# FS3
# Quick Start Guide

## Overview

The new FS3 combines AJA's industry-proven frame synchronization with high-quality 4K up-conversion technology to seamlessly integrate SD and HD signals into 4K workflows. AJA's adaptive scaling algorithms, paired with our well-known conversion technology ensures your up-converted images will have the maximum quality possible. You can input SD or HD resolution SDI via BNC or Fiber, and output up-converted 4K video to multiple BNC and Fiber outputs simultaneously. FS3 also includes the industry-proven features included in AJA frame synchronizers such as up, down, cross-conversion of SD, HD, and 3G-SDI formats, RGB color correction, region of interest scaling, extensive audio controls and routing, web UI control, GPI triggers and more, making it an extremely versatile tool that can support a variety of production requirements.

Synchronizing diverse formats is a critical part of a broadcast, mobile or post-production environment. FS3 syncs to analog SD blackburst, HD tri-level sync, or to the incoming SDI signal. FS3 also provides integer frame rate conversion (3:2, 1:2, 2:1).

The growth of 5.1 and 7.1 audio has increased the number of audio channels that must be managed in a production. FS3 accepts embedded SDI audio on all four SDI inputs (two coax and two optional fiber), and has an internal 64x64 audio matrix that allows routing of all embedded audio channels. Besides audio level, phase, and delay controls, FS3 also provides for 5.1 and 7.1 mixdown to stereo.

### FS3 Control

The FS3 front panel buttons and knobs control menus in the display, allowing you to fully configure the system. Front panel LEDs report important system statuses. The FS3 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.

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## Quick Start Guide Objectives

The FS3 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 FS3 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 FS3 up and running for the first time, and confirm it is operating properly. It also provides step-by-step instructions that demonstrate a few FS3 signal processing examples.

**Stand Alone Tests**
- *"First Power Up"*
- *"Internal Test Signals to All Outputs"*

**Computer Setup**
- *"FS3 Network Setup"*

**Processing Examples**
- *"HD to UHD 4-Link Quadrant 59.94"*
- *"SD to 4K 4-Link 2SI 50 with Sidebar Matte"*

For additional information, please see the FS3 *Installation and Operation Guide* available on the AJA website and on the supplied DVD.

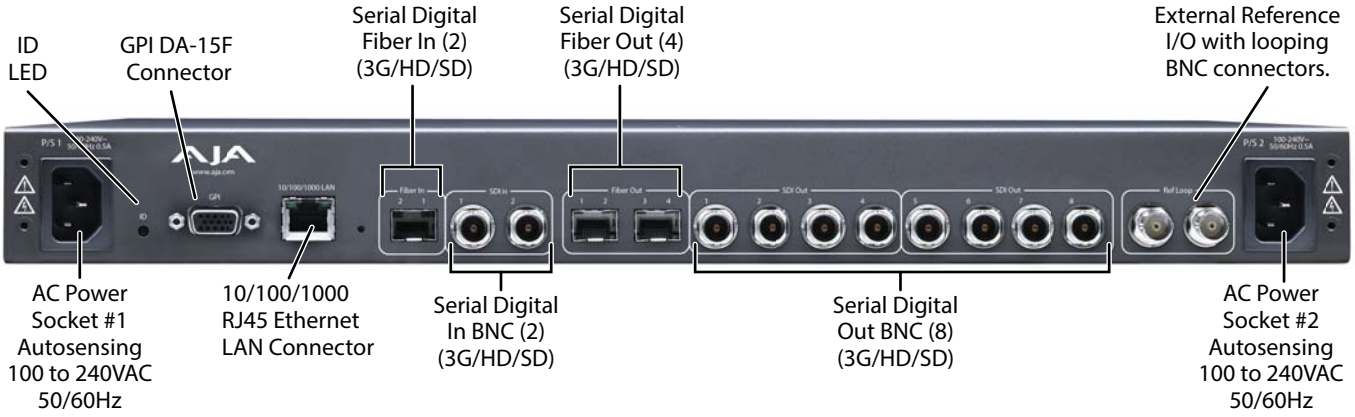
# Installation Summary

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

*NOTE: The "Stand Alone Tests" on page 3 can be performed with the* FS3 *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 FS3 back panel as shown in *Figure 1*.

***Figure 1. FS3 Rear Panel***




5. Connect one or two power cords to the FS3 and mains AC (100-240 VAC, 50/60 Hz, 55 Watts). For redundancy, use both cords and connect them to separate branch circuits. The FS3 power supply is autosensing and adjusts to the available power.
6. Connect your computer to the FS3 using a CAT5 Ethernet cable to the FS3 RJ45 10/100/1000 Ethernet LAN connector. You can connect directly or via a network device

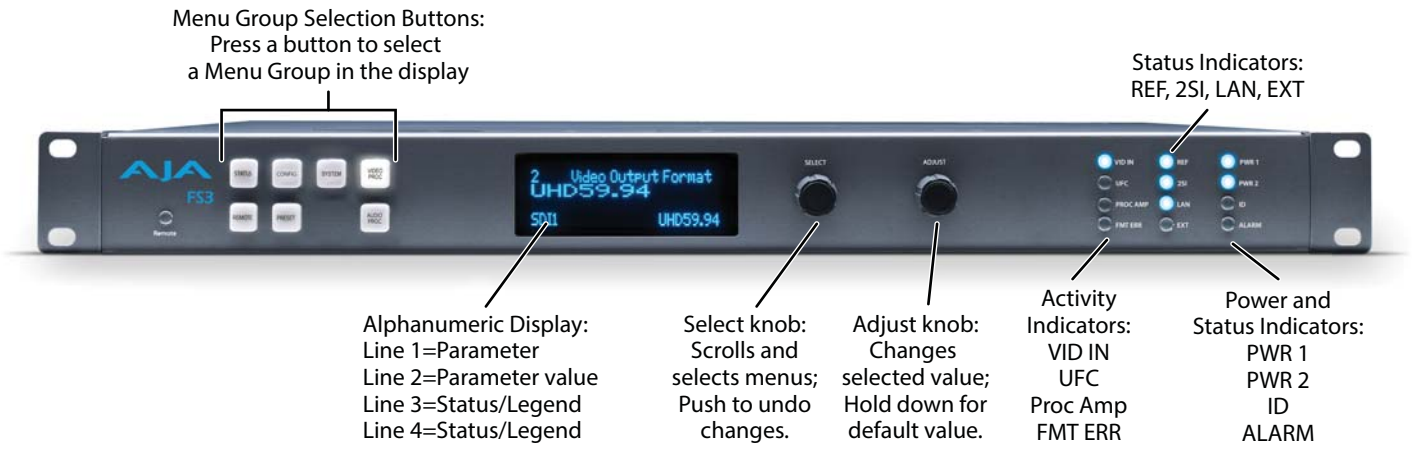
such as a switch, hub, bridge, etc. The FS3 automatically senses and adjusts to either a straight-through or crossover cable.

*NOTE: See "FS3 Network Setup" on page 4 for more detailed computer configuration instructions.*

## Stand Alone Tests

The stand alone tests can be performed without a computer, using the FS3 front panel controls and rear connections.

***Figure 2. FS3 Front Pane***




The following procedures assume the FS3 is at factory defaults (taken from a newly opened box). If not set to defaults, the FS3 may behave differently.

## First Power Up

The following workflow powers up the FS3 and demonstrates some example alarms.

### Setup

- Ensure the FS3 is completely disconnected (all video, audio, network, and power connector ports are empty).

### Procedure

1. Connect both FS3 power cords to mains AC and allow time for the unit to boot up. Observe the front panel LEDs.
   - The ALARM LED will light red, indicating an alarm condition, and the REF LED will be off. By default the FS3 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 menus will report No Input for the Video Processor video inputs (the ports are disconnected), and the *GEN* (Genlock) parameter will report *Ref* (configured for external reference) but will also report *No Input* or *No Ref*.

| **Video Format Status screen** | | | **Video Format Alarm Status screen** | | |
|---|---|---|---|---|---|
| IN | SDI 1 | No Input | IN | SDI 1 | Incompat |
| BKGD | Black | | BKGD | Black | |
| GEN | Ref | No Input | GEN | Ref | No Ref |
| OUT1 | | UHD59 | OUT1 | | UHD59 |

3. Connect a 1080i59.95 HD tri-level sync reference signal to one of the FS3 Ref Loop BNCs.
   - The front panel ALARM LED will go off and the REF LED will light blue, indicating no alarm exists and the FS3 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*.

| **Video Format Status screen** | | | **Video Format Alarm Status screen** | | |
|---|---|---|---|---|---|
| IN | SDI 1 | No Input | IN | SDI 1 | Incompat |
| BKGD | Black | | BKGD | Black | |
| GEN | Ref | 1080i59 | GEN | Ref | OK |
| OUT1 | | UHD59 | OUT1 | | UHD59 |

4. Disconnect one of the power cords, leaving the other attached.
   - The ALARM LED will light red, and the PWR LED of the power supply with the removed cord will turn off.
5. Reconnect the power cable. The ALARM LED will turn off and the PWR LED will light.

This workflow confirms the FS3 powers up successfully and reports reference and power supply alarms.

*NOTE:* FS3 *Reference, Power Supply, and Video Format alarms can be disabled, if desired,*

## Internal Test Signals to All Outputs

This workflow generates bars and tone and sends them to all the FS3 outputs. This example uses the SDI 1-4 output connectors and a UHD video and embedded audio monitor. In the following procedures, where the terms *select* and *adjust* are used, turn the front panel *SELECT* and *DJUST* knobs.

### Setup

- Connect the FS3 SDI 1-4 output connectors to a UHD capable display equipped with embedded audio monitoring.

### Procedure

1. Press the *VIDEO PROC* button.
   - Select *4 Output Mode*, and adjust to *Test Pattern*.
   - Select *21 Test Pattern* and adjust to *75% Bars*.
2. Press the *AUDIO PROC* button.
   - Select *21 Global Audio Out* and adjust to *Sig Gen 1KHz*.

   You should now be able to see and hear the test signals on the UHD display, and on any other devices connected to the FS3 outputs.

This workflow confirms the FS3 generates and outputs video and audio.

# FS3 Network Setup

The following instructions summarize ways to configure the FS3 to communicate with a computer directly or over a network.

## Networking Using DHCP or Default Static IP

The FS3 factory default configuration automatically looks for a DHCP server to issue an IP address. If your network includes a DHCP server, plug the FS3 into the network and connect with the unit as follows:

1. Press the *CONFIG* button.
2. Turn the *SELECT* knob to navigate to config parameter *2.2 IP Address*. Note on a piece of paper the DHCP-supplied IP address shown.
3. With your laptop or desktop computer connected to the same LAN as the FS3 and DHCP enabled, type the IP address you noted into the browser address field and press *Enter*. You should now see the FS3's browser *Status* screen.

If the FS3 cannot get an address from the network DHCP server, the FS3 will automatically use a preset factory static IP address of 192.168.0.2. You can access the FS3 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 FS3 default: 192.168.0.1. Alternatively, change the FS3 gateway address to match your gateway:
   A. Press *CONFIG*, turn *SELECT* to *2.4 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 FS3's browser status screen.

## Networking the FS3 Using Your Own Static IP

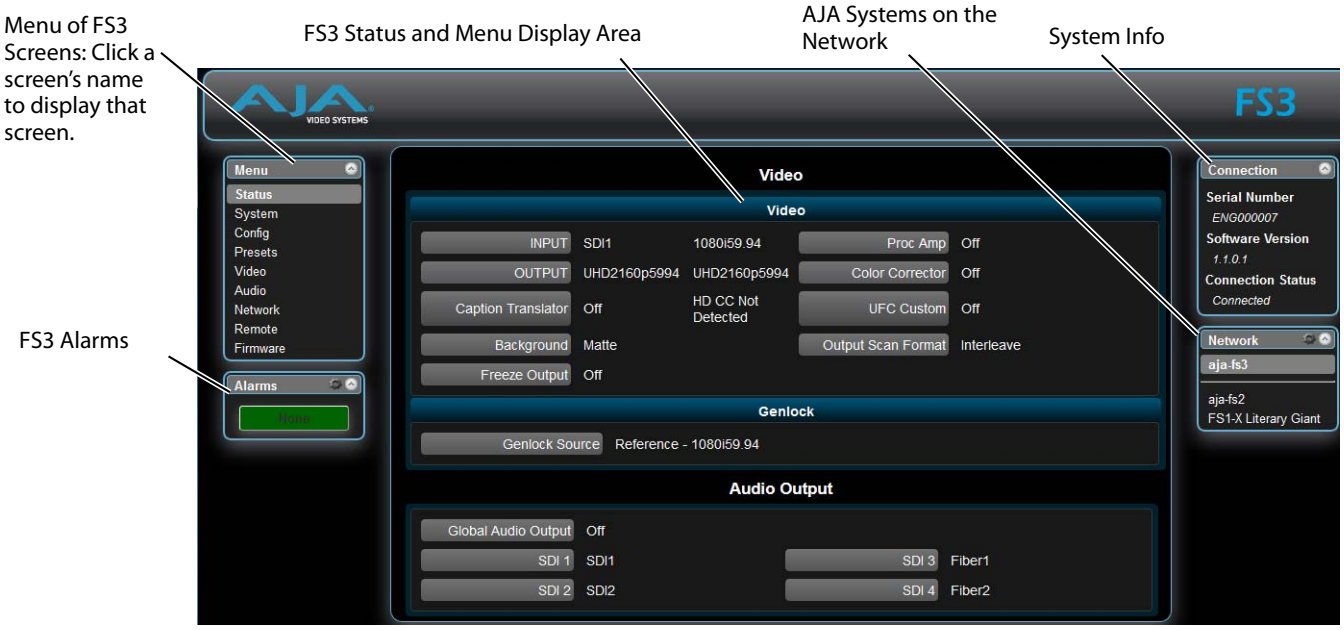
If you don't want to use DHCP or the default static IP address, you can set your own static IP address:

1. Select the *CONFIG* button and use the *SELECT* knob to navigate to parameter *2.1 IP CONFIG*. Use the *DJUST* knob to select *Static*.
2. Turn *SELECT* to navigate to parameter *2.2 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 *2.3 Subnet Mask*. Use the *SELECT* and *DJUST* knobs as in the previous step to set the desired subnet mask.
5. Turn *SELECT* to advance to *2.4 Default Gateway*. Use the *SELECT* and *DJUST* 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 FS3. You should now see the FS3's *Status* screen.

## Web Browser Menu Summary

*Figure 3* summarize web browser menu operation. The settings generally correspond to the front panel display parameters, providing you two methods of controlling the FS3. To see the equivalent front panel display parameter number, hover the cursor over a setting.

***Figure 3. FS3 Web Interface, Main Status Screen***




**Drop Down Parameter Operation**

Most FS3 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 FS3 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. 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.

# FS3 Processing Examples

In the following procedures, your exact actions depend on which FS3 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 FS3 web pages.

## HD to UHD 4-Link Quadrant 59.94

The following workflow demonstrates up-converting an HD SDI input to a UHD SDI 4-Link Quadrant (Square Division) output. This example uses a 1080i 59.94 input and reference, and generates a UHDp59.94 output.

### Setup

- Ensure the FS3 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 (either with a terminator or by connecting to terminated equipment). Once connected the FS3 front panel REF LED will light.
- Connect a 1080i59.94 HD SDI signal to the SDI1 input on the rear of the FS3. Once connected the FS3 front panel VID IN LED will light.
- Connect the four FS3 SDI1-4 video output connectors to a compatible UHD monitor.

*NOTE: Alternatively, you can monitor each UHD quadrant at full resolution on a standard SDI monitor by connecting each of the four outputs individually.*

### Procedure

If the FS3 has factory default settings, the UHD signal should be present on the four BNC output connectors. If not, check the following:

1. *SYSTEM* menu:
   - Select *5 Genlock Source*, and adjust to *Reference*.
   - Select 6 *Output Frame Rates*, and adjust to *59.94/23.98*.
2. *VIDEO PROC* menu:
   - Select *1 Input*, and adjust to *SDI1 (factory default)*.
   - Select *2 Video Output Format*, and adjust to *UHD59.94 (factory default)*.
   - Select *3 Output Scan Format* and adjust to *Quadrant (factory default)*.
   - If necessary, select *4 Output Mode* and adjust to *Normal (factory default)*.

## SD to 4K 4-Link 2SI 50 with Sidebar Matte

The following workflow demonstrates converting an SD SDI input to a 4K SDI 4-Link 2SI (Two Sample Interleave) output with a matte sidebar. This example uses a 625i 50 input, 1080i 50 reference, and generates a 4Kp50 output.

### Setup

- Ensure the FS3 is receiving a valid reference signal. Connect a 1080i50 HD tri-level sync signal to one of the Ref Loop BNC connectors, and terminate the other Ref Loop BNC connector (either with a terminator or by connecting to terminated equipment). Once connected the FS3 front panel REF LED will light.
- Connect a 625i SD SDI signal to the SDI1 input on the rear of the FS3. Once connected the FS3 front panel VID IN LED will light.
- Connect the four FS3 SDI1-4 video output connectors to a compatible 4K monitor.

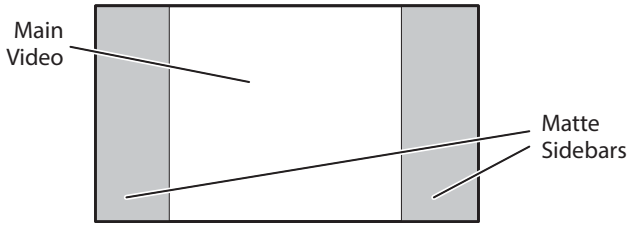
*NOTE: Alternatively, you can monitor the entire raster of the 2SI signal at lower resolution on a standard SDI monitor by connecting just one of the four outputs.*

### Procedure

1. *SYSTEM* menu:
   - If necessary, select *5 Genlock Source*, and adjust to *Reference (factory default)*.
   - Select *9 Output Frame Rates*, and adjust to *50/25*.
2. *VIDEO PROC* menu:
   - If necessary, select *1 Video Input*, and adjust to *SDI1*.
   - Select *2 Video Output Format*, and adjust to *4K1080p50*.
   - Select *3 Output Scan Format* and adjust to *Interleave*.

- If necessary, select *4 Output Mode* and adjust to *Normal (factory default)*.
- Select *7 Background Fill* and adjust to *Matte*.
- If necessary, select *8 Upconvert Mode* and adjust to *4x3 Pillar (factory default)*.

You should now see the processed sidebar image on the SDI monitor.




- Select *11.3 Matte Hue* and adjust to different degree settings. You should see the sidebar color hue change as you adjust.
- If vertical black bars exist between the matte and up-converted image, you can go to *9 Sidebar Edge* and adjust the matte to the edge of the image.

This workflow confirms the FS3 up-converts incoming video with sidebar matting.