

PHANTOM

Miro<sup>®</sup> C110



ViSiON  
RESEARCH

AMETEK<sup>®</sup>  
MATERIALS ANALYSIS DIVISION



# MANUAL

When it's too fast to see, and too important not to.<sup>®</sup>

www.phantomhighspeed.com

# Miro C110 Camera MANUAL

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The contents of this manual may be subject to change without notification.

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# specifications

- Maximum 915 fps at full resolution of 1280 x 1024; 1295 fps at 1280 x 720; 52,445 fps at reduced resolution of 128 x 8; Minimum 100 fps at all resolutions
- 8GB high-speed internal RAM
- 1.2Gpx/second throughput
- 1.3 Megapixel; 2/3 inch CMOS sensor (9.18mm diagonal)
- 12-bit pixel depth
- 5.6  $\mu\text{m}$  pixel size
- ISO 640T; 640D color; ISO 2500D, 5000T monochrome; (adjustable)
- Continuous Adjustable Resolution in 128 x 8 pixel increments
- 5  $\mu\text{s}$  min. exposure standard
- Standard Ethernet and BNC connectors
- Operating temperature: 0°C to 50°C
- SDI available through BNC connector on back of camera
- Trigger Options: Dedicated BNC, or via Phantom PCC software
- Power: Camera: 16 - 28 VDC, 12W; 100 - 240 VAC 65W power supply included
- Gb Ethernet for control and data
- Multi-Cine: Partition internal memory into segments and make shorter recordings back-to-back without missing any action (63 maximum)
- Lens mount: C-mount, reversible to accept CS lenses

# 1

## Introduction



Miro C110

### Camera Capabilities

The Phantom® Miro® C110 is a member of the Miro C-Series family of small, flexible cameras designed for a large variety of applications and analyses. It is capable of capturing 1.2 Gigapixels per second (Gpx/s) of data from the CMOS sensor. At full 1.3 Mpx resolution (1280 x 1024), the Miro C110 can capture 915 frames-per-second (fps); 1,295 fps at 720p HD; and at a reduced resolution 128 x 8 the camera can capture 52,445 fps.

The Miro C110 has a C-mount and a sensor with small, densely packed pixels to capture detail. Its small size of 72mm x 93mm x 82.5mm and light weight of 0.54 kg make it easy to mount in tight places and on microscopes. It uses standard Ethernet and BNC cables.

## Image Storage

The Miro C110 is available with 8GB of internal high-speed memory.

## Sensor Characteristics

The Miro C110 uses a CMOS sensor available in color or monochrome.

The 5.6 micron ( $\mu\text{m}$ ) pixels provide a sensitivity, measured using the ISO 12232 SAT method, of ISO 5,000T; 2,500D for monochrome cameras, and 640T; 640D for color cameras (adjustable).

Each pixel has a bit-depth of 12-bits yielding 4,095 gray levels with high dynamic range.

Sensor resolution is 1280 x 1024 pixels “wide-screen” format. The rectangular shape of the 1.3 Mpx sensor allows the user to keep moving objects in the frame longer and is compatible in aspect ratio with modern display technology. The physical size of the sensor is 7.168 mm x 5.7344 mm (9.18mm diagonal).

The camera has a global electronic shutter, with minimum exposure time of 5 $\mu\text{s}$ .

## Advanced Features

**Multi-Cine:** The internal memory of the Miro C110 can be partitioned into as many as 63 segments for shorter recordings, back-to-back, without missing any action.

**Image-Based Auto-Trigger (IBAT):** The Miro C110 can detect changes in an image which can be used to trigger the camera (or even a number of cameras), making it easy to record unpredictable events.

**Continuous Recording:** Automatically save cines from internal camera memory to external storage, without user intervention.

**Memory Gate:** An input signal which, when activated, prevents the storage of the sensor produced image-data, by disabling write-access to memory.

**Event Marking:** Primarily used to tag events of significance during recording, to make it easier to jump from one event to the next during playback, along with easing the process of performing timing measurements of a recorded Cine.

## Lensing

The Miro C110 has a C-lens mount that can be reversed to accept CS lenses.

## Command & Control

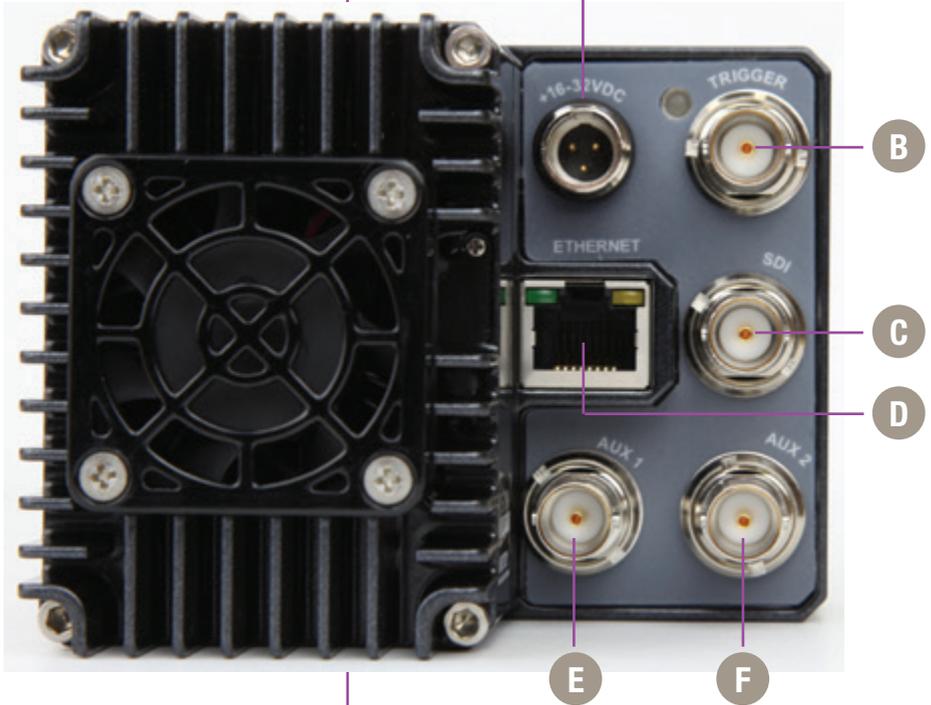
The camera is controlled with Phantom PCC software or a handheld Phantom Remote Control Unit (RCU).



Detailed information about Phantom cameras, features, and software can be found at:

**[www.phantomhighspeed.com](http://www.phantomhighspeed.com)**

# camera connectors



Miro C110 Rear View

# 2

## Connectors

**+16-28VDC**

**A**

Mini XLR connector connects to +16-28VDC Power Supply.

**Trigger**

**B**

Input: when a TTL pulse (rising / falling edge) is detected, camera triggers.

**SDI**

**C**

BNC connector for HD video.

**Ethernet**

**D**

RJ45 connector connects GigE to a control unit computer / laptop for camera control communication.

**AUX 1**

**E**

Input / Output (switchable via PCC):

- Default setting:
  - F-Sync (input / output): Connect an external source, including the F-Sync from a second Phantom camera, to drive the camera's frame rate. Use in combination with Sync; External in the External Sync menu.
- Available through drop-down box in PCC:
  - Strobe (input): Signal goes low for the duration of each frame's exposure
  - Event (input): When the Event signal is active, frames are tagged with an Event marker (as metadata). These events can be searched or referenced during playback.
  - Memgate (input): When Memgate signal is active the camera stops recording into its internal memory (frames are discarded).

**AUX 2**

**F**

Input / Output (switchable via PCC):

- Default setting:
  - Strobe (Output): Signal goes low for the duration of each frame's exposure.
- Available through drop-down box in PCC:
  - READY (output): When signal is high it indicates that the camera is in capture mode. Using PCC, signal can be set to go low at trigger or at the end of recording.



# 3

## Quick Start Guide

### Prepare Your Computer

Camera controlling computers:

1. Must have either the Microsoft Windows 7, 8.1, or 10 operating system installed.
2. Firewalls must be turned off.  
(Contact your IT Group if necessary)
3. Using the 'Windows Control Panel' set the IP address of your computer's network card to 100.100.100.1 with a 255.255.0.0 subnet mask.

### Install PCC Software

Install the latest version of Phantom Camera Control (PCC) software from the accompanying CD or USB key.

### Cable the Camera

Connect the 16-28VDC power supply to the camera's power connector.

Attach the supplied Ethernet cable (or any Ethernet cable) between the Phantom camera and the computer.

If an external trigger is being used to trigger the camera, connect it to the Trigger BNC on the back of the camera.

### Select Camera for Use

In the Manager Control Panel double mouse-click on the Phantom camera to be used from the 'Cameras' group folder.

### Define Recording Parameters

Click the 'Live' tab.

Click 'Cine Settings' and define the following parameters by either selecting the required value from the pull-down selection list, or typing the value into the respective data entry field.

1. Set 'Resolution' to the required Width x Height.
2. Choose the required 'Sample Rate' and 'Exposure Time'.

**Perform CSR**  
**Perform White Balance  
(Color Cameras Only)**

**'Arm' Camera**

**Trigger**

**Edit Cine**

3. Post Trigger to zero (0) by:
  - a. Moving the 'T' (Trigger Position) slider to the right, or
  - b. Enter zero (0) into the 'Last' data entry field.

Cover the camera lens first, then select the CSR, (Current Session Reference), button.

Place a white or neutral non-saturated object in front of the camera and right-click on the white or neutral non-saturated area in the displayed image, then Select 'White Balance' from the popup display window.

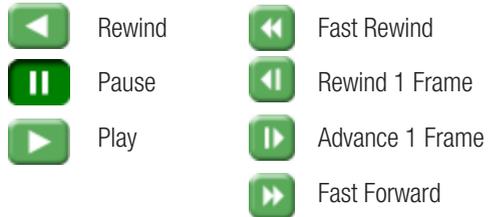
Click the 'Capture' button to start recording to the camera's internal memory (circular buffer).

At the end of the action, click the action 'Trigger' button at the bottom of the 'Live' panel, or

Provide a switch closure or an external trigger signal (TTL pulse) via the Trigger connector.

Click the 'Play' tab.

Using the following Video Control Buttons to locate the first image of the cine to be saved.



Locate the first image of the cine to be saved.

Click the 'Mark-In' button. 

Locate the last image of the cine to be saved.

Click the 'Mark-Out' button. 

Select 'Play, Speed, & Options' and enable (check) 'Limit to Range'.

Under the Video Control Buttons click the 'Jump to Start' button. 

## Review Edited Cine

Review the edited cine using the Video Control Buttons.

Click the 'Save Cine...' button at the bottom of the 'Play' panel.

## Save to Computer

In the 'Save Cine' window:

1. Navigate to the folder where you want to save the cine file.
2. Enter a file name for the cine file in the 'File name:' data entry field.
3. From the Save as type pull-down selection list select the 'Cine Raw, \*.cine' file format.
4. Click the Save button to begin downloading the cine file from the camera to the computer's hard drive.

Click the down-arrow of the 'Save Cine...' button.



Confirm cine save before deleting from internal memory

## Confirm Computer Save

Click the 'Open File'  button.

In the 'Open Cine' window:

1. Navigate to the folder containing the saved cine file.
2. Highlight the cine file to be opened.
3. Click the Open button.

Using the Video Control Buttons review the saved cine file.

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## Phantom Camera Control Application

# PCC

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The latest version of Phantom PCC software can be found and downloaded from the support section of the Vision Research website:  
[www.phantomhighspeed.com](http://www.phantomhighspeed.com)

### Pre-Installation

Phantom control software is certified to operate with the following Microsoft Windows operating systems: Windows 7, 8.1 and 10.

The computer and camera must be associated with the same sub-network to communicate with one another.

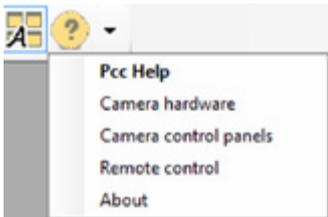
Vision Research has preset IP address (100.100.x.x) with a subnet mask (255.255.0.0) to the camera. Typically the IP address 100.100.100.1 / 255.255.0.0 is defined to the control computer. When multiple computers are used to control the same camera, each computer requires a unique IP address, for example, 100.100.100.1 (255.255.0.0), 100.100.100.2 (255.255.0.0), and so on.

The software is built around a multi-layered work area that includes the following work areas:

Provides quick access to the most frequently used functions. Position the mouse over a button and wait for a second to display a text box describing what it is.

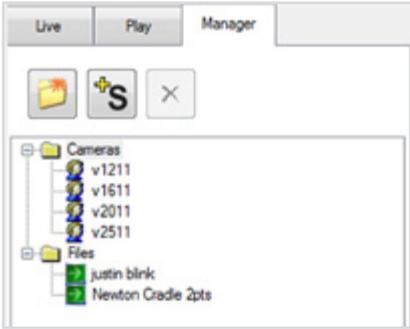
### PCC (Phantom Camera Control) Application Overview

#### Toolbar



Note the 'Help' buttons which provides valuable reference information on the software, including extensive documentation.

## Control Tabs



The main window of PCC is divided into three tabs: Live, Play and Manager.

When first started, the 'Manager' tab is selected. It is in this tab connected cameras are displayed, selected for use, and renamed. It is also used to manage saved Cine files.

To rename, highlight then click the name of a camera. This can be useful when working with multiple cameras.

All camera control and setting of shooting parameters (frame rate, shutter, etc.) is performed in the 'Live' tab.

The 'Play' tab is used to review, edit, and save Cine files, (either from the camera or from files on the local hard drive).



## PVP (Phantom Video Player) Application Overview

PVP can be launched directly from the desktop, or by clicking the 'Video Out' toolbar button in PCC. PVP controls only the camera's HD-SDI outputs as connected to a compatible SDI monitor.



PVP provides the ability to view, capture, review, edit, and/or save a Cine recorded into the camera's RAM to a hard drive.

## Camera Control via PCC

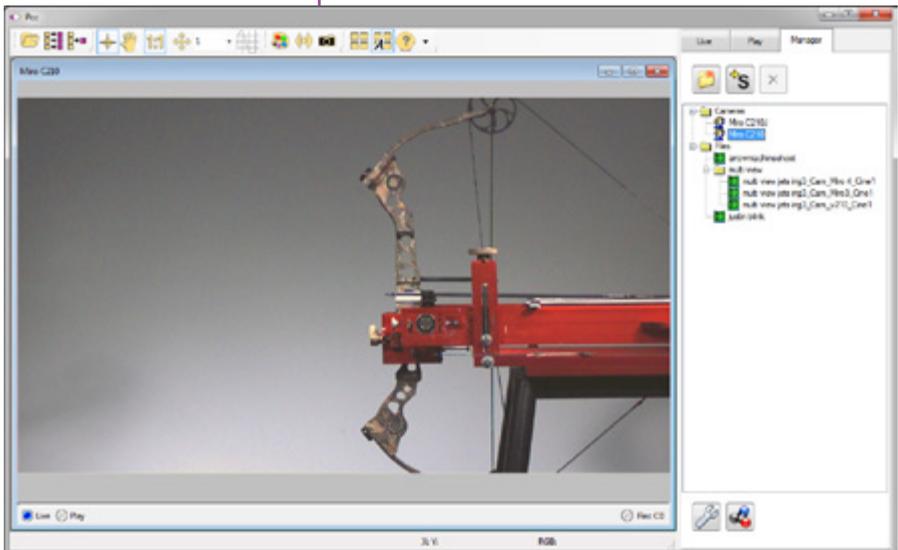
PCC provides the ability to select various units for specific camera parameters by clicking the 'Preference' button at the bottom of the Manager tab.

Units can be set to commonly used values ('Presets') or they can be customized using the pull-down selection lists. First time users should use one of the three 'Presets'.



The 'Exp' unit is probably the most important unit to be set. It specifies what unit to use when setting the exposure time. You probably will want this set to micro-seconds. The other unit to set is PTF (Post Trigger Frames) covered later in this section.

Double-click the camera(s) to be controlled listed in the 'Manager' tab, or select the camera(s) from the 'Camera' pull-down list in the 'Live' tab.



## Image Processing

Once a camera is selected a 'Preview' panel will display to the left of the control tabs showing the current image being captured by the camera. This image may differ slightly to that of the image being output over the camera's SDI port due to display differences in the video monitor and computer screens.

You can adjust the display options by clicking on the 'Image Tools' toolbar button.

The 'Image Tools' window is used to view a 'Histogram' and change settings that affect the computer display and the video output of the camera.

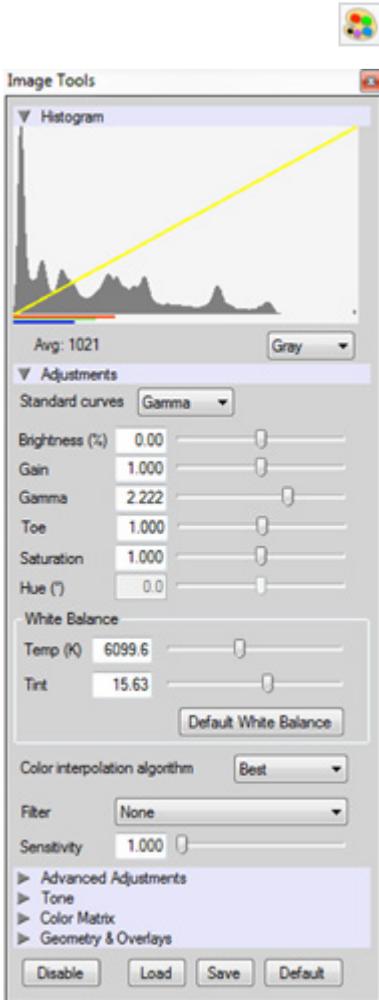
Some of the variables include; brightness, gain, gamma, saturation, hue, white balance adjustments (Temp (K) and Tint), individual red, green and blue pedestal, gain and gamma values, tone control, and more.

When Log mode is selected, most of these variables are locked and can not be adjusted.

At the bottom of the window is a 'Default' button that restores all parameters except white balance, tone, and color matrix to their default values.

The 'Default White Balance' button restores white balance to the default (which under the most typical lighting will produce a green image).

The Tone 'Reset' button restores the image tone to the default values, and the Color Matrix 'Restore' button return the color matrix values to their default values.



Changes made only affect the metadata of the Cine file, not the raw data. If you are recording the camera's video output it is important that these be set to values that produce the image you wish to record.

The 'Zoom Actual Size' toolbar button resizes the images being displayed in the Preview/Playback panel to their actual size.



The 'Zoom Fit' toolbar button resizes the images to fit panel.

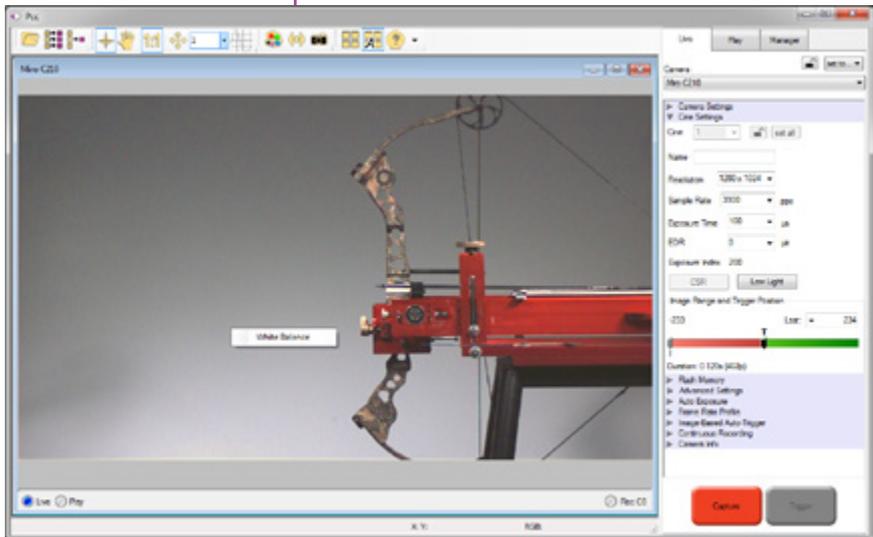


Images can also be zoomed to a specific magnification ratio by selecting a number from the pull-down list to the right of the Zoom Fit button.

## Automatic White Balance

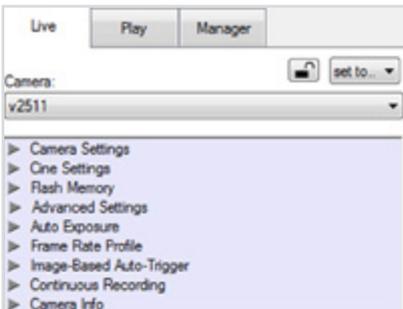
Performing a White Balance should be the first step in color adjustment (color cameras only).

Right mouse click on area that resembles white in the image in the 'Preview' or 'Playback' panel, then click on the 'White Balance' pop-up window. It is not necessary to fill the frame with white – a small target can be used.



## Capture Settings

Just below the 'Camera' selector in the 'Live' tab are a series of expandable headers, which contain groups of related camera settings.

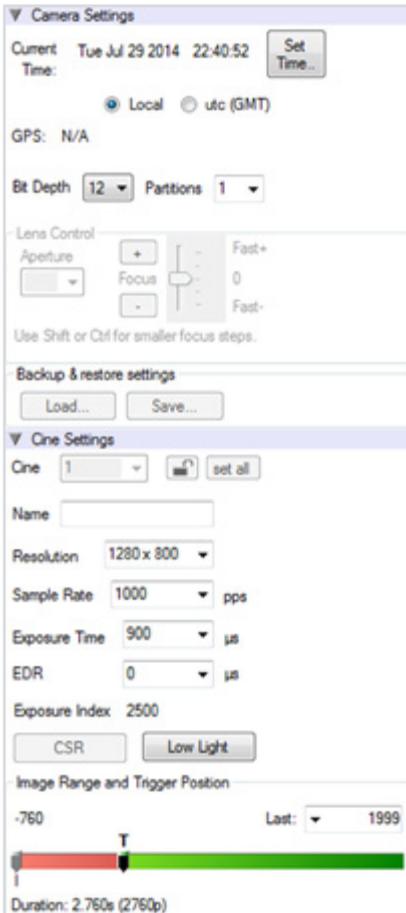


This manual will cover the most commonly used settings, see the 'Pcc Help' file for details of other settings.

## Camera Settings & Cine Settings



Camera Settings are used to set and recall the overall camera system parameters. Cine Settings are used to set the capture parameters.



**Set Time:** Synchronizes the time stamps embedded in the recorded image data to the computer's clock.

**Bit Depth:** The Miro C110 operates in 12-bit mode only.

**Partitions:** Select the number of desired partitions (evenly divided memory segments) from the 'Partitions' pull-down menu. For basic camera setups, this should be set to one.

**Lens Control:** Not supported by the Miro C-Series cameras.

**Backup & Restore:** Allows for user settings to be saved and recalled from the camera's memory.

**Resolution:** Set the the number of pixels used to capture an image. For example, if 1280 x 1024 (width x height) is set, the full sensor space is available. Smaller resolutions allow higher recording speeds. Cropped resolutions are set using the 'Crop and Resample' menu in Image Tools.

**Sample Rate:** Set the acquisition frame rate in frames-per-second (FPS).

**Exposure Time (shutter):** Set the exposure time in micro-seconds, percentage, or degrees (this depends on how the PCC preferences are set).

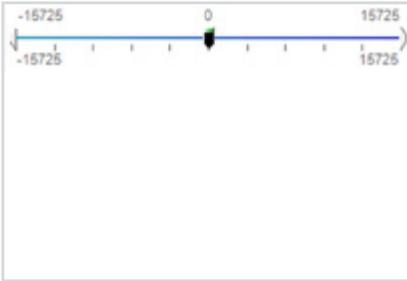
**EDR (Extreme Dynamic Range):** Not supported.

**Exposure index:** This is a reference display of the EI value in relation to the Image settings.

**CSR (Current Session Reference):** With the lens covered performing a CSR resets the black point of every pixel for optimal image quality.

**Image Range and Trigger Position:** The slider represents the memory buffer, with the 'Duration' indicated in seconds and the total number of frames available.

## Key Advanced Settings



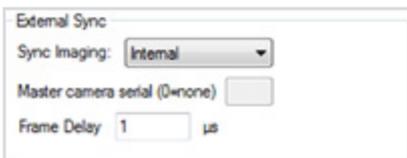
The trigger position is indicated in the 'Last' pull-down menu or as the 'T' slider along the timeline. The trigger position is the point at which the camera stops continually recording when a trigger signal is detected.

The first of these key features is the option to enable the 'Start/End of recording actions' to be performed automatically at the beginning or end of a shot. The most common ones are:

- 'Auto play Video Out' begins playback after recording. The range marked under 'Auto play Video Out' affects both playback and saving to the internal CineFlash.
- 'Restart Recording,' when enabled, automatically restarts the recording process after the 'Auto' actions have been performed.



When 'Restart Recording' is enabled PCC does not provide any user confirmation before the clip is erased from RAM and starts recording again. This feature should be used with care!



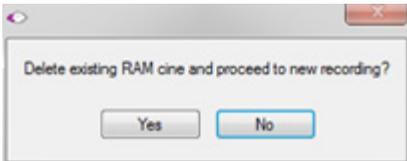
'External Sync' instructs the camera to utilize one of the following three frame sync clock sources:

- Internal - instructs the camera to utilize its' internal crystal oscillator to drive the camera's frame rate.
- External - should be selected when an externally supplied frame sync clock pulse is supplied to drive the frame rate. This can be used to synchronize two cameras together via F-Sync.
- LockToVideo - Frame rate is driven by the camera's current video rate. FPS will jump to the closest multiple of the current video rate (23.98, 24, 25, 29.97 or 30).

## Recording a Cine

In 'Loop' mode to begin recording to the camera's RAM click the red 'Capture' button.

## Triggering the Camera



## Reviewing a Cine



The red 'Capture' button changes to 'Abort Recording' and the green 'Trigger' button is enabled when the camera is recording. The Abort Recording button instructs the camera to stop recording, leaving the camera's RAM empty.



Selecting the 'Trigger' button instructs the camera to immediately stop recording when the 'Trigger Position' is set to zero. If a value greater than zero is set, the camera will continue to record 'post-trigger' frames until the user specified value is met.

Using an external trigger signal provides a more accurate trigger to the camera.



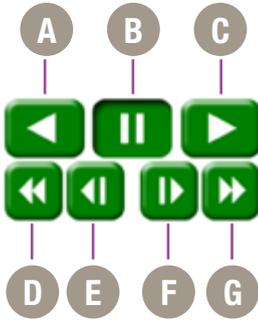
If a clip exists in the camera's memory, you will be asked if you are sure you wish to delete it before continuing. If yes, click 'Delete cine(s) and start new recording'.

Once the camera has completed recording a Cine in the camera's RAM it can be reviewed by selecting it from the 'Cine' pull-down selection list in the PCC 'Play' tab.

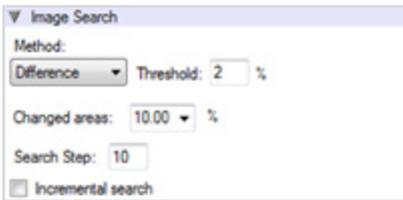


A previously saved Cine stored on the computer's hard drive can be opened using the 'Open File' toolbar button (also places the file under the 'Cines' group folder in the Manager tab).

The viewing option can be changed via the 'Play Speed & Options' and the Cines' metadata can be viewed in the 'Frame Info' and 'Cine Info' sections.



### Performing a Quick Search Through a Cine



### Editing a Cine

### Saving a Cine

Use the 'Video Control' buttons to review the cine.

- A.** Rewind
- B.** Pause
- C.** Play
- D.** Fast Rewind
- E.** Rewind 1-Frame
- F.** Advance 1-Frame
- G.** Fast Forward

Quickly search through cine files to find the points of interest:

'Scroll' (scrub) through the clip using the 'Image Location' slider or click anywhere on the timeline to jump to points in the cine quickly.

'Jump' to the trigger frame by clicking on the 'T' button, or jump to specific frames by entering the frame number into the jump '#' data entry field, then hit the enter key.

'Image Search'. The goal is to search or find an image change in the recording, based on the difference between image content. Right-Click on the 'Play' button to begin the image search. Besides image content changes, Image Search can also look for images that are tagged as 'Event' images.

Using the following 'Video Control' buttons locate the first image of the cine to be saved and click the 'Mark-In'  button.

Locate the last image of the cine to be saved and click the 'Mark-Out'  button.

Click 'Play, Speed, & Option' and enable (check) 'Limit to Range'.

Under the 'Video Control' buttons click the 'Jump to Start'  button, then review the edited cine.

Click the 'Save Cine...' button to save the edited cine to the computer's hard drive.



# 5

## Download & Image Processing

### Introduction

The images recorded on the camera's RAM are stored in a Vision Research proprietary RAW (uncompressed) file structure called a 'Cine' file.

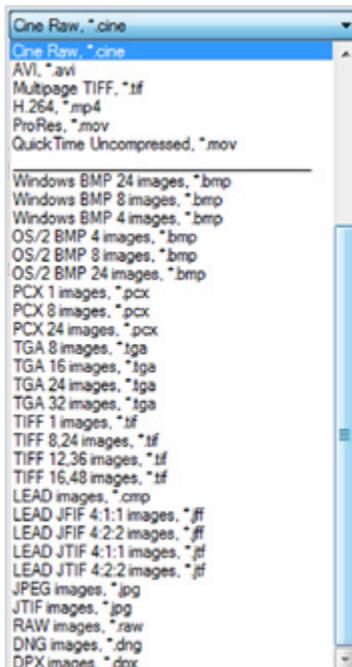
These Cine files can be converted to industry standard formats (ProRes, H264, DPX, DNG, TIFF, JPEG, and more) with PCC software provided by Vision Research. Phantom PCC and PVP software are only compatible with Windows operating systems, however there are third party solutions available for working with Phantom cameras in Mac OSX.

### PCC Software Solutions

Windows-based PCC software provides the ability to convert cine files into a number of other formats.

### Converting Cine Files

Single cine files can be converted by selecting the desired format from the 'Save as Type' selection list in the 'Save Cine' dialogue window.



The file formats above the separator line in the 'Save as Type' selection list are 'movie-like' formats (meaning the entire clip will be saved as a single file) while the formats below the line are image formats (meaning each frame of cine will be saved as a sequence of images).



Re-saving a clip in the 'Cine RAW' format can be useful for creating sub-clips with no loss in image quality or metadata.

To convert a cine to a 'movie-like' format select the desired format from the list, navigate to the destination folder, assign a file name to the clip and save.

Some valuable parameters can be found in the 'advanced settings' window, such as the particular codec.

Other formats, like .avi and .mp4 allow the compression ratio to be entered. The lowest compression is the default.

To convert a cine clip into a sequence of images (frames) you must add one of the following annotations to the end of the file name: '!n' or '+n (where n is the number between 1 to 8). This will assign the sequential frame numbers to the file name for each frame being created.

Example: image\_!5.tif

The '!' annotator instructs the software to append the cine's image number (relative to the trigger point) to the file name. If the first frame in the clip is - 100, then the first converted frame will have the name: image\_-00100.tif.

The '+' annotator will add frame numbers starting at 1.

Example: image\_+5.tif

This will cause the first converted frame to have the name: image\_00001.tif



Ensure all image adjustments have been applied prior to initiating the conversion process. All metadata (gain, gamma, saturation, etc.) will be embedded into the converted images.

## Batch Convert



The 'Batch Convert Files' toolbar button can be used to convert a single, or multiple saved cine files into any one of the supported file formats.

Use the shift and/or control keys, to select the cine files you wish to convert in the 'Open Cine' dialogue window, then click the 'Open' button.

Navigate to the destination folder, in the 'Multifile Convert Destination' dialogue window, and select the file format.

The 'File Name' will depend on the type of file format you are converting to.

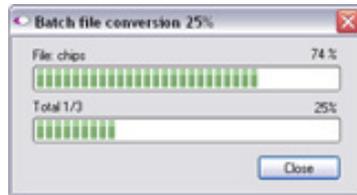
If you are converting the cine file into a 'movie-like' formats leave the file name as 'All selected file.' The software automatically assigns the original file name to the converted file and appends the appropriate file extension.

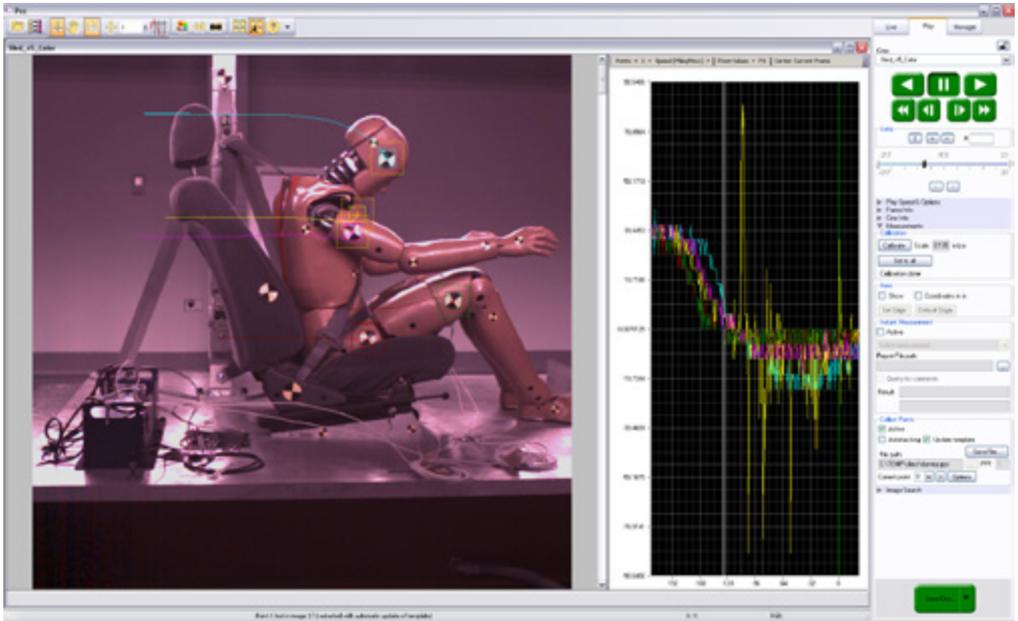
However, if you are converting the file into a sequence of images, you need to enter the annotation only detailed in the 'Convert a Cine' topic earlier in this chapter.

Example: +4

The software automatically creates a separate folder for each of the files being converted, assigns the original file name, and appends the appropriate image number and file extension to each image.

Once the 'Convert' button is clicked a progress window appears. Each converted cine will be placed in its own folder named after the original cine file.





Example of three points being tracked. The graph plots and displays, by default, the x-axis coordinate of all points / targets from the Origin point.

# 6

## Measurements

### Introduction

With the PCC (Phantom Camera Control) 2-D motion analysis tools, the end-user can perform timing, position, distance, velocity, angle and angular speed measurements, and track multiple points or objects to compute and graph their XY-coordinates, speed, or acceleration. PCC, for example, provides several edge detection algorithms and image processing tools to improve the measurement process. The measurement technology provides a motion analysis system that harmonizes measured data with images.



Details on how to use the various PCC measurement tools can be found in the PCC Help File > Step-by-Step Procedures > Play Panel Procedures > Measurements.

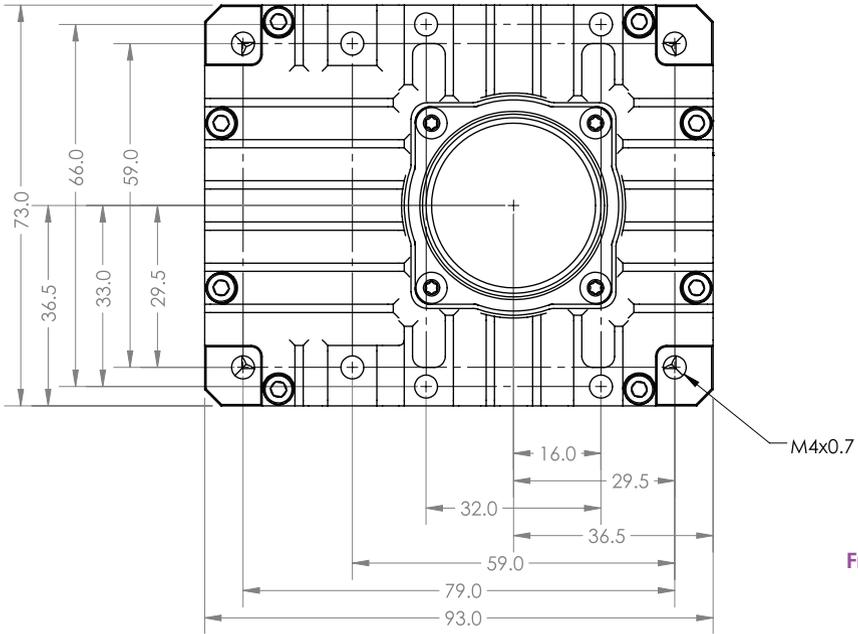
### Data Acquisition



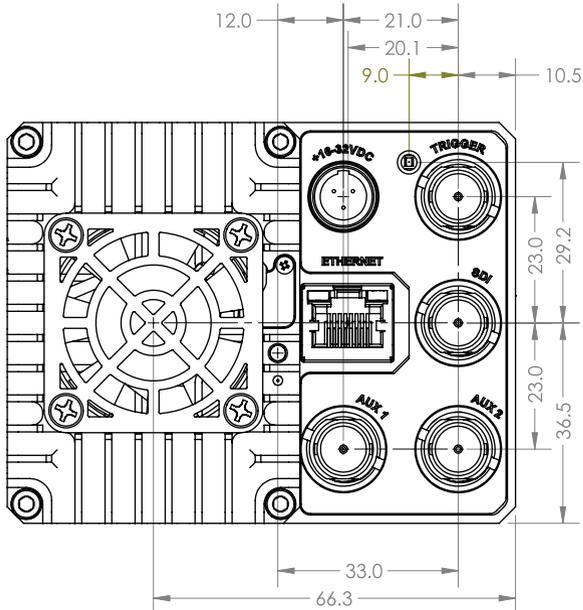
To investigate the effect environmental conditions may have on the recorded data, a National Instruments™ USB- or M- Series Data Acquisition (DAQ) module can also be used to acquire data from a wide range of sensors, and synchronize it with slow-motion video images recorded on a Phantom camera, using Phantom Camera Control (PCC) software.



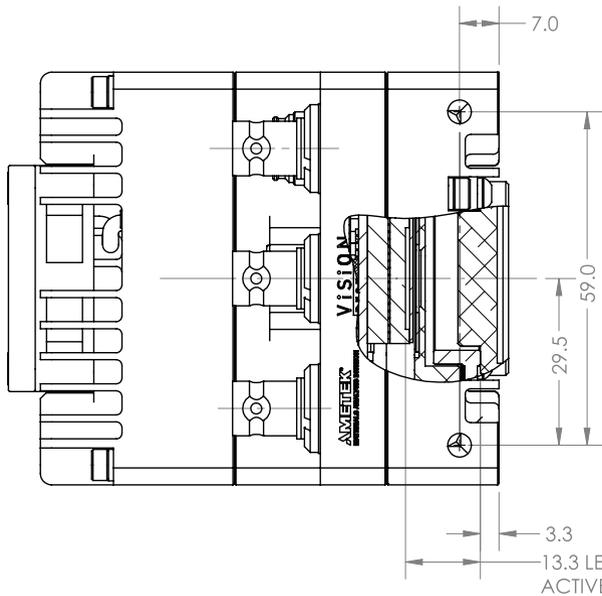
# 7 | Support



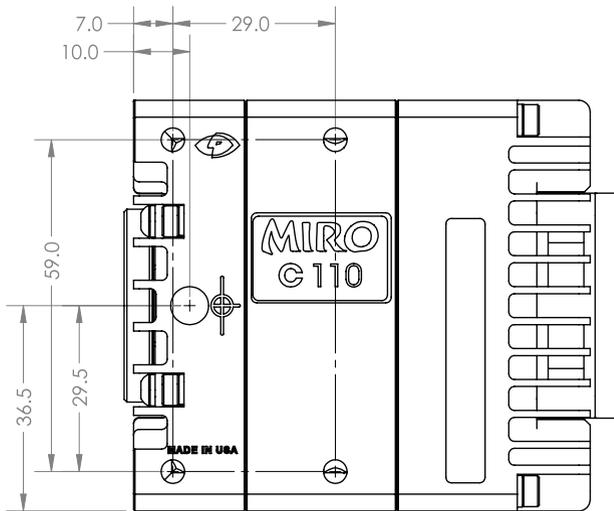
Front View



Rear View



Right View



Left View

# connector pinouts



Use these schematics to build custom cables at your own risk. Mis-wired cables can cause serious damage to the camera, which is not covered under warranty. Vision Research recommends only using cables supplied by Vision Research.



These pin-out diagrams refer to the connector on the camera body. Part numbers indicated are for the cable's connector.

## Power Connector



Power port

3-pin Mini XLR Connector part # REAN RT3FC-B

PIN	NOMENCLATURE / FUNCTION
1	GND / Power Ground
2	VDC / Provides DC (Direct Current) positive power to the Phantom camera. Valid voltage ranges are +12-28VDC
3	CHGND / Chassis Ground

## Ethernet Connector



Gigabit Ethernet port

RJ-45

PIN	NOMENCLATURE / FUNCTION
1	MDI2+ / Gigabit Ethernet
2	MDI2- / Gigabit Ethernet
3	MDI3+ / Gigabit Ethernet
4	MDI3- / Gigabit Ethernet
5	MDI1+ / Gigabit Ethernet
6	MDI1- / Gigabit Ethernet
7	MDIO+ / Gigabit Ethernet
8	MDIO- / Gigabit Ethernet

## BNC Connectors

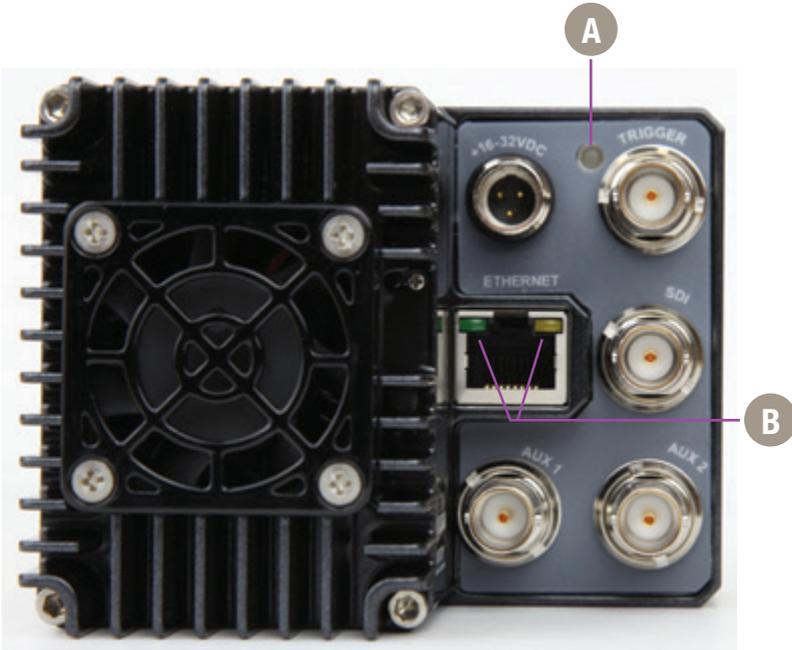


### Multiple signal ports

#### BNC

	Description
Trigger	Input: when a TTL pulse (rising / falling edge) is detected, camera triggers.
SDI	Output: for HD video.
Aux 1	Input / Output: switchable via PCC: <ul style="list-style-type: none"><li>• Default setting:<ul style="list-style-type: none"><li>– F-Sync (input / output): Connect an external source, including the F-Sync from a second Phantom camera, to drive the camera's frame rate. Use in combination with Sync; External in the External Sync menu.</li></ul></li><li>• Available through drop-down box in PCC:<ul style="list-style-type: none"><li>– Strobe (input): Signal goes low for the duration of each frame's exposure.</li><li>– Event (input): When the Event signal is active, frames are tagged with an Event marker (as metadata). These events can be searched or referenced during playback.</li><li>– Memgate (input): When Memgate signal is active the camera stops recording into its internal memory (frames are discarded).</li></ul></li></ul>
Aux 2	Input / Output: switchable via PCC: <ul style="list-style-type: none"><li>• Default setting:<ul style="list-style-type: none"><li>– Strobe (Output): Signal goes low for the duration of each frame's exposure.</li></ul></li><li>• Available through drop-down box in PCC:<ul style="list-style-type: none"><li>– READY (output): When signal is high it indicates that the camera is in capture mode. Using PCC, signal can be set to go low at trigger or at the end of recording.</li></ul></li></ul>

# led indicators



Miro C110 Rear View

## Trigger LED

A

COLOR	CAMERA STATE
White	Camera is booting up
Green	Camera is in Preview mode
Red	Camera is in Capture mode
Red Flashing	Camera is in Trigger mode, and saving images

## Ethernet LEDs

B

COLOR	ETHERNET STATE
Green	Ethernet Link
Amber	Ethernet Activity

## What are the recording limits of a Miro C110?

Resolution (W x H)	Max FPS <sup>1</sup>
1280 x 1024	915
1280 x 720	1295
1024 x 768	1215
768 x 576	1615
768 x 480	1935
512 x 512	1815
512 x 384	2405
512 x 320	2870
384 x 288	3180
256 x 256	3565
128 x 128	6870
128 x 64	12805
128 x 16	36365
128 x 8	52445

<sup>1</sup> Determined by 'Resolution' (Height) setting

## Can I use any Ethernet cable with the Miro C110?

Yes. We include an Ethernet cable and a BNC cable with the camera, just to get you started. But any Ethernet or BNC cable will work.

## Can I use my F-mount lens with the Miro C-Series cameras?

Yes, with a converter. The Miro C's come with a C lens mount that can be reversed to become a CS lens mount. To use an F-mount lens, you can purchase a converter (part number VRI-FMNT-CMNT).

## The C110 looks like the C210. Is it Hi-G? Can it be used with a Miro Junction Box?

The Miro C110 has many of the design features as the C210, and it is made to be rather tough. However, it is not specified as a Hi-G camera, and cannot survive the same shocks and vibrations that the C210 can survive. The C110 is not designed to work with a Miro Junction Box, and has different connectors.

## If the camera doesn't have a shutter, how can I perform a Current Session Reference?

The Miro C's do not have a shutter, but you can still perform a Current Session Reference (CSR). Just make sure you cover the lens before clicking the CSR button.

## What are the available signals for the C110?

Trigger (dedicated BNC); SDI (dedicated BNC); F-Sync (Aux 1 default); Strobe (Aux 2 default)

## What is the worst case power draw of the cameras?

The cameras draw only 12W during operation.

**There are fixed black spots on the image, particularly at small apertures.**

This is most likely caused by dust particles stuck on the sensor or OLPF (optical low pass filter) surface. The best way to check is to remove the lens and look at the glass surface with a bright light source. Vision Research recommends not to use canned air or cotton swabs to clean the sensor surface. It is safer to use a manual bulb-style air blower and/or sensor cleaning brush for removing loose dust particles.

Additional tips for cleaning sensors can be found in the maintenance section of this manual.

**The live images look scrambled and the frame rate can't be set.**

If the image is non-responsive and scrambled, the camera may be set to an external sync without a sync source connected. In the PCC > Live > Advanced Settings menu, check the External Sync setting to ensure that 'Internal' is selected.

**Restoring the factory defaults**

If the camera is stuck in an unusual state it may be useful to restore the camera's factory defaults. This returns the capture parameters, image processing, video modes, and image calibration back to the original settings.

To do this, you will need to perform an 'iLoad'. For details on performing an 'iLoad' follow the 'Step-by-Step Procedures / Live Panel Procedures / Advanced Settings / Performing an iLoad (on a Ph16 Camera)' topic within the supplied PCC Help file.

**Back Focus Adjustment**

Due to differences in various lenses and other mechanical tolerances it may be necessary to adjust the lens mount on the camera to obtain proper focus. In most cases, changing a lens or replacing a mount will not require adjusting the back focus, though it should be verified. When the focus distance marks on a lens do not match the measured distance between the sensor & subject, it indicates the need to adjust the back focus.

By adjusting the back focus, you are changing the distance of between the flange and the sensor plane. Shims are included to assist in both slight and coarse back focus adjustments.

## Sensor & OLPF Cleaning Technical Tips

- Sensor cleaning should only be attempted by experienced imaging professionals.
- Use a small, but powerful flashlight to look at the sensor and filter, it's easier to spot the dust.
- The OLPF assembly is removable and located in front of the sensor. Once the lens mount is uninstalled the OLPF can be easily removed (2 screws) for cleaning (if applicable).
- Sensor cleaning must be done in a clean and controlled environment.
- Always have a forced-air bulb style blower and a clean sensor cloth handy for more serious dirt.
- Sensor cleaning solution (like Eclipse) should only be used if absolutely necessary, and applied with a soft wipe intended for sensor cleaning.
- Cotton swabs aren't a good idea, unless they are wrapped in a sensor wipe material. They leave behind more than they remove.
- Never use your finger to get a speck of dust off, it's going to make things much worse.
- Never blow on the sensor or OLPF.
- Never put sharp objects near the surface of the OLPF or sensor.
- Always keep the Phantom body cap on the camera when there is no lens attached.

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