EAN-Airborne Innovations Camera

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Alerts

The following notifications are used throughout the document to help identify important safety and setup information to the user:

⚠ **CAUTION:** Alerts to a potential hazard that may result in personal injury, or an unsafe practice that causes damage to the equipment if not avoided.

ⓘ **IMPORTANT:** Identifies crucial information that is important to setup and configuration procedures.

Used to emphasize points or reminds the user of something. Supplementary information that aids in the use or understanding of the equipment or subject that is not critical to system use.

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1 Overview

This document describes how to configure the SightLine OEM video processing boards to receive video from the Airborne Innovations AGS-720p Micro Global Shutter color and mono cameras.

SightLine OEM boards configured in this document: 1500-0EM, 3000-OEM, and 4000-OEM.

1.1 Associated Documents

EAN-Camera Compatibility: Lists third-party cameras that are currently supported by SightLine software. Lists camera adapter board kits for the SightLine OEM video processing boards.

EAN-Digital Video Configuration: Describes how to configure the SightLine hardware for digital video input.

EAN-Ethernet-and-Serial-Communication: Describes how to set up serial communications for cameras or other payload devices from SightLine hardware.

Interface Command and Control (IDD): Describes the native communications protocol used by the SightLine Applications product line. The IDD is also available as a PDF download on the Software Download page.

Panel Plus User Guide: A complete overview of settings and dialog windows located in the Help menu of the Panel Plus application.

Additional support documentation EANs can be found on the Documentation pages of the SightLine Applications website.

1.2 SightLine Software Requirements

1500-OEM: Version 2.24.xx and higher and FPGA version 10.

3000-OEM: Version 2.24.xx and higher.

ⓘ **IMPORTANT:** The Panel Plus software version should match the firmware version running on the board. Firmware and Panel Plus software versions are available on the Software Download page.

1.2.1 FPGA - 1500-OEM

Version 10 of the FPGA driver firmware is required for the camera to operate correctly with the 1500-OEM. Version information is located on the *Connect* tab under the *Video Output* section. FPGA version 10 does not support other digital cameras. See the EAN-FPGA Firmware Update 1500-OEM for updating instructions. Use *./FPGA_V10.sh* to flash the FPGA.

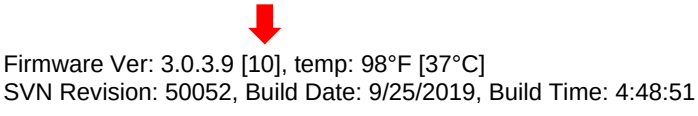


Figure 1: FPGA Version Number Location

2 Interface Boards and Adapters

System interface boards provide options for network interfacing, serial ports, and GPIO. Camera interface and adapter boards provide an interface from the camera to OEM. See the ICD-1500 Adapter Boards and ICD-3000-4000 Adapter Boards for complete specifications and pinouts.

ⓘ **IMPORTANT:** All boards should be connected and secured with the included cables and hardware fasteners first before applying power.

3 Hardware Connections

3.1 1500-OEM AGS-720p Camera Bench Setup

Interface and adapter boards:

- SLA-1500-FPC: AGS-720p camera and 1500-OEM interface. The 1500-OEM supplies power to the camera through the SLA-1500-FPC board.
- SLA-1500-AB: Provides serial and network interfaces.

Cable connections:

- SLA-CAB-1514: Connects to J3 (14-pin) on the 1500-OEM connector and to the 1500-AB J3 (14-pin) connector. This provides analog video, network, and serial connections to the 1500-OEM.
- SLA-CAB-FPC04: Connects to the SLA-1500-FPC board and to the AGS-720p camera. Provides serial communication and video to the camera. See FPC cable instructions and precautions.
- SLA-PWR-B05V: Connects to the 1500-AB board and AC power source.

Power and network connectivity LEDs:

A green light indicates the 1500-AB board is powered on. A blue light on the 1500-AB and a green light on the 1500-OEM board indicate that all the boards are powered on. A second flashing green light on the 1500-OEM indicates network connectivity.

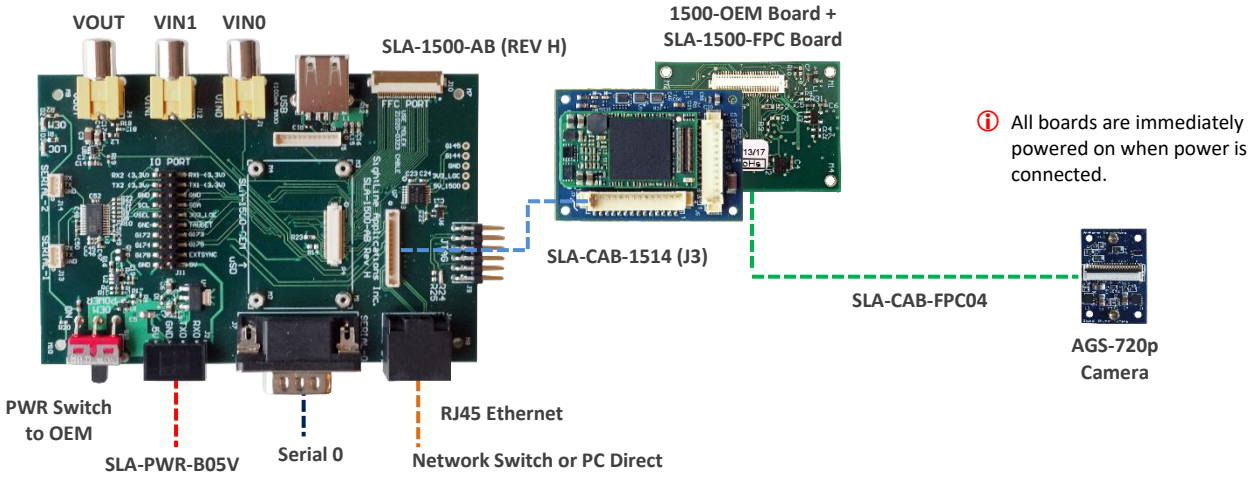


Figure 2: 1500-OEM AGS-720p Camera Bench Setup

3.2 3000-OEM AGS-720p Camera Bench Setup

Interface and adapter boards:

- SLA-3000-FPC: AGS-720p camera and 3000-OEM interface. The 3000-OEM supplies power to the camera through the SLA-3000-FPC board.
- SLA-3000-IO: Provides serial and network interfaces. Adapter boards can be connected to one of two available video input connectors (VIN1 or VIN0). See the 3000-OEM exploded assembly drawing for more connection layout information.

  VIN0 has camera channels 0 and 1 assigned. VIN1 has camera channels 2 and 3 assigned. If the configuration includes an analog board with a digital adapter board the analog board must be installed on VIN0.
- SLA-3000-mIO (optional smaller IO board): Provides serial and network interfaces. This board allows SLA-3000-FPC board to be connected directly to the OEM board.

Cable connections:

- SLA-CAB-FPC04: Connects to the SLA-3000-FPC board and to the AGS-720p camera. Provides serial communication and digital video to the camera. See FPC cable instructions and precautions.
- SLA-CAB-0403: Connects to J4 on SLA-3000-mIO board. Provides an RJ45 Ethernet connection.
- SLA-PWR-C12V: Connects to J5 on SLA-3000-IO board and AC power source.
- SLA-CAB-1504 / SLA-PWR-B12V: Connects to J9 on the SLA-3000-mIO board and AC power source.

Power and network connectivity LEDs:

A green light on the 3000-IO or 3000-mIO board indicates that all boards are powered on. An amber light on the 3000-OEM board verifies network connection.

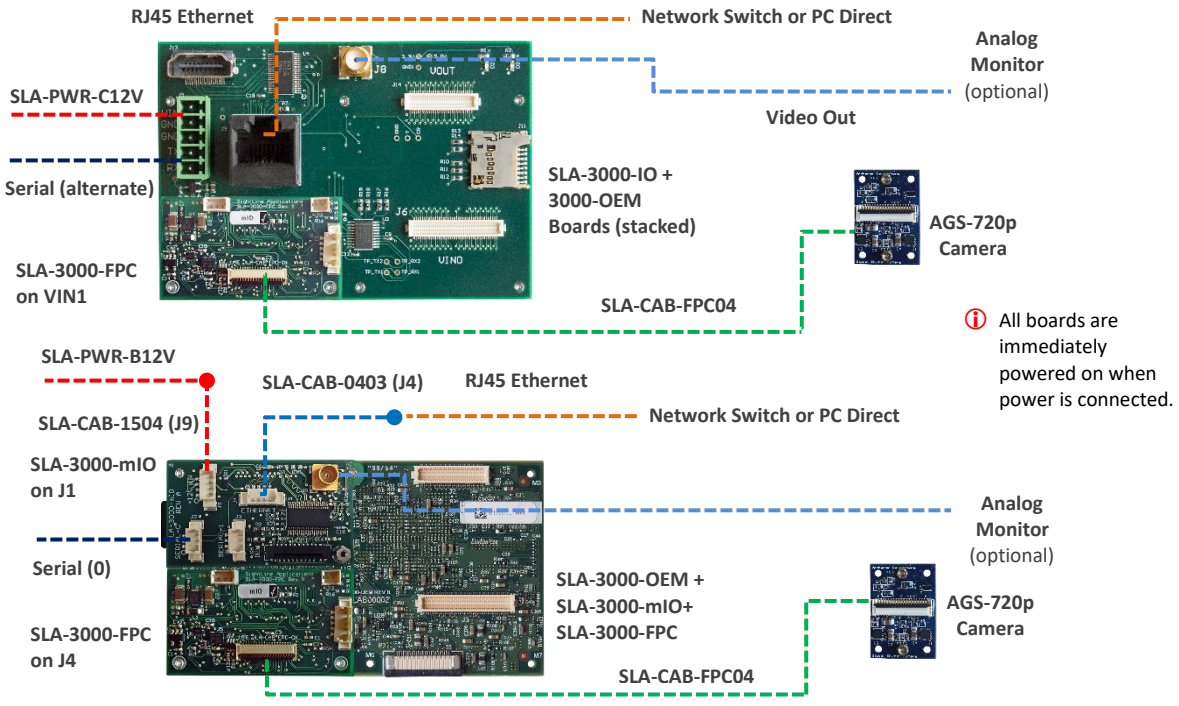
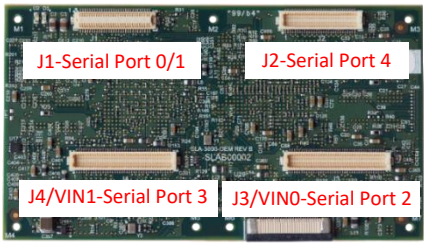


Figure 3: 3000-OEM AGS-720p Camera Bench Setup



3000-OEM	SLA-3000-IO	Serial Port	Camera Index Panel Plus
J1		0/1	NA
J2	VOUT	4	NA
J3	VIN0	2	CAM0/CAM1
J4	VIN1	3	CAM2

Figure 4: 3000-OEM Serial Port and Connector Reference

3.3 4000-OEM AGS-720p Camera Bench Setup

Interface and adapter boards:

- SLA-3000-FPC: AGS-720p camera and 4000-OEM interface. The 4000-OEM supplies power to the camera through the SLA-3000-FPC board. Serial and network interfaces are provided on the 4000-OEM board.
- The SLA-3000-FPC board can be connected to J6 on the 4000-OEM. Additional camera adapter boards can be connected using the SLA-4000-MIPI board on J9. See the ICD-3000-4000 Adapter Boards for specific MIPI board power requirements.

Cable connections:

- SLA-CAB-FPC04: Connects to the 3000-FPC board and to the AGS-720p camera. Provides serial communication and digital video to the camera. See FPC cable instructions and precautions.
- SLA-CAB-0403: Connects to J4 on the 4000-OEM board. Provides an RJ45 Ethernet connection.
- SLA-CAB-1504 / SLA-PWR-B12V-36W: Connects to J50 on the 4000-OEM board and AC power source.

Power and network connectivity LEDs:

A green light (D1) on the 4000-OEM board indicates that all boards are powered on. An amber light (D5) verifies network connection.

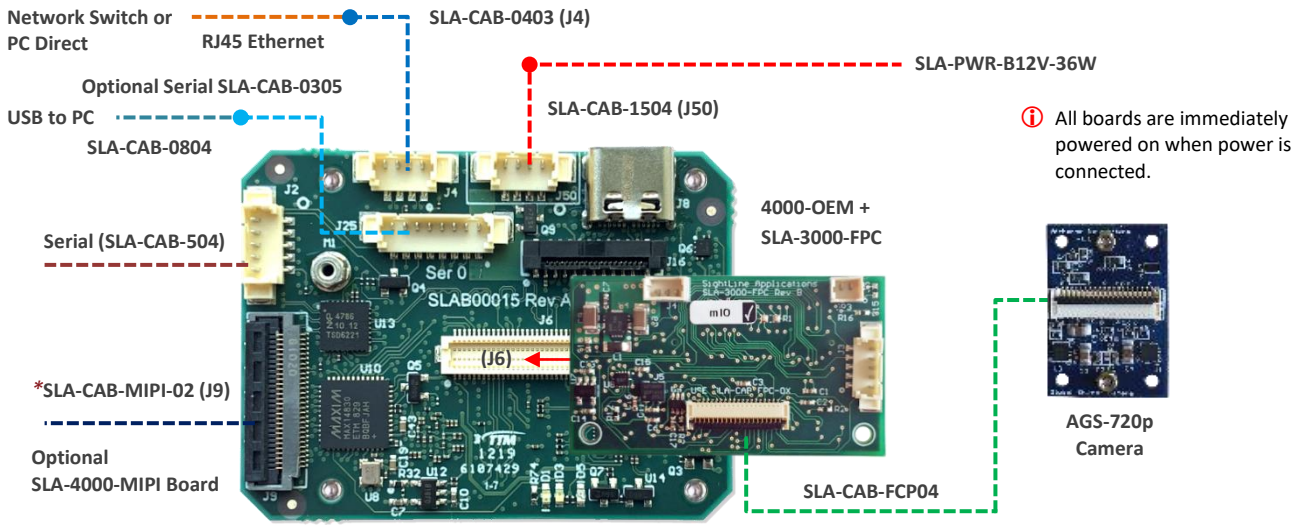


Figure 5: 4000-OEM AGS-720p Camera Bench Setup

**SLA-CAB-MIPI-02 is an FFC cable and must be oriented and connected correctly. See FFC cable instructions and precautions before connecting the SLA-4000-MIPI board.*

4 Configuration Settings

This section covers the basic camera configuration settings in Panel Plus for the SightLine OEM video processing boards.

Before connecting with the Panel Plus software, the OEM board should be powered up and connected through:

- a network switch or directly to the host PC (preferred) or,
- Direct serial connection (for troubleshooting or if a network connection cannot be established).

See the one of the corresponding OEM startup guides for connection and video streaming instructions:

- EAN-Startup Guide 1500-OEM
- EAN-Startup Guide 3000-OEM
- EAN-Startup Guide 4000-OEM

IMPORTANT: This procedure makes the assumption that the customer has read the OEM startup guide(s) and has a basic understanding of the following fundamentals:

- Completed a functional connection between the SightLine video processing board and Panel Plus application
- Familiar with Panel Plus controls
- Successfully streamed video in Panel Plus

If you do not have a strong basic system setup and familiarity, we recommend reviewing the OEM startup guide(s) and work with our support team to establish basic connection and streaming fundamentals.

4.1 Acquisition Settings

From the main menu in Panel Plus go to *Configure* » *Acquisition Settings*.

If available, use the *AutoFIll* drop down menu in the *Acquisition Settings* dialog to automatically populate the relevant fields with the correct settings. The settings can also be manually entered as shown in Table 1, Table 2, or Table 3.

For information about Acquisition fields in Panel Plus see EAN-Digital Video Configuration.

IMPORTANT: Save parameters and reset the board when changing parameters. Cycle system power when changing resolution.

If video does not display, try saving and activating the settings again. Check the encoding settings on the Compression tab and review the network addresses for the destination video.

Table 1: 1500-OEM Panel Plus Basic Acquisition Settings

Digital Cameras	Camera Index = Digital		Camera Type = Generic Digital									
Acquisition Settings	**Auto Fill**	**Height**	**Width**	**VFP**	**HFP**	**Bits**	**Input**	**Invert VSync**	**Invert HSync**	**Sync/Crop**	**Init Code**	**Flags**
Airborne Innovations												
AGS720p Color	Airborne Innovations AGS720p Color	720	1280	2	1	8	Bayer	None	None	None	InitAR0134CS	0x203
AGS720p Mono	Airborne Innovations AGS720p Mono	720	1280	2	0	8	Gray	None	None	None	InitAR0134CS	0x200
Configuration notes: Requires software version 2.24.14 and above and FPGA version 10.												

Table 2: 3000-OEM Panel Plus Basic Acquisition Settings

Digital Cameras	Camera Index = Cam 0 (VIN0) / Cam 2 (VIN1)					Camera Type = Generic Digital						
Acquisition Settings	**Auto Fill**	**Height**	**Width**	**VFP**	**HFP**	**Bits**	**Input**	**Invert VSync**	**Invert HSync**	**Sync/Crop**	**Init Code**	**Flags**
Airborne Innovations												
AGS720p Color	Airborne Innovations AGS720p Color	720	1280	2	1	16	Bayer	None	None	None	InitAR0134CS	0x203
AGS720p Mono	Airborne Innovations AGS720p Mono	720	1280	2	1	16	Gray	None	None	None	InitAR0134CS	0x200
Configuration notes: Requires software version 2.24.14 and above.												

Table 3: 4000-OEM Panel Plus Basic Acquisition Settings

Digital Cameras	Camera Index = 0		Camera Type = Generic Digital									
Acquisition Settings	**Auto Fill**	**Height**	**Width**	**VFP**	**HFP**	**Bits**	**Input**	**Invert VSync**	**Invert HSync**	**Sync/Crop**	**Init Code**	**Flags**
Airborne Innovations												
AGS720p color	YES	720	1280	2	1	8	Bayer	None	None	None	InitAR0134CS	0x203
AGS720p mono	YES	720	1280	1	0	8	Gray	None	None	None	InitAR0134CS	0x200
Configuration notes: Requires software version 3.00.04 and above.												

4.2 Airborne Camera Color Controls

The Airborne camera color controls can be modified in the *Image Control* section in the *Video* tab of Panel Plus.

AGS720p color camera: Modify the *Luma*, *Red*, *Green*, and *Blue* color controls as needed.

AGS720p mono camera: Use the *Red*, *Green*, and *Blue* default settings. Modify the *Luma* setting as needed.

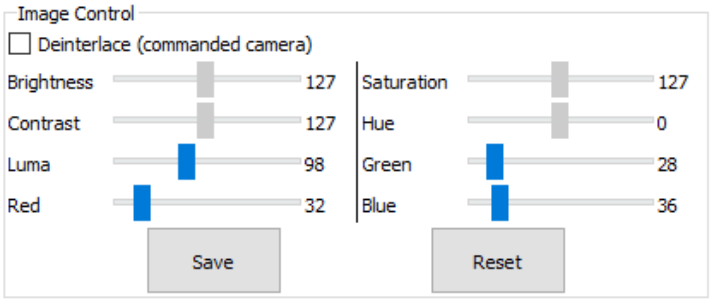
Setting the Luma, Red, Green, or Blue values will trigger a Reset to the default values.

When using the 3000-OEM board make sure the correct command camera is selected when adjusting the color controls.

Brightness, Contrast, Saturation, and Hue are not adjustable.

Save the parameters to the board. Restart the system to keep the settings in place through subsequent restarts.

Luma (default = 98)
Red (default = 32)



Green (default = 28)
Blue (default = 36)

Figure 6: Imager Color Controls

5 Troubleshooting

Cam 2 is not available on the 1500-OEM.	In Panel Plus, check that the Acquisition Settings are configured correctly. Save parameters and reset the board when changing settings.
Warning - Invalid FGPA version for the selected digital camera type. Image is washed out or looks poor.	Version 10 of the FPGA driver firmware is required for the camera to operate correctly with the 1500-OEM. FPGA version 10 does not support other digital cameras. See the EAN-FPGA Firmware Update 1500-OEM for updating instructions.

6 Questions and Additional Support

For questions and additional support, please contact Technical Support. Additional support documentation and Engineering Application Notes (EANs) can be found on the Documentation page of the SightLine Applications website.

Appendix A - Camera Setup Notes

The AGS720p camera setup is done through the *InitAR0134CS* Camera Init Code in SightLine firmware when the acquisition settings are configured using the Panel Plus Basic Acquisition Settings tables. The settings in the camera do not need to be changed.

The following camera setup notes are useful for customers that build custom versions of the 1500-OEM board. Camera control registers are configurable through the I2C bus.

More information on configuring camera control registers can be found in the IDD under *Modules* » *Serial Port* » *SLAI2CCommand_t*.

1500-OEM - I2C bus 2:

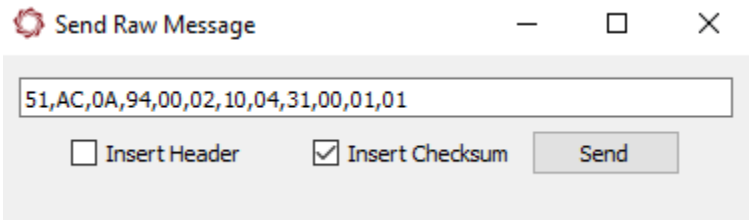
- `i2cdetect -a -r -y 2` (this should show device at bus ID 0x10)
- `i2cset -f -y 2 0x10 0x30 0x00` (register address 0x3000)
- `i2cget -f -y 2 0x10` (returns 0x24) (high by
- `i2cget -f -y 2 0x10` (returns 0x06) (low byte)
- Chip ID for Aptina AR0134 is 0x2406

1500-OEM example of enabling auto-exposure on Airborne camera using I2C bus 2 and Panel Plus:

1. Establish an SSH session to the OEM with Tera Term (recommended) or similar application.
2. From the Tera Term window type:

   `i2cdetect -a -r -y 2` (this should show device at bus ID 0x10)
3. From the main menu in Panel Plus go to *File* » *Send Command*. In the message field enter:

   51,AC,0A,94,00,02,10,04,31,00,01,01. Check the *Insert Checksum* box and click *Send*.



4. From the Tera Term window type:
   a. `i2cset -f -y 2 0x10 0x31 0x00` (register address 0x3100 for auto-exposure)
   b. `i2cget -f -y 2 0x10` (this should show 0x00 for high byte)
   c. `i2cget -f -y 2 0x10` (this should show 0x01 for low byte indicating the auto-exposure is now enabled)

Camera suspend-and-reset are controlled through 2 GPIO lines:

1500-OEM - GPIO174 and GPIO178:

- 1500-OEM J 4 (50 pin):
  - GPIO174 = pin 13
  - GPIO178 = pin 19
- 39-pin in FPC cable (Molex cable, FPC 39 Position 0.3mm pitch)
  - GPIO174 = pin 36
  - GPIO178 = pin 1