

# FS4

## Quick Start Guide



### Overview

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FS4 is AJA's flagship frame synchronizer and converter, offering incredible versatility and connectivity in a sleek and compact 1RU frame for all your 4K/UltraHD/2K/HD/SD conversion needs. Offering huge flexibility and the power to adapt to meet the needs of rapidly changing environments, FS4 offers two modes to deal with your 2K/HD/SD multichannel needs as well as your 4K/UltraHD pipelines.

In Four Channel Mode, FS4 can be used as four separate Frame Synchronizers/Format Converters for 2K/HD/SD projects with separate color correction and proc amp controls for each.

In Single Channel Mode you can handle a complete 4K/UltraHD/2K/HD/SD feature set including up, down, cross-conversion, 2SI compatibility and unparalleled video connectivity with I/O options for 4K/UltraHD including Quad 1.5Gb, Dual 3Gb, Quad 3Gb and 6Gb, 12Gb over optional SFP modules.

FS4's extensive digital video connectivity is only matched by its expansive digital audio flexibility. The growth of 5.1 and 7.1 audio has increased the number of audio channels that must be managed in a production as well as needing to create stereo mixdowns from 5.1 and 7.1 sources. The MADI standard provides a convenient way to transport large numbers of audio channels along a single cable, simplifying the cabling demands for broadcasters, mobile trucks and production. FS4 supports both fiber and coax connections with 128-channel MADI input and output. An internal 277x208 audio matrix allows full routing of MADI, mixdowns and all audio coming from SDI, fiber and AES sources for an incredible amount of audio processing capability in a single box.

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**FS4 Control** The FS4 front panel buttons and knobs are used with menus in the display, allowing you to fully configure the system. Front panel LEDs report important system statuses. The FS4 also has an internal web server that allows remote monitoring and control of parameter setting via an Ethernet 10/100/1000 network-attached computer running a web-browser. Firmware updates are also performed from the web browser.

## Quick Start Guide Objectives

The FS4 can be extremely simple to use, because of its ability to detect incoming signal formats and automatically apply the correct video processing for the selected output format. However, the FS4 is also extremely powerful and can be flexibly configured to perform a wide variety of tasks.

This Quick Start Guide is designed to help you get your FS4 up and running for the first time, and confirm it is operating properly. It also provides step-by-step instructions that demonstrate a few FS4 signal processing examples.

**Stand Alone Tests**

- ["First Power Up"](#)
- ["Internal Test Signals"](#)

**Computer Setup**

- ["FS4 Network Setup"](#)

**Processing Examples**

- ["Four Channel Mode Conversion Example"](#)
- ["Single Channel Mode Down Conversion Example"](#)
- ["Single Channel Mode Up Conversion Example"](#)

For additional information, please see the *FS4 Installation and Operation Guide* available on the AJA website.

## Installation Summary

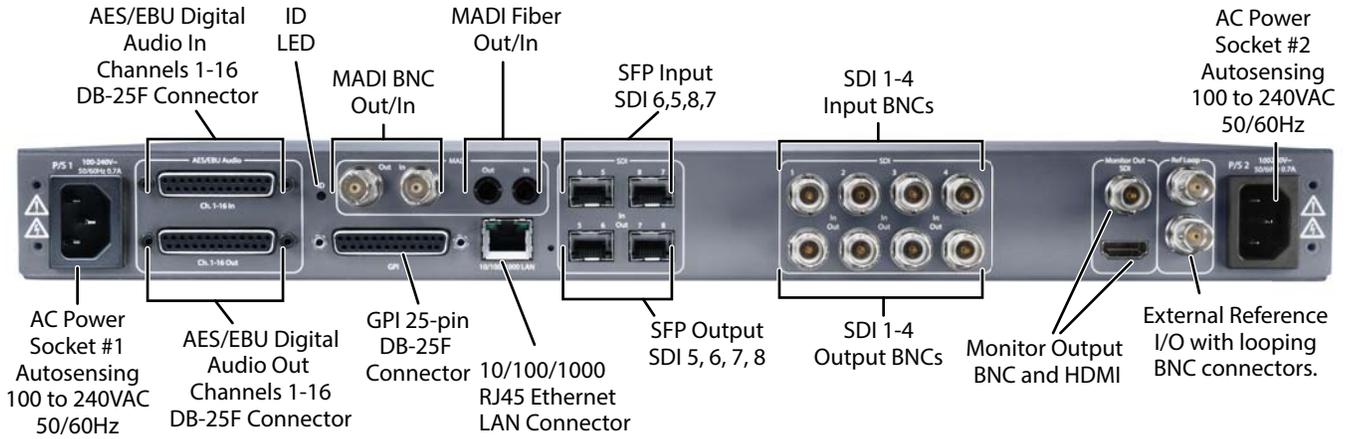
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1. Unpack the shipping box, inspect and inventory the contents, and read the late-breaking news sheet, if any.
2. Install any optional SFP I/O modules by sliding them into the SFP cages in the back. Use only AJA approved modules.

*NOTE: The ["Stand Alone Tests"](#) on page 3 can be performed with the FS4 sitting on a bench to test system operation before physically installing the unit.*

3. Mount the physical chassis: front rack, rear rack, or deskmount—1 RU x 17.5 inches (44.45 cm) x 16 inches (40.65 cm). Do not block air flow through the side vents.
4. Make signal I/O connections to the FS4 back panel as shown in [Figure 1](#).

**Figure 1. FS4 Rear Panel**



5. Connect one or two power cords to the FS4 and mains AC (100-240 VAC, 50/60 Hz, 55 Watts). For redundancy, use both cords and connect them to separate branch circuits. The FS4 power supply is autosensing and adjusts to the available power.
6. Connect your computer to the FS4 using a CAT5 Ethernet cable to the FS4 RJ45 10/100/1000 Ethernet LAN connector. You can connect directly or via a network device such as a switch, hub, bridge, etc. The FS4 automatically senses and adjusts to either a straight-through or crossover cable.

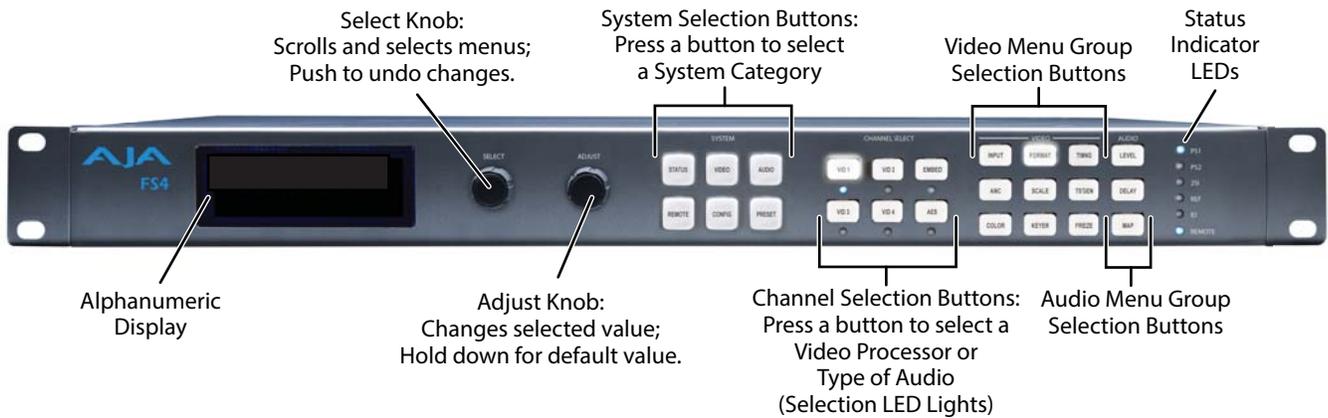
**NOTE:** See *"FS4 Network Setup"* on page 5 for more detailed computer configuration instructions.

## Stand Alone Tests

The stand alone tests can be performed without a computer, using the FS4 front panel controls and rear connections. The following procedures assume the FS4 is at factory defaults (taken from a newly opened box). If not set to defaults, the FS4 may behave differently.

**NOTE:** FS4 units are configured at the factory to operate in Four Channel Mode.

**Figure 2. FS4 Front Pane**



## First Power Up

The following workflow powers up a default FS4 and demonstrates some example alarms.

- Setup**
- Ensure the FS4 is completely disconnected (all video, audio, network, and power connector ports are empty).

- Procedure**
1. Connect both FS4 power cords to mains AC and allow time for the unit to boot up. Observe the front panel LEDs.
    - The REF LED will light red, indicating an alarm condition. By default the FS4 is configured to operate genlocked to an external reference signal.
  2. Press the front panel *STATUS* button, then turn the *SELECT* knob to view various Status menus.
    - The Status menu for Video Processor 1 will report *No Input* for IN1, the port is disconnected), and the *GEN* (Genlock) parameter will report *Ref* (configured for external reference) but will also report *No Input*.

Video Format Status screen			Video Format Alarm Status screen		
IN1	SDI 1	No Input	IN1	SDI 1	OK
BKGD	Black	1080i59	BKGD	Black	OK
GEN	Ref	No Input	GEN	Ref	No Ref
OUT1		1080i59	Rate		59/29/23

3. Connect a 1080i59.94 HD tri-level sync reference signal to one of the FS4 Ref Loop BNCs, and connect a 75 ohm terminator to the other Ref BNC.
  - The REF LED will light blue, indicating the FS4 is genlocked to an external reference signal.
  - The Status menu *GEN* parameters will report *Ref* and indicate the format of the incoming reference signal or *OK*.
  - However, because the FS4 is still not receiving a compatible video input, *No Input*, will be reported for IN1.

Video Format Status screen			Video Format Alarm Status screen		
IN1	SDI 1	No Input	IN1	SDI 1	OK
BKGD	Black	1080i59	BKGD	Black	OK
GEN	Ref	1080i59	GEN	Ref	OK
OUT1		1080i59	Rate		59/29/23

4. Connect a 1080i59.94 SDI video source to the SDI 1 input BNC.
  - The front panel will report 1080i59 and an OK status for SDI 1.
 This indicates no alarm condition exists.

Video Format Status screen			Video Format Alarm Status screen		
IN1	SDI 1	1080i59	IN1	SDI 1	OK
BKGD	Black	1080i59	BKGD	Black	OK
GEN	Ref	1080i59	GEN	Ref	OK
OUT1		1080i59	OUT1		1080i59

5. Disconnect one of the power cords, leaving the other attached.
  - The front panel PWR LED will light red for the power supply with the removed cord.
  - The PS status will report PS1 (or 2) OFF

6. Reconnect the power cable. The PWR LED for that power supply will light blue and the power supply status will report OK.

This workflow confirms the FS4 powers up successfully and reports reference and power supply alarms.

*NOTE: FS4 Reference, Power Supply, and Video Format alarms can be disabled, if desired. This will prevent the LEDs from going red, but will not affect front panel status displays.*

## Internal Test Signals

This workflow generates bars and tone and routes them to an FS4 video and audio output. This example uses the SDI 1 and AES output connectors, an SDI video monitor, and an AES audio monitor.

*NOTE: In the following procedures, where the terms select and adjust are used, turn the front panel SELECT and ADJUST knobs.*

- Setup**
- Connect the FS4 SDI 1 output BNC connector to an SDI video display with a BNC cable.
  - Connect the FS4 AES/EBU output DB25 connector to an AES audio monitor using a standard TASCAM pinout cable (customer supplied). Separate DB25 connectors carry all 8 AES digital audio pairs (16 audio signals), one connector for input and one for output. Turn the output gain of the audio monitor to a low level.

- Procedure**
1. Press the *VID1* Channel Select button.
  2. Press the *FORMAT* Video button
    - Select *1 Output Format* and adjust to a signal compatible with your SDI monitor (for example, 1080i59.95).
  3. Press the *TSTGEN* Video button.
    - Select *1 Test Pattern Gen* and adjust to *On*.
    - Select *2 Test Pattern* and adjust to *75% Bars*.
  4. Press the *AES* Channel Select button.
  5. Press the *MAP* Audio button.
    - Select *1.0 AES Out* and adjust to *Sig Gen 400KHz*.

You should now be able to see the test signal on the SDI Monitor display, and hear the audio on the AES monitor.

This workflow confirms the FS4 generates and outputs video and audio.

## FS4 Network Setup

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The following instructions summarize ways to configure the FS4 to communicate with a computer directly or over a network.

### Networking Using DHCP or Default Static IP

The FS4 factory default configuration automatically looks for a DHCP server to issue an IP address. If your network includes a DHCP server, plug the FS4 into the network and connect with the unit as follows:

1. Press the *CONFIG* button.
2. Turn the *SELECT* knob to navigate to the Status menu that has the name of the FS4 at the top (default is "aja-fs4"). Note the DHCP-supplied IP address shown.

3. With your laptop or desktop computer connected to the same LAN as the FS4 and DHCP enabled, type the IP address you noted on the FS4's display into the browser address field and press *Enter*. You should now see the FS4's browser *Status* screen.

If the FS4 cannot get an address from the network DHCP server, the FS4 will automatically use a preset factory static IP address of 192.168.0.2. You can access the FS4 using the default static address as follows:

1. Set your computer's IP address to whatever address you prefer in the 192.168.0 (class C) network.
2. Set the computer's Subnet mask to 255.255.255.0 (most PCs default to the proper netmask when the address is set).
3. Set the gateway address, if used, to match the FS4 default: 192.168.0.1. Alternatively, change the FS4 gateway address to match your gateway:
  - A. Press *CONFIG*, turn *SELECT* to 3.4 *Default Gateway*, push and then turn *ADJUST* to change the first group of digits.
  - B. Turn *SELECT* to advance to the next set of numbers, and turn *ADJUST* to set these numbers.
  - C. Continue using *SELECT* and *ADJUST* to set the full address.
  - D. When finished, push *ADJUST* momentarily to save the address.
4. Run a browser on the computer and type "192.168.0.2" (the factory static IP address). You should now see the FS4's browser status screen.

## Networking the FS4 Using Your Own Static IP

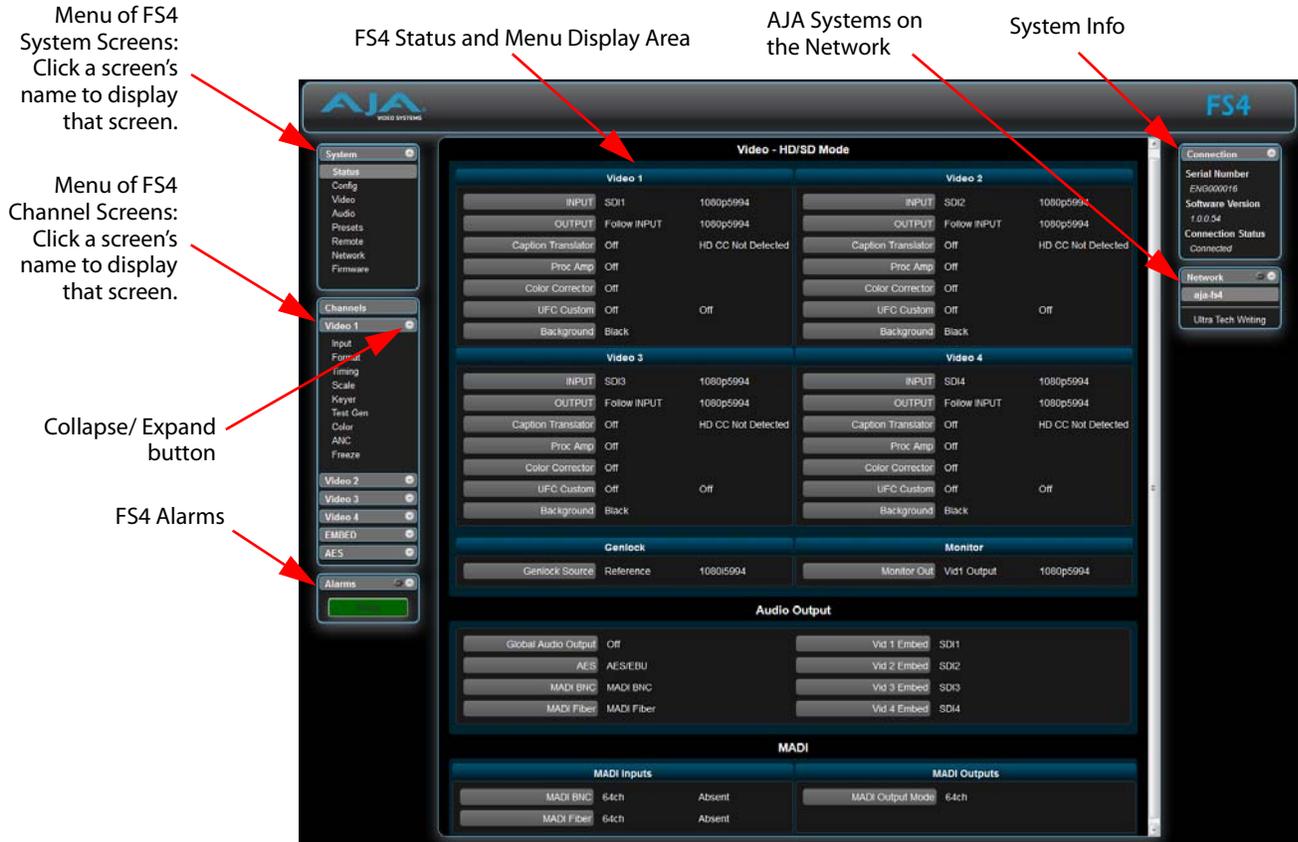
If you don't want to use DHCP or the default static IP address, you can set your own static IP address:

1. Select the *CONFIG* button and use the *SELECT* knob to navigate to parameter 3.1 *IP CONFIG*. Use the *ADJUST* knob to select *Static*.
2. Turn *SELECT* to navigate to parameter 3.2 *IP ADDRESS*. The display shows the default static IP address: 192.168.0.2.
3. Change the IP address as follows.
  - A. Push the *ADJUST* knob momentarily so that the first octet (set of numbers) blinks, and then turn *ADJUST* to change the numbers.
  - B. Turn *SELECT* to advance to the next set of numbers, and turn *ADJUST* to set these numbers.
  - C. Continue using *SELECT* and *ADJUST* to set the full address.
  - D. When finished, push *ADJUST* momentarily to save the address.
4. Turn *SELECT* to advance to 3.3 *Subnet Mask*. Use the *SELECT* and *ADJUST* knobs as in the previous step to set the desired subnet mask.
5. Turn *SELECT* to advance to 3.4 *Default Gateway*. Use the *SELECT* and *ADJUST* knobs as in the previous step to set the desired gateway address.
6. Run a browser on the computer and type in the IP address you set for the FS4. You should now see the FS4's *Status* screen.

## Web Browser Menu Summary

*Figure 3* summarizes web browser menu operation. The settings generally correspond to the front panel display parameters, providing you two methods of controlling the FS4. To see the equivalent front panel display parameter number, hover the cursor over a setting.

**Figure 3. FS4 Web Interface, Main Status Screen, Four Ch Mode**



**Drop Down Parameter Operation**

Most parameters available on the browser are selected from a drop-down list. The currently active parameter is displayed. Click on the down arrow symbol next to the parameter to display the list and select an alternative value. The FS4 will immediately operate with the new setting.

**Slider Operation**

Some screens contain slider controls for setting values. To set a value, you can click on a slider to select it and then use the mouse to drag the slider to the position you desire. For fine tuning, while the slider is selected (highlighted by a blue border), use the keyboard left and right arrow keys to change the value one unit at a time. Or you can enter the value directly by clicking on the number displayed above the slider, type in your number then hit *Enter* to have it take effect. After setting a slider's position, click on the page's background area (blue highlight turns off) to ensure the change is confirmed and saved.

**Sub-Menus**

Some parameters, when activated, open sub-menus. The sub-menus are a lighter gray color and have a collapse/expand button on the parent selection. This lets you collapse the sub-menus to make it easier to configure the system. The collapsed setting only stays in effect until the user reconnects or refreshes the browser.

## FS4 Processing Examples

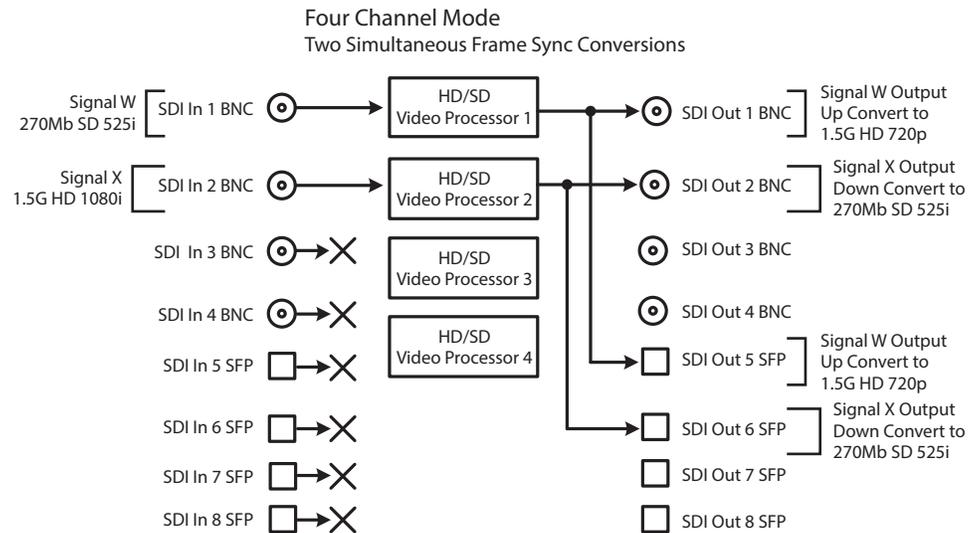
In the following procedures, your exact actions depend on which FS4 interface you are using. Where the terms *MENU NAME*, *select* and *adjust* are used:

- On the front panel interface, press the indicated Menu Group Selection button and then turn the *SELECT* and *ADJUST* knobs to choose the parameter and change the setting. The Front Panel menu numbers are included in the procedures.

- On the web browser interface, use your mouse to select the name of the Menu Screen and then choose the parameter and setting using the drop down list or slider. Menu numbers are not present on the FS4 web pages.

## Four Channel Mode Conversion Example

**Figure 4. Four Channel Mode Example, Two Conversions**



**Table 5. FS4 Menu Settings for Figure 4**

Channel Select Button	Video Button	Menu Name	Setting
VID1	INPUT	1 Input	SDI1
VID1	FORMAT	1 Output Format	720p 5994
VID1	FORMAT	2.0 Link Cfg SDI1	Sngl Link LvIA
VID2	INPUT	1 Input	SDI2
VID2	FORMAT	1 Output Format	525i 5994
VID2	FORMAT	2.0 Link Cfg SDI1	Sngl Link LvIA

The following workflow demonstrates simultaneously up-converting an SD 525i SDI input to an HD 720p SDI output, and also down-converting an HD 1080i SDI input to an SD 525i SDI output. Two copies of each output signal are available, one on a BNC connector and the other on an SFP connector. (Two additional conversions can be performed using the other two Video Processors.) This example uses a 1080i 59.94 reference.

- Setup**
- Ensure the FS4 is receiving a valid reference signal. Connect a 1080i59.95 HD tri-level sync signal to one of the Ref Loop BNC connectors, and terminate the other Ref Loop BNC connector.
  - Connect a 525i 59.94 SDI signal to the SDI1 BNC input on the rear of the FS4. Once connected the LED below the VID1 button on the FS4 front panel will light.
  - Connect a 1080i59.94 SDI signal to the SDI2 BNC input on the rear of the FS4. Once connected the LED below the VID2 button will light.
  - Connect the SDI1 BNC output connector to a compatible video monitor.
  - Connect the SDI2 BNC output connector to a compatible video monitor.

**Procedure** If the FS4 has factory default settings, converted HD and SD signals should be present on both monitors. If not, check the following:

#### System Configuration

1. Press the *CONFIG* System button:
  - Select *2 FS4 Mode*, and adjust to *HD/SD*. and press the *ADJUST* knob.
2. Press the *VIDEO* System button
  - Select *1 Output Frame Rate*, and adjust to *59/29/23*.
  - Select *2 Genlock Source*, and adjust to *Reference*.

#### Video Processor 1 Setup

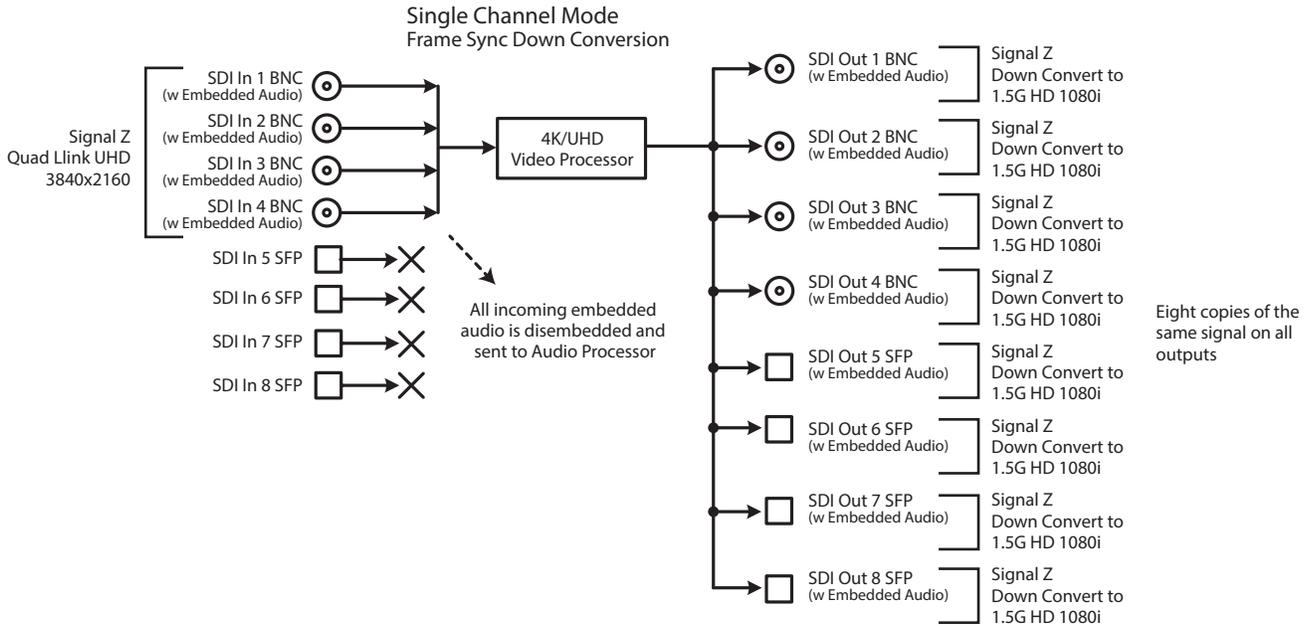
3. Press the *VID1* Channel Select button
4. Press the *INPUT* Video button
  - Select *1 Input*, and adjust to *SDI1*.
5. Press the *FORMAT* Video button.
  - Select *1 Output Format*, and adjust to *720p5994*.
  - Select *2.0 Link Cfg SDI1* and adjust to *Sngl Lnk LvIA*.
6. Press the *TSTGEN* Video button.
  - Select *1 Test Pattern Gen* and adjust to *Off*.

#### Video Processor 2 Setup

7. Press the *VID2* Channel Select button
8. Press the *INPUT* Video button
  - Select *1 Input*, and adjust to *SDI2*.
9. Press the *FORMAT* Video button.
  - Select *1 Output Format*, and adjust to *1080i5994*
  - Select *2.0 Link Cfg SDI2* and adjust to *Sngl Lnk LvIA*.
10. Press the *TSTGEN* Video button.
  - Select *1 Test Pattern Gen* and adjust to *Off*.

# Single Channel Mode Down Conversion Example

**Figure 5. Single Channel Mode, Down Conversion**



**Table 6. FS4 Menu Settings for Figure 5**

Channel Select Button	Video Button	Menu Name	Setting
VID1	INPUT	1 Input	1-4 QuadLink
VID1	FORMAT	1 Output Format	1080i5994
VID1	FORMAT	2.0 Link Cfg SDI1-4	Sngl Link LvIA

The following workflow demonstrates down -converting a Quad Link UHD input to an SD 525i SDI output.

- Setup**
- Ensure the FS4 is receiving a valid reference signal. Connect a 1080i59.95 HD tri-level sync signal to one of the Ref Loop BNC connectors, and terminate the other Ref Loop BNC connector.
  - Connect a Quad Link UHD 59.94 signal to the FS4 SDI 1, 2, 3, and 4 video input BNC connectors.
  - Connect any one of the FS4 SDI BNC output connectors to a compatible video monitor.

**Procedure** System Configuration

1. Press the *CONFIG* System button:
  - Select *2 FS4 Mode*, select *4K/UHD* and press the *ADJUST* knob. Wait for the FS4 to reboot (not longer than 90 seconds).
2. Press the *VIDEO* System button
  - Select *1 Output Frame Rate*, and adjust to *59/29/23*.
  - Select *2 Genlock Source*, and adjust to *Reference*.

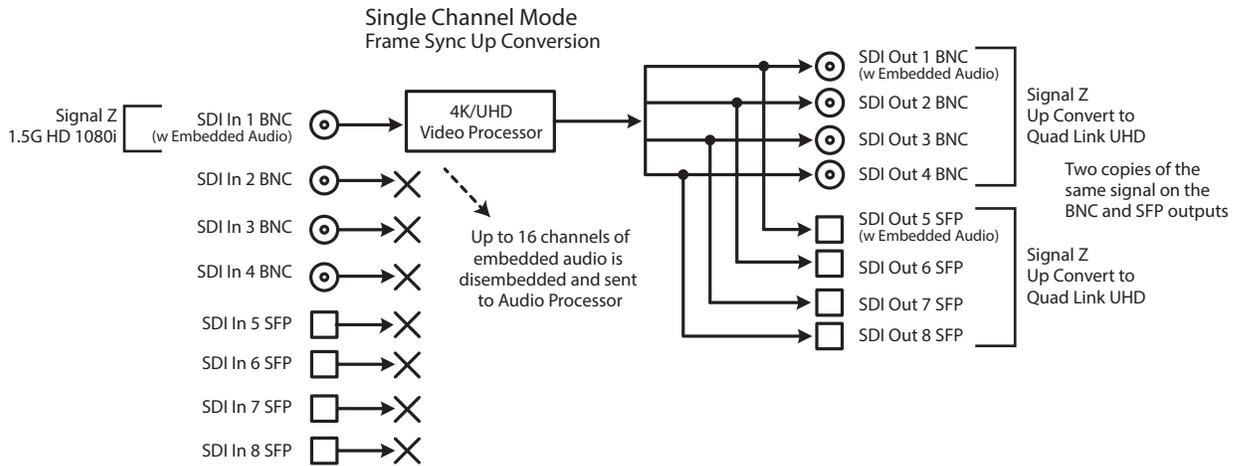
Video Processor Setup

3. Press the *VID1* Channel Select button
4. Press the *INPUT* Video button
  - Select *1 Input*, and adjust to *1-4 QuadLink*.
5. Press the *FORMAT* Video button.
  - Select *1 Output Format*, and adjust to *1080i5994*.
  - Select *2.0 Link Cfg SDI1-4* and adjust to *Sngl Lnk LvlA*.
6. Press the *TSTGEN* Video button.
  - Select *1 Test Pattern Gen* and adjust to *Off*.

The down-converted SD signal should now be present on the connected video monitor.

## Single Channel Mode Up Conversion Example

**Figure 6. Single Channel Mode, Up Conversion**



**Table 7. FS4 Menu Settings for Figure 6**

Channel Select Button	Video Button	Menu Name	Setting
VID1	INPUT	1 Input	SDI1
VID1	FORMAT	1 Output Format	UHD2160p5994
VID1	FORMAT	2.0 Link Cfg SDI1-4	QuadLink LvlA

The following workflow demonstrates up-converting an HD SDI input to a UHD SDI 4-Link Quadrant (Square Division) output. This example uses a 525i 59.94 input and generates a UHDp59.94 Two Sample Interleave output.

- Setup**
- Ensure the FS4 is receiving a valid reference signal. Connect a 1080i59.95 HD tri-level sync signal to one of the Ref Loop BNC connectors, and terminate the other Ref Loop BNC connector.
  - Connect a 1080i59.94 SDI signal to the SDI1 input on the rear of the FS4. Once connected the FS4 front panel VID IN LED will light.
  - Connect the four FS4 SDI1-4 video output BNC connectors to a compatible UHD monitor.

*NOTE: Alternatively, you can monitor the entire raster of the 2SI signal at lower resolution on a standard SDI monitor by connecting just one of the four outputs.*

**Procedure** System Configuration

1. If the FS4 is not already in Single Channel Mode, press the *CONFIG* System button:
  - Select *2 FS4 Mode*, select *4K/UHD* and press the *ADJUST* knob.
2. Press the *VIDEO* System button
  - Select *1 Output Frame Rate*, and adjust to *59/29/23*.
  - Select *2 Genlock Source*, and adjust to *Reference*.

Video Processor Setup

3. Press the *VID1* Channel Select button
4. Press the *INPUT* Video button
  - Select *1 Input*, and adjust to *SDI 1*.
5. Press the *FORMAT* Video button.
  - Select *1 Output Format*, and adjust to *UHD2160p5994*.
  - Select *2.0 Link Cfg SDI1-4* and adjust to *QuadLnk LvIA*.
  - Select *4 Link Output Image Mapping* and adjust to *2SI*.
6. Press the *TSTGEN* Video button.
  - Select *1 Test Pattern Gen* and adjust to *Off*.
7. The up-converted SD signal should now be present on the connected video monitor.