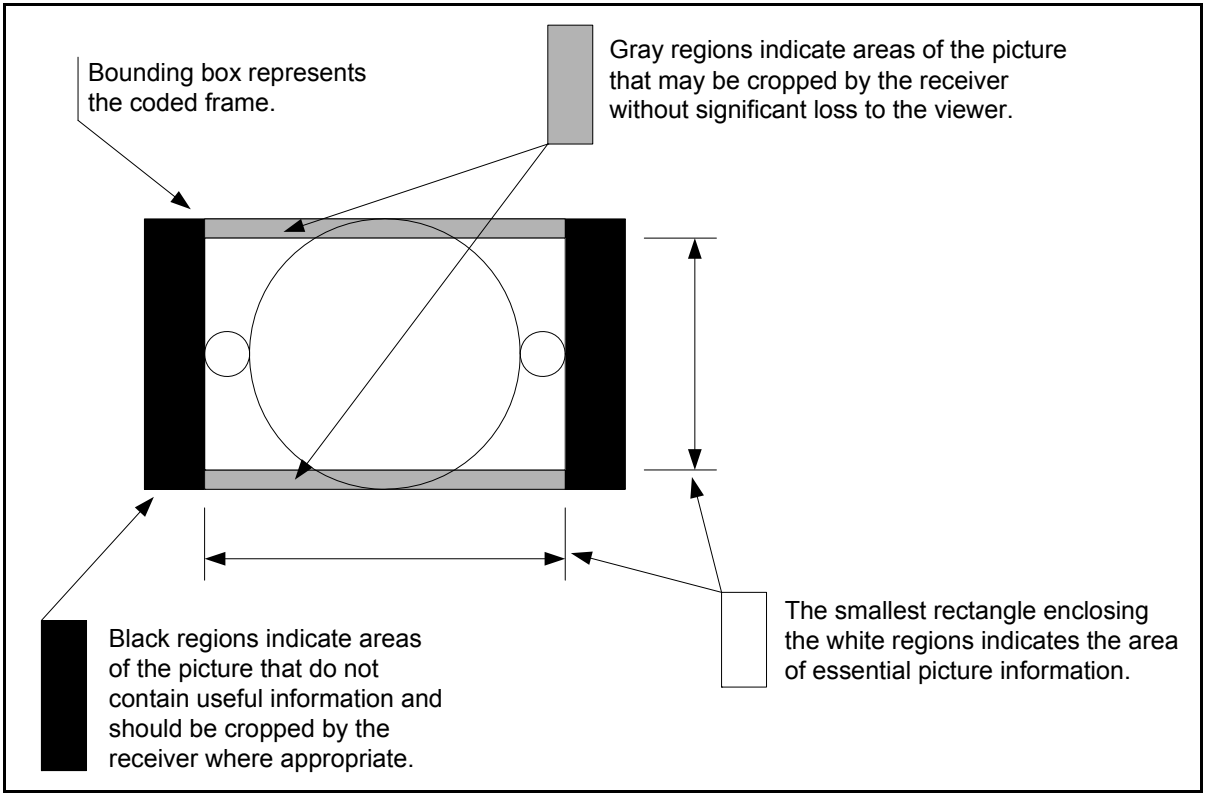


Figure 3-6. Explanation of AFD Diagrams

AFD 4:3 code and description

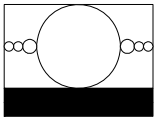
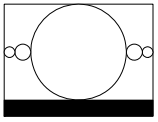
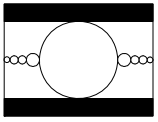
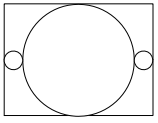
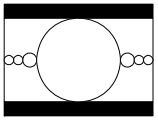
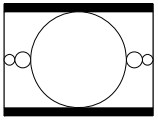
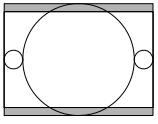
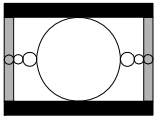
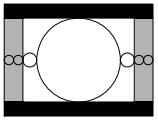
WSS name	AFD and VI Select parameter options	Illustration in a 4:3 coded frame	Description
16:9 Top	16:9 Top		Image with a 16:9 aspect ratio as letterbox at the top of a 4:3 coded frame
14:9 Top	14:9 Top		Image with a 14:9 aspect ratio as letterbox at the top of a 4:3 coded frame
>16:9	>16:9 in 4:3		Image with aspect ratio greater than 16:9 as a vertically centered letterbox in a 4:3 coded frame
Full Frame	4:3 Full		Image is full frame, with an aspect ratio that is the same as the 4:3 coded frame
16:9 Center	16:9 L		Image with a 16:9 aspect ratio as a vertically centered letterbox in a 4:3 coded frame
14:9 Center	14:9 L		Image with 14:9 aspect ratio as a vertically centered letterbox in a 4:3 coded frame
Full A 14:9	4:3 A 14:9		Image with a 4:3 aspect ratio and with an alternative 14:9 center in a 4:3 coded frame
None	16:9 L A 14:9		Image with a 16:9 aspect ratio and with an alternative 14:9 center as a vertically centered letterbox in a 4:3 coded frame
None	16:9 L A 4:3		Image with a 16:9 aspect ratio and with an alternative 4:3 center as a vertically centered letterbox in a 4:3 coded frame

Figure 3-7. Available AFD Select Options when OutAspectRatio is Set to 4:3

AFD 16:9 code and description

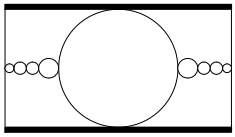
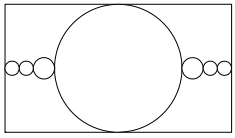
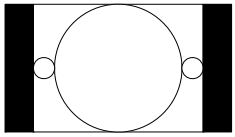
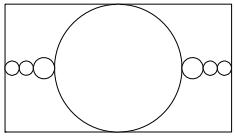
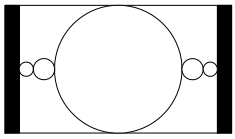
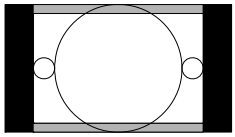
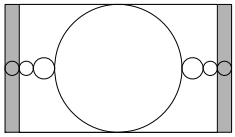
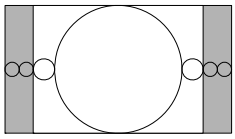
WSS name	AFD and VI Select parameter options	Illustration in a 16:9 coded frame	Description
None	>16:9 in 16:9 AFD Code: 0100		Image with aspect ratio greater than 16:9 as a vertically centered letterbox in a 16:9 coded frame
Anamorphic	16:9 Full AFD Code: 1000		Image is full frame, with an aspect ratio that is the same as the 16:9 coded frame
None	4:3 P AFD Code: 1001		Image with a 4:3 aspect ratio as a horizontally centered pillarbox image in a 16:9 coded frame
None	16:9 Prtctd AFD Code: 1010		Image is full frame, with a 16:9 aspect ratio and with all image areas protected
None	14:9 P AFD Code: 1011		Image with a 14:9 aspect ratio as a horizontally centered pillarbox image in a 16:9 coded frame
None	4:3 P A 14:9 AFD Code: 1101		Image with a 4:3 aspect ratio and with an alternative 14:9 center as a horizontally centered pillarbox image in a 16:9 coded frame
None	16:9 A 14:9 AFD Code: 1110		Image with a 16:9 aspect ratio and with an alternative 14:9 center in a 16:9 coded frame
None	16:9 A 4:3 AFD Code: 1111		Image with a 16:9 aspect ratio and with an alternative 4:3 center in a 16:9 coded frame

Figure 3-8. Available AFD Select Options when OutAspectRatio is Set to 16:9

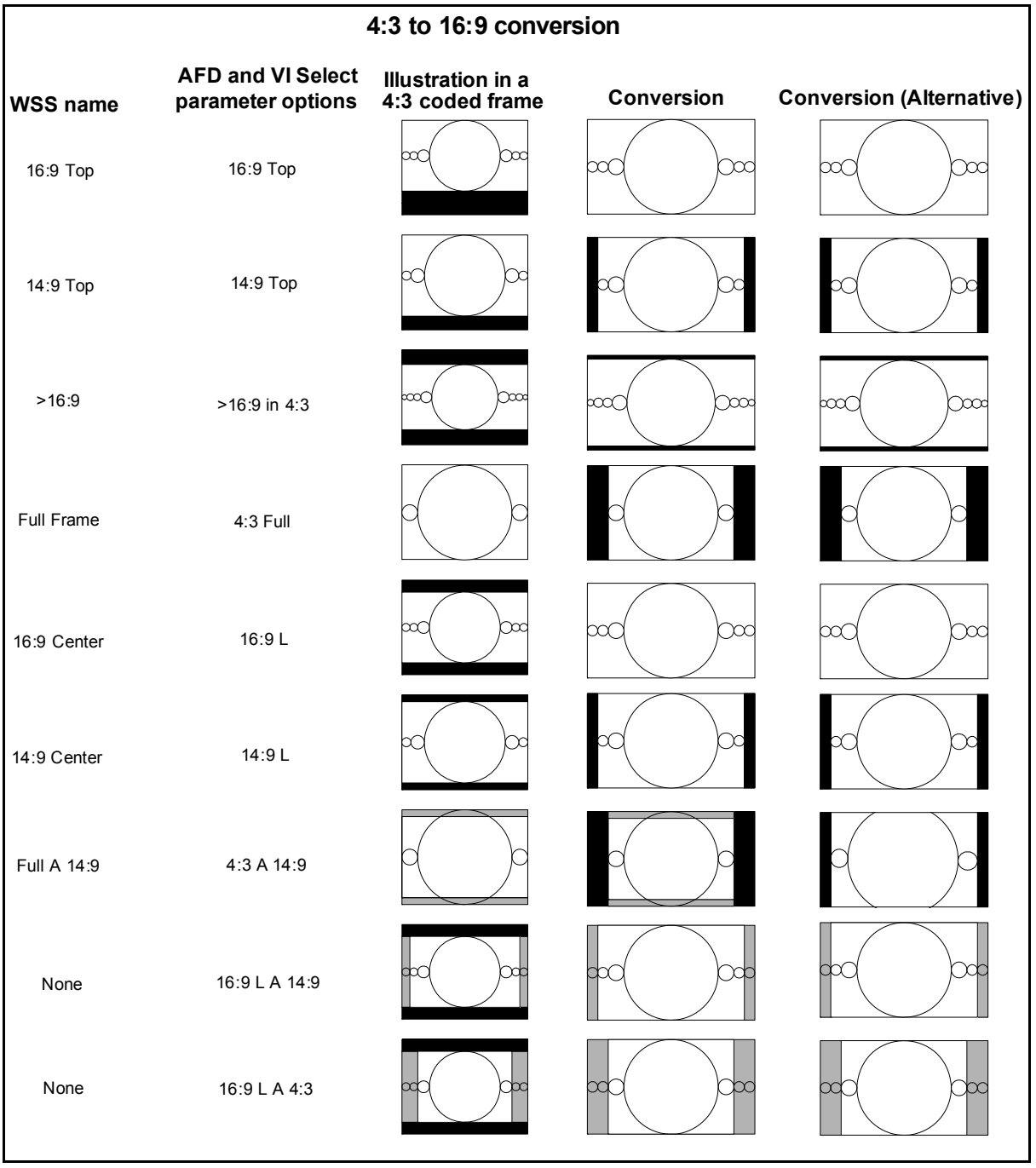


Figure 3-9. Available AFD Select, VI Select, and WSS Select Options When Converting from 4:3 to 16:9

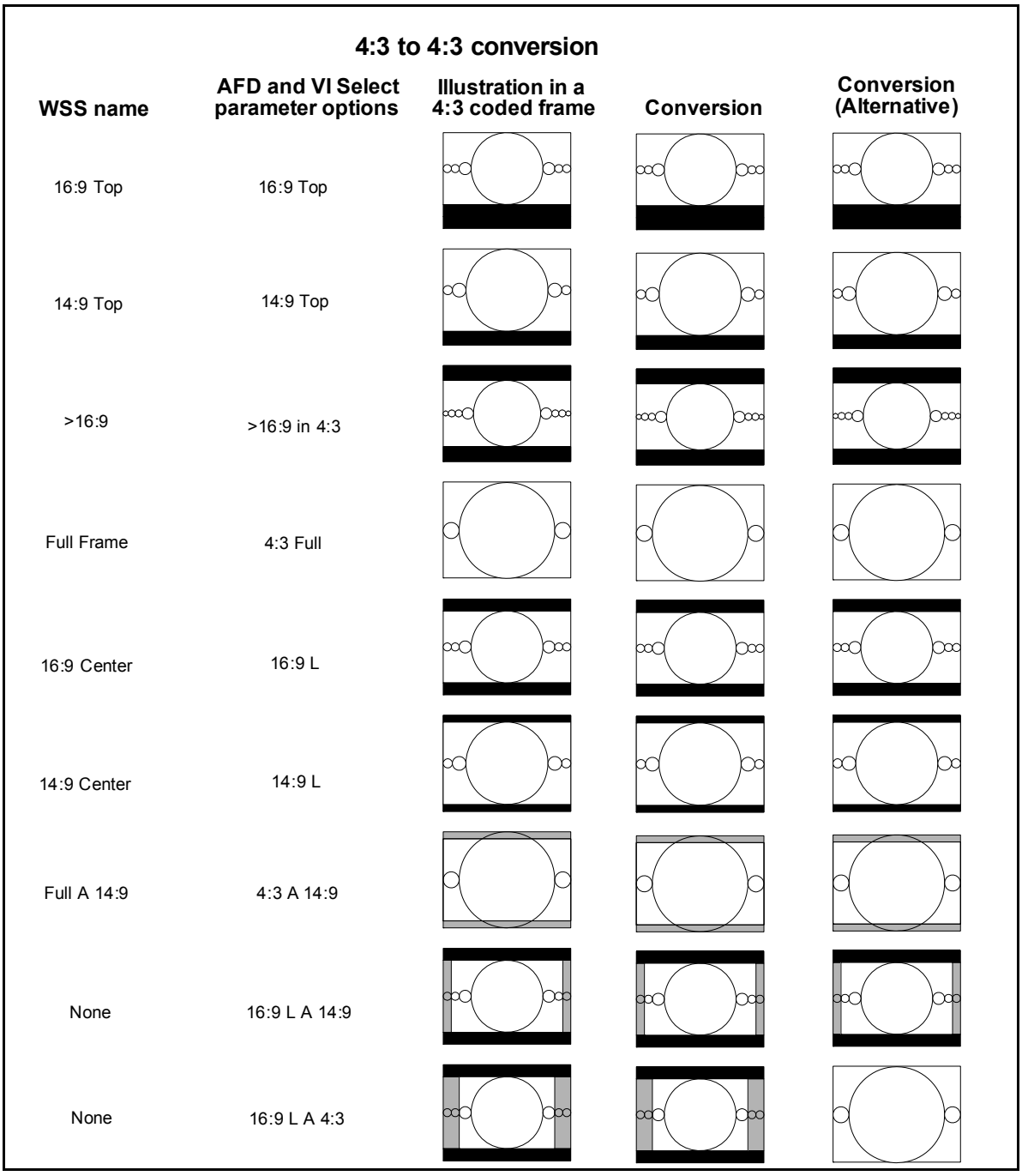


Figure 3-10. Available AFD Select, VI Select, and WSS Select Options When Converting from 4:3 to 4:3

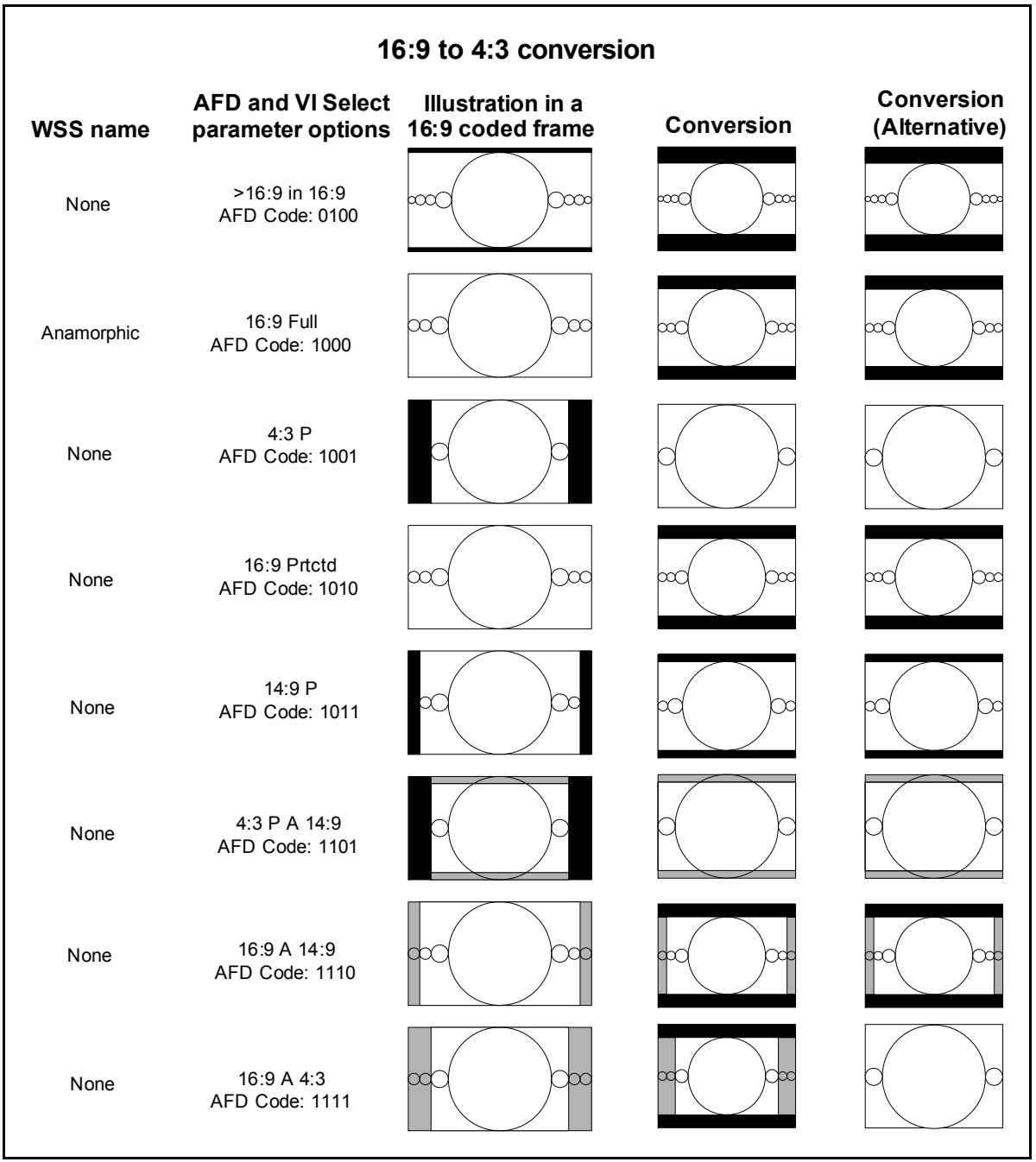


Figure 3-11. Available AFD Select, VI Select, and WSS Select Options When Converting from 16:9 to 4:3

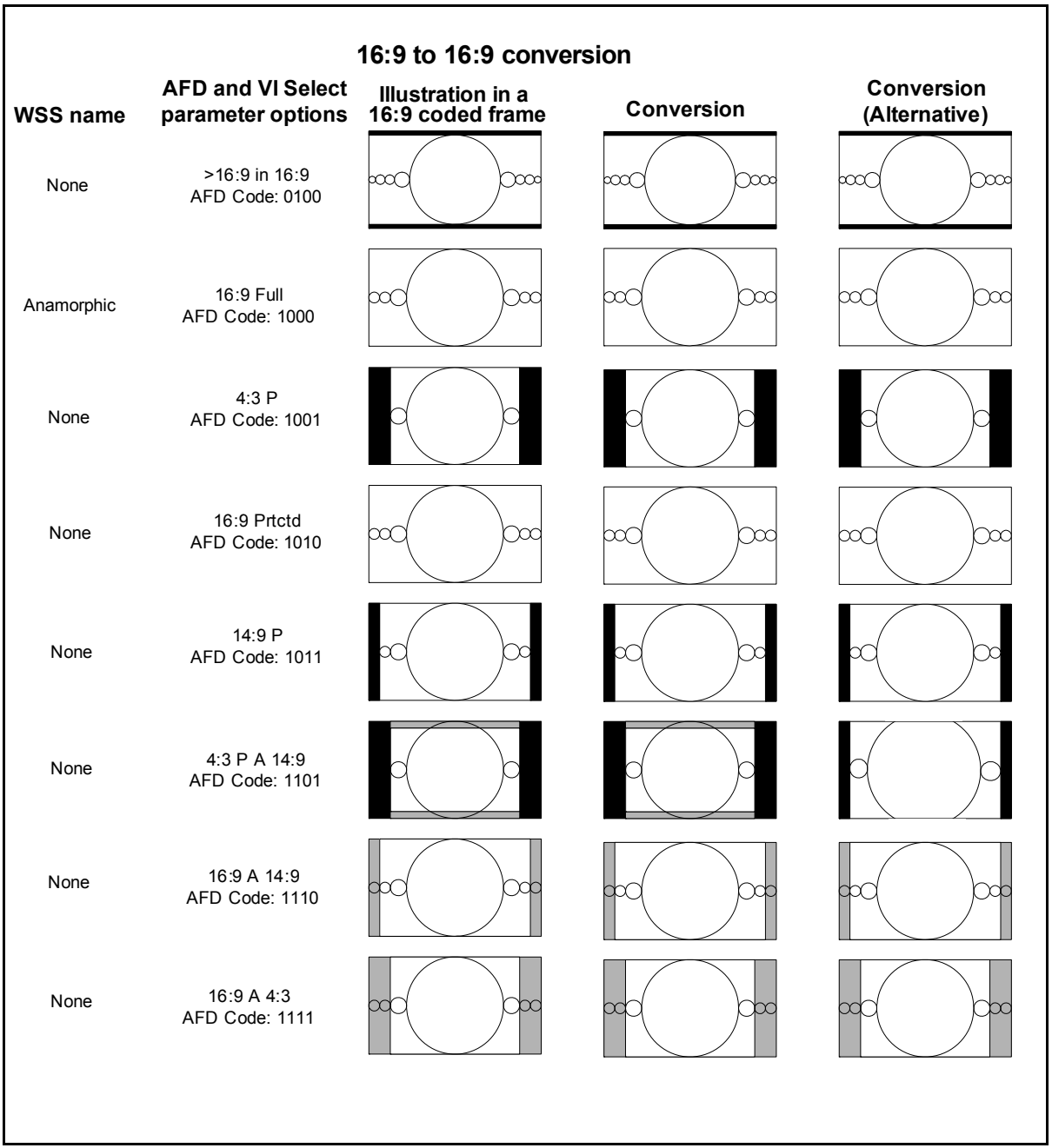


Figure 3-12. Available AFD Select, VI Select, and WSS Select Options from 16:9 to 16:9

Closed Captioning and DVB Teletext Captioning

Although North America has dedicated standards for closed captioning of video (EIA-608 and 708), many countries in Europe and elsewhere have not yet adopted formal standards. For these countries, closed captioning is part of the DVB Teletext System as described in ITU-R BT-653-3. These specifications define all Teletext Systems (Systems A, B, C, D) used in the world and are also known as the World System Teletext (WST). A Teletext system is made of several pages of various data information and CC data is described in one these pages. System B is used in Australia, the UK, and Germany, among other countries.

Australian closed captions are inserted on line 21/334 in analog PAL broadcast signals, as per the ITU-R BT-653-3. When analog PAL is produced or converted to SDTV (625 digital), a digitized version of the closed captioning appears on line 21/334 (in the same way line 21 on NTSC signals is digitized and appears on the line 21 of SD-SDI signals). The ITU-R BT-653-3 document proposed by Free TV Australia indicates how to carry this CC data into the VANC area of SD-and HD-SDI signals by use of the SMPTE 334M VANC embedding protocol. For digital broadcasting, Australia intends to use the ETSI EN 300 472 standard that specifies the conveyance of ITU-R System B Teletext in DVB bit streams.

Setting Closed Captioning and Teletext

To make changes to the default CC and Teletext settings, use the **Closed Captioning/Teletext Embed** and **Closed Captioning/Teletext Embed Line** parameters from the path **Video > Output > Embedder** path.

To verify the presence of the embedded CC, use the **Input Closed Captioning/Teletext Present** parameter (**Video > Input > De-embedder** path).

If you have purchased and enabled the XHD6801✚ closed captioning feature, you can use the closed captioning parameters to enable and select the video line in which you want to embed closed captioning data. Contact your product sales representative for information about obtaining a closed captioning license key. If you have already purchased a license key, but have not yet enabled the feature, see “Entering License Keys” on page 36.

Audio Configuration

XHD6801✚ modules process embedded audio. The input embedded audio from SDI 1 is demultiplexed (de-embedded) and synchronized to the video, delayed to match the video processing delay, processed, and then remultiplexed (re-embedded) into HD- and SD-SDI video output. Up to four groups of audio can be embedded into the video stream.

Audio Controls

XHD6801✚ modules can route audio from one of several sources to the outgoing SDI signal (up to 8 channel pairs can be embedded).

The modules are capable of demultiplexing up to four groups of embedded audio from the primary video SDI stream, and embedding up to four groups into the output SDI stream. XHD6801✚ modules can select up to eight channel pairs of embedded audio.

The **Demux Group Present** and **Demux Channel Pairs Present** parameters (**Audio > Input > Status > Demux Group Present** and **Demux Channel Pairs Present**) indicate which groups and channel pairs have audio present in the video inputs.

See page 55 for more information about audio status parameters.

Audio Routing

Input

To manually configure the audio inputs, you will need to select options in the **Audio > Input > Routing** section. Set your options in the **SRC1** to **SRC8 Input Select** parameters.

The default settings for the inputs follow this pattern:

- SRC1 Input Select = SDI 1 Group 1 Channel 1/2
- SRC2 Input Select = SDI 1 Group 1 Channel 3/4
- SRC3 Input Select = SDI 1 Group 2 Channel 1/2
- SRC4 Input Select = SDI 1 Group 2 Channel 3/4, etc.

Output

To manually configure the output of the audio, select **Enable** in **Mux Group 1 Enable** to **Mux Group 4 Enable.** (This is found at **Audio > Output > Embedder > Mux Group 1 Enable** to **Mux Group 4 Enable.**)

Then set your options in the **Routing** section **(Audio > Output > Routing > Mux Group *x* Channel *x*)**.

The default audio routing settings follow this pattern:

- Mux Group 1 Channel 1 = SRC 1A
- Mux Group 1 Channel 2 = SRC 1B
- Mux Group 2 Channel 1 = SRC 2A
- Mux Group 2 Channel 2 = SRC 2B, etc.

In addition to selecting audio sources from the video groups, four custom tone generators are available, as well as **Mute** and **SMPTE RP155** and **EBU R68** tones. To set the four custom tones, follow the path to **Audio > Other > Tones > Tone Generators 1** to **4 Level**.

Audio Proc Amp

Gain, bypass, and delay controls are available for the left and right side of each of the processed audio channels. You can individually adjust the gain and delay of the left and right sides of each channel using the control parameters in the **Gain** and **Delay** sections (**Audio > Processing > Gain** or **Delay**).

The audio can contain non-PCM audio data (in other words, it is indicated by **bit 1** of channel status bits being set for **Non-Audio** instead of **Audio** as shown on page 90). In this case, the sample rate converter must be bypassed to ensure audio integrity. You must individually indicate which sample rate converter or gain to bypass using the **SRCx Gain/Bypass** parameters (**Audio > Input > Bypass > SRC*x* Gain/Bypass**). Select **Manual** in the **SRC/Gain Bypass Mode** to enable these individual controls.

If you set **SRC/Gain Bypass Mode** to **Auto**, the audio will be monitored, and if non-PCM audio data is detected, the sample rate converter for that side of the channel will be bypassed.

In addition to the mute controls that control audio pairs individually, a **Master Mute** control mutes all of the audio channel pairs (**Audio > Processing > Gain > Master Mute**). Also, if the audio source for either side of a given audio channel does not have any incoming audio, the signal will be automatically muted.

Audio Status Parameters

The read-only **Demux Group Present** parameter (in the **Audio > Input > Status** path) indicates which groups are present in the video input (see Figure 3-13). The "=" indicates no audio is detected for a particular group, while the letter **P** indicates the presence of audio. For example, "= P= =" means the XHD6801✚ detects audio in Group 2, but no audio is detected in the other three groups.

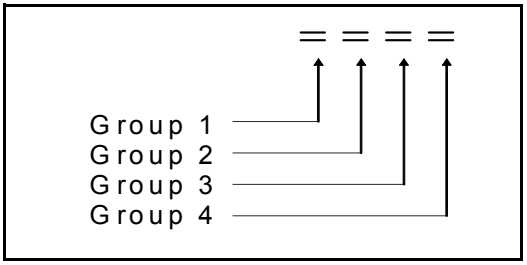


Figure 3-13. Demux Group Present and Demux Group Error

The **Demux Group Error** parameter (also in the **Audio > Input > Status** path) displays errors in the same way. In a string of "=" signs, the letter **E** indicates an error for that audio group.

Demux Channel Pair Present displays the eight channel pairs, with the letter **P** indicating audio presence (see Figure 3-14).

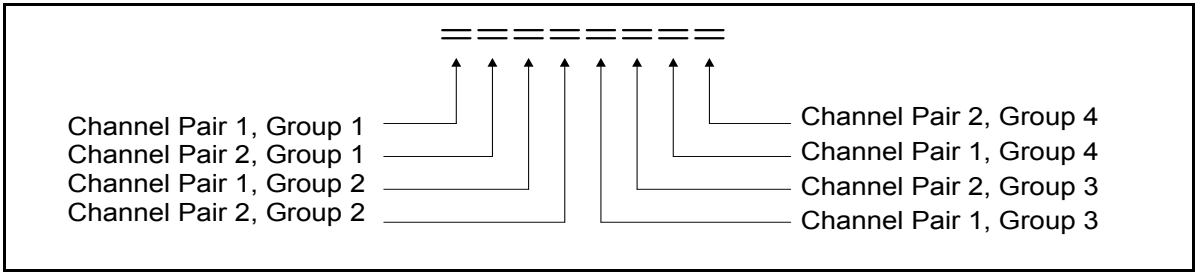


Figure 3-14. Demux Channel Pair Present/Type

Demux Channel Pair Type displays the eight channel pairs, with the letter **A** indicating PCM audio, and the letter **D** indicating non-PCM (data).

GPI

The XHD6801✚ modules provide four GPI inputs and two GPI outputs for automation. These are open collector style inputs with approximately 10 KΩ pull-ups to +5V. This means that you can use "contact closure-to-ground" switches to control these GPI inputs.

The GPI actions are controlled by these parameters (in the **Video > Other > GPI** path):

- GPI In Trigger 1 to 4
- GPI In Event 1 to 4
- GPI Status
- GPI Out State 1 and 2
- GPI Out Event 1 and 2
- GPO Status

All GPI events occur in the order they are triggered and will override older events. For example, if the three GPI events are set up as follows, the resulting ARC setting will appear as shown in Figure 3-15.

- GPI Trigger 1 = Rising Edge, GPI Event1 = 16:9 Anamorphic
- GPI Trigger 2 = Falling Edge, GPI Event2 = Preset 3
- GPI Trigger 3 = Rising Edge, GPI Event3 = Pixel True
- ARC Preset = 4:3

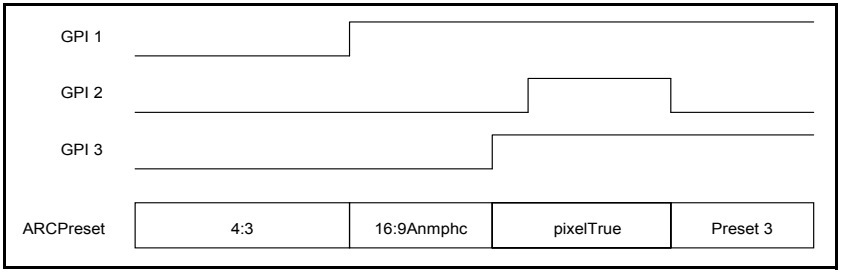


Figure 3-15. Processing of Multiple GPI Events

Video Keying

The video keying feature is activated by following the **Video > Output > Config > Video Keying** path. When enabled, the key image appears on the **SDI Program/Monitor Out** feed. The **On Screen Display** feature (**Video > Output > Config > On Screen Display)** also appears on the **SDI Program/Monitor Out** feed when it is enabled.

Chapter 4

Parameters, LEDs, and Alarms

Overview

This chapter describes the parameters, LEDs and alarms used on the XHD6801✚.

The following topics are covered:

Control Parameters

Table 4-1 on page 63 lists all of the available parameters and options for the XHD6801✚ modules. The parameters are listed in the order that they appear in CCS Pilot and Navigator. If you are using ✚ Pilot Lite, some parameters in the list may not appear in the order as they appear in the software. Also, because of space limitations, some rarely-used parameters will not appear in the OSD list.

On Screen Display Monitoring

If you are using card-edge controls to configure your XHD6801✚ module, you can use the OSD Monitoring feature to view the current parameter selections. When the **On-Screen Display** parameter is turned on, the current parameter selections are displayed on module's monitoring outputs. For information on enabling OSD Monitoring, see "Enabling On-Screen Display" on page 35.

Parameter Table Notes

When viewing the control parameter tables, observe the following:

- Shaded table rows indicate read-only (feedback) parameters.
- Bolded parameter options indicate the default settings for the parameter.
- The bank selection and rotary switch combinations for each parameter and parameter option are listed in the tables under the **Bank, Switch** heading. For information about navigating through the parameter list using the card-edge controls, see "Changing Parameter Settings Using Card-Edge Controls" on page 33.
- Parentheses indicate a series of parameters, usually sequentially numbered.

INSERT
OSD TABLE
HERE

INSERT
OSD TABLE
HERE

Table 4-2. Simplified Parameter List

Level One	Level Two	Level Three	Level Four
Video	Active Bypass is Valid		
	Input	SDI 1 Input Standard Set	
		Status	SDI 1 In Standard
			SDI 1 Standard Mismatch
		CRC/EDH	SDI 1 CRC/EDH Error Count
			SDI 1 EDH Present
			Error Poll Interval
			SDI 1 Error Counter Reset
		De-embedder	AFD Present
			VI Scan Present
			VI AFD Present
			VI Detect Line Fields (1 and 2)
			WSS Present
			WSS Detect Line
			Input CC/TT Present
			CC/TT Error Control
	Output	Output Video Standard Select	
		Global Frame Rate	
		Scalar Bypass	
		DA Output Select	
		Primary LOV Mode	
		Configuration	On Screen Display
			OSD Transparency Level
			Test Pattern Display
			Test Pattern Select

Table 4-2. Simplified Parameter List

Level One	Level Two	Level Three	Level Four
Video (cont'd)	Output (cont'd)	Configuration (cont'd)	Safe Area Graticles
			Video Keying
			Background Color
		Embedder	AFD Control
			AFD Embed Line
			AFD Select
			VI Control
			VI Embed Line
			VI Select
			SD Out VI with AFD
			WSS Control
			WSS Embed Line
			WSS Select
			CC/TT Embed
			CC/TT Embed Line
	Processing	Synchronizer	Input Frame Delay
			DA: Channel: Vertical Phase
			DA: Channel: Horizontal Phase
			Program Channel: Vertical Phase
			Program Channel: Horizontal Phase
			Force Freeze
			Video Frozen
		ARC	ARC Mode Feedback
			ARC Preset Up
			ARC Preset Cross
			ARC Preset Down
			ARC Preset SD-ARC

Table 4-2. Simplified Parameter List

Level One	Level Two	Level Three	Level Four
Video (cont'd)	Processing (cont'd)	ARC (cont'd)	ARC Preset Save
			ARC Preset Recall
			Horizontal Offset
			Vertical Offset
			Horizontal Scale
			Vertical Scale
			ARC Horizontal Offset Feedback
			ARC Vertical Offset Feedback
			ARC Horizontal Scale Feedback
			ARC Vertical Scale Feedback
			Overscan Up
			Overscan Cross
			Overscan Down
			Overscan SD-ARC
			Out Aspect Ratio
			Auto ARC Reset
		Video Processing	Proc Amp Enable
			Luma Gain
			Chroma Gain
			Black Level
			Chroma Offset
			Hue Phase
			Black Clip Enable
			Black Clip Level
			White Clip Enable
			White Clip Level
			Horizontal Bandwidth
			Vertical Bandwidth

Table 4-2. Simplified Parameter List

Level One	Level Two	Level Three	Level Four
Video (cont'd)	Processing (cont'd)	Video Processing	Noise Reduction
			Block Artifact Noise Reduction
			Mosquito Noise Reduction
			Detail Enhance Level
			Detail Enhance Threshold
Audio	Input	Demux Error Control	
		Status	Demux Group Present
			Demux Error
			Demux Channel Pair Status
		Channel Swap	Demux Group 1 Channels 1 and 2 Swap
			Demux Group 1 Channels 3 and 4 Swap
			Demux Group 2 Channels 1 and 2 Swap
			Demux Group 2 Channels 3 and 4 Swap
			Demux Group 3 Channels 1 and 2 Swap
			Demux Group 3 Channels 3 and 4 Swap
			Demux Group 4 Channels 1 and 2 Swap
			Demux Group 4 Channels 3 and 4 Swap
		Routing	Sample Rate Converter (1 to 8) Input Select
		Bypass	Sample Rate Converter/Gain Bypass Mode
			Sample Rate Converter 1 to 8 Bypass Feedback
			Sample Rate Converter (1 to 8) Gain Bypass
	Output	Embedder	Mux Group Error
			SD Embed 24-bits Enable
			Mux Group (1to 4) Enable

Table 4-2. Simplified Parameter List

Level One	Level Two	Level Three	Level Four
Audio (cont'd)	Output (cont'd)	Routing	Mux Group 1 Channel (1 to 4)
			Mux Group 2 Channel (1 to 4)
			Mux Group 3 Channel (1 to 4)
			Mux Group 4 Channel (1 to 4)
	Processing	Audio Control Style	
		Audio Type	Audio Type (1 to 16 or Ch. 1 to 8, L to R)
		Gain	Master Mute
			V-bit Mute Enable
			Gain Lock
			Gain (1 to 16 or Ch. 1 to 8, L to R)
		Delay	Delay Lock
			Delay (1 to 16 or Ch. 1 to 8, L to R)
		Phase Invert	Invert (1 to 16 or Ch. 1 to 8, L to R)
	Other	Fade Time	
		I/O Delay Config	I/O Delay Sample Rate Converter (1 to 8)
		Other	Tones (ToneGen [1 to 4] Level)
Reference	Reference Standard		
	Valid Reference Std.		
	Reference Locked		
	Reference Source		
Other	License Key		
	License Key Status		
	Serial Number		
	Firmware Version		
	Firmware Date		
	Firmware Time		
	Options		
	Factory Default		

Table 4-2. Simplified Parameter List

Level One	Level Two	Level Three	Level Four
Other (cont'd)	GPI	GPI In Trigger (1 to 4)	
		GPI In Event (1to 4)	
		GPI Status	
		GPI Out State (1 to 2)	
		GPI Out Event (1to 2)	
		GPO Status	

LEDs and Alarms

Monitoring LEDs

The XHD6801✚ have monitoring LEDs that serve as a quick monitoring reference. Figure 4-1 shows the location of the monitoring LEDs on a typical 6800✚ module. Table 4-2 on page 70 describes the meaning of the card-edge LEDs, from left to right.

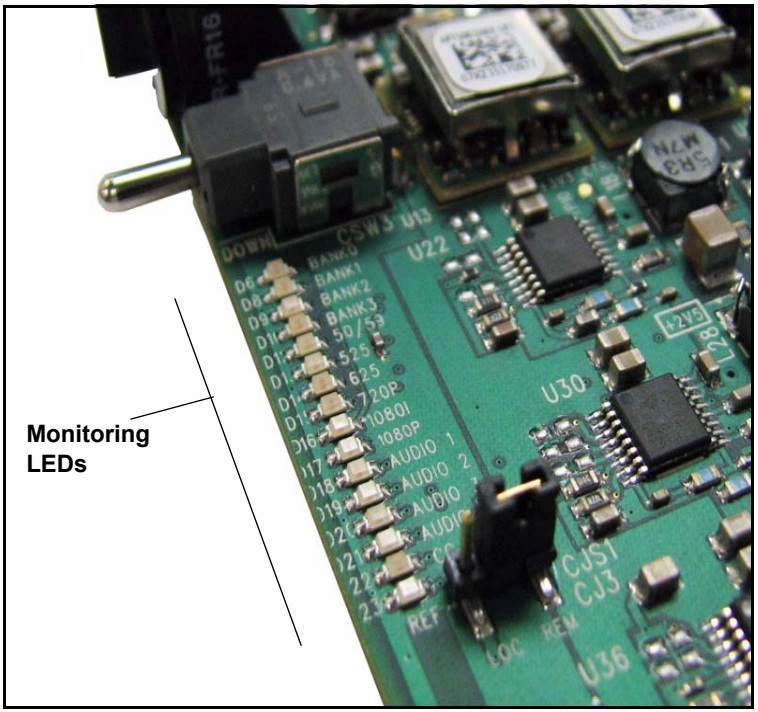


Figure 4-1. Location of XHD6801✚ LEDs

Module Status LEDs

Table 4-3. LED Status Indicators

LED	Description	Color Indication
50-59	Indicates the frame rate for the input video standard	• Green: 59 • Off: 50
525	Indicates the input standard is 525	Green: 525 input standard is detected
625	Indicates the input standard is 625	Green: 625 input standard is detected
720p	Indicates the input standard is 720p	Green: 720p input standard is detected
1080i	Indicates the input standard is 1080i	Green: 1080i input standard is detected
1080p	Indicates the input standard is 1080p	Green: 1080p input standard is detected
Audio1	Reports the presence of audio group 1 in the input video stream	Green: Group 1 audio is present
Audio2	Reports the presence of audio group 2 in the input video stream	Green: Group 2 audio is present
Audio3	Reports the presence of audio group 3 in the input video stream	Green: Group 3 audio is present
Audio4	Reports the presence of audio group 4 in the input video stream	Green: Group 4 audio is present
CC	Indicates the presence of closed captioning	Green: Closed captioning data is present
Reference	Indicates the presence of a valid reference signal	Green: Valid signal is present

The XHD6801✚ modules do not have any card-edge alarms. Instead, the module status LED on the corner of the module lights up if an error is detected. See Figure 1-1 on page 6 for the location of this LED, and Table 4-3 for a definition of the LED colors.

Alarms are usually logged and monitored within software control applications such as ✚ PilotLite or CCS Pilot. See the appropriate software control user manual or online help for more information.

Table 4-4. LED Color and Meaning

LED Color Sequence	Meaning
Off	There is no power to the module; the module is not operational.
Green	There is power to the module; the module is operating properly.
Red	There is an alarm condition.
Flashing Red	The module has detected a hardware/firmware fault.
Amber	The module is undergoing configuration.

Note

If the LED is flashing red, please contact your Customer Service representative.

Alarms

Table 4-4 describes the specific alarms for XHD6801✚ modules. You can only identify specific alarms using a software control application.

Table 4-5. XHD6801✚ Alarms

Alarm Name	Alarm Meaning	Alarm Level
SDI 1 Std Mismatch	There is a mismatch between reference video and video standard	Major
SDI 1 Loss of Video	The module detects a loss of video at the SDI 1 input	Major
Processing Bypass Active	The Scalar Bypass switch (Video > Output > Scalar Bypass) is turned on.	Minor
Reference Not Locked	Loss of locked reference	Major
Teletext Parity Error	The teletext input has a parity error	Minor
Teletext Frame Error	The teletext input has a frame error.	Minor
Master Mute On	The master audio mute is enabled.	Minor
PCM Vbit Mute On	The PCM outputs are automatically muted when the V-bit is set.	Minor

Chapter 5

Specifications

Overview

The following specification tables appear in this chapter:

Specifications and designs are subject to change without notice.

Inputs

SD/HD-SDI Video

Table 5-1. SD/HD-SDI Video Input Specifications

Item	HD-SDI Specification	SD-SDI Specification
Number of inputs	1	
Standards	SMPTE 292M (1.485, 1,485/1.001 Gbps)	SMPTE 259M-C 270 Mbps, 525/625 component video
Frame rate	• 1080i: 50, 59.94 Hz • 720p: 50, 59.94 Hz	• 486i: 59.94 Hz • 576i: 50 Hz
Connector	BNC per IEC 169-8	BNC per IEC 169-8
Impedance	75Ω	75Ω
Return loss	>15 dB (typical) from 5 MHz to 1485 MHz	>15 dB (typical) from 5 MHz to 270 MHz
Equalization	Adaptive cable equalization for up to 328 ft (100 m) (typical) of Belden 1694A coaxial cable at 1.485 Gbps	Adaptive cable equalization for up to 700 ft (230 m) (typical) of Belden 8281 co-axial cable

Genlock

Table 5-2. Genlock Input Specifications

Item	Specification
Connector	BNC per IEC 169-8
Impedance	75Ω
Return loss	> 40 dB 25 Hz to 30 MHz (SMPTE 318M-1999)
Common mode range	• 5.5 V pk-to-pk
Input level	• NTSC/PAL-B (1 V pk-to-pk, -4.5 dB to 6.0 dB) • ± 300 mV, -4.5 dB to 6.0 dB for Tri-Level Sync •1080i: 59.94/50 •1080p: 29.97/25
Locking range	± 6 ppm (sync lock only, no burst lock)
Signal type	• NTSC/PAL-B analog composite • ± 300 mV Tri-Level Sync (1080i/720p)
Standard	SMPTE 170M (NTSC), ITU-R BT.470-6 (PAL-B), SMPTE 274M (1080i, 1080p)

Outputs

SDI Video Outputs

Table 5-3. SD/HD-SDI Reclocked Output Specifications

Item	HD-SDI Specification	SD-SDI Specification
Number of outputs	8	
Standards	SMPTE 292M (1.485, 1.485/1.001 Gbps)	SMPTE 259M-C (270 Mbps, 525/625 component video)
Connector	BNC per IEC 169-8	BNC per IEC 169-8
Impedance	75Ω	75Ω
Return loss	>15 dB (typical) from 5 MHz to 1485 MHz	>15 dB (typical) from 5 MHz to 270 MHz
DC offset	0.0 V ± 0.5 V	0.0 V ± 0.5 V
Signal level	800 mV ± 10%	800 mV ± 10%
Rise and fall time	<270 ps (20% to 80%)	400 to 1500 ps (20% to 80%)
Overshoot	<10% of amplitude (all outputs terminated)	<10% of amplitude (all outputs terminated)
Jitter	• Timing <1 UI pk-to-pk • Alignment <0.2 UI pk-to-pk	<0.2 UI pk-to-pk

Miscellaneous

Audio Delay (Data Out)

Table 5-4. Audio Delay Specifications

Item	Specification
Number of outputs	1
Connector	BNC per IEC 169-8
Impedance	75Ω
Return loss	>20 dB (typical) to 6 MHz

Performance

Table 5-5. Audio Delay Specifications

Item	Specification
Power consumption	17.5 W
Operating temperature	41° to 113°F (5° to 45°C)

Appendix A

Communication and Control Troubleshooting Tips

Overview

Find the following troubleshooting information in this appendix:

Software Communication Problems

The frame is powered up, but the module does not communicate with ✚ Pilot Lite or CCS Pilot/Navigator.

Solutions

- Ensure you have specified the proper module slot.

  See your *FR6802✚ Frame Installation and Operation Manual* for more information about slot identification.

- Verify whether there is an ICE6800✚ or 6800✚ETH module installed in the frame.
  - FR6802✚ frames only use ICE6800✚ modules to communicate with CCS software and hardware.
  - FR6802✚QXF frames use ICE6800✚ or 6800✚ETH modules to communicate with CCS software and hardware.
- Remove any legacy 6800 series product that is in the frame.

  ✚ Pilot Lite and CCS software cannot communicate with legacy 6800 series products, even though these modules may operate with card-edge controls in an FR6802✚ frame. Legacy 6800 products do not have the "✚" symbol on their extractor handles.
- Check for bent pins on the back module by following this procedure:
  a. Unplug the front module.
  b. Unscrew and remove the back module.
  c. Inspect the 20- or 30-pin spring connector at the bottom of the back module (Figure 6-1 on page 81), and verify that the connector does not have any slightly bent or pressed pins.
  d. Carefully reposition any bent pins; If this is not possible, contact Customer Support.

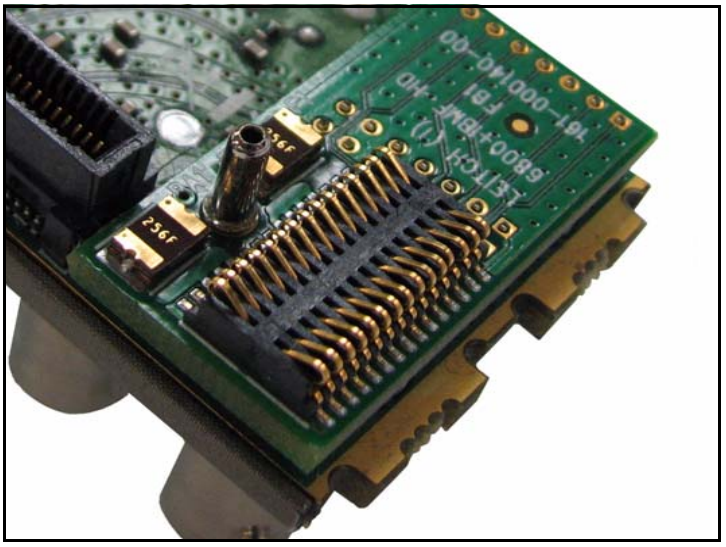


Figure 6-1. Typical Back Module Spring Connector

The frame is powered up, but ✚ Pilot Lite does not communicate with the module.

Solutions

- Ensure you have installed the correct cables between the PC and the frame:
  - A *null modem* serial cable must be used between a PC and an FR6802✚ frame (not a straight-through cable). At minimum, this requires that pins **2** and **3** are crossed, but pin **5** (ground) is straight-through to pin **5**.
  - A USB cable must be used between a PC and an FR6802✚QXF frame.
- Verify whether there is an ICE6800✚ or 6800✚ETH module installed in the frame.
  - ✚ Pilot Lite control is disabled if an ICE6800✚ or 6800✚ETH control module is installed in the frame.
- Set the **Frame ID** DIP switch settings correctly (the **Frame ID** DIP switch is located at the rear of the frame.)
  - If only one frame is connected, set the DIP switch to **00**.
  - If multiple frames are used in a daisy-chain, set the DIP switch numbers consecutively to the following:

- **00** (frame 1)
- **01** (frame 2)
- **10** (frame 3
- **11** (frame 4)

See your *FR6802✚ Frame Installation and Operation Manual* for more information about frame ID switch settings.

- Check that the correct COM port is configured in ✚ Pilot Lite and that another application is not using that COM port.

✚ Pilot Lite and CCS software see the frame, but do not find all of the modules

Solutions

- Remove any legacy 6800 series products.
- Plug your modules in before starting the discovery.
- Start your discovery after the frame and all modules have fully powered up.
- Refresh ✚ Pilot Lite (**File** > **Refresh**), and ensure that the installed modules are fully powered up first before discovery.

✚ Pilot Lite and CCS Pilot/Navigator do not respond after they have been launched.

Solution

Close either ✚ Pilot Lite or CCS Pilot/Navigator. Both programs cannot be running at the same time on the same PC.

✚ Pilot Lite and CCS software show a module in the control window, but cannot control it.

Solution

1. Set the module's Local/Remote jumper to **Remote.**
2. Ensure the module name in the Control window matches the module type in the frame.
3. Gently push the module into its slot in the frame to ensure it is seated properly and powered up.
4. Verify that the Control window indicates the device is ready.

Hardware Communication Problems

After a power failure, the frames and PC do not communicate.

Solution

1. Wait four minutes for the frames to recover from the power failure.
2. Close the ✚ Pilot Lite or CCS software, and then restart the PC.
3. Restart the software application.

The module does not seem to work.

Solutions

- Ensure the correct frame is powered up.
- Verify that all appropriate rear connections are secure.
- Gently push the module into its slot in the frame to ensure it is seated properly.
- Ensure the back module does not have bent pins by following this procedure:
    a. Unplug the front module.
    b. Unscrew and remove the back module.
    c. Inspect the spring connector at the bottom of the back module (Figure 6-1), and verify the connector does not have any slightly bent or pressed pins.
    d. Carefully reposition any bent pins; if this is not possible, contact Customer Support.

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Customer Service Support
+1 888 534 8246
BCDService@harris.com

Broadcast Communications Division
4393 Digital Way | Mason, OH USA 45040 | Tel: 1 (513) 459 3400
www.broadcast.harris.com