

## FEATURES

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Subject to change Rev July 2012

# Automatic Mechanical Shutter & Automatic Black Reference

## AUTO BLACK REFERENCE APPLICATIONS:

Applications that benefit most from Auto Black Reference include:

- Explosive testing where access to the camera is restricted.
- Rocket or missile launch test where access to the camera is restricted.
- Any environment where a CSR is to be performed prior to image capture.

### INTRODUCTION:

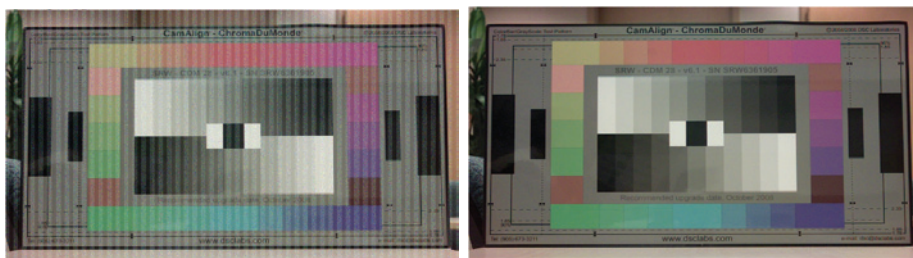
The use of an internal mechanical shutter has become one of the most popular features on our newest Phantom camera models. This Automatic Mechanical Shutter feature automatically shades the sensor during a Current Session Reference (CSR). This allows the camera operator to do a CSR without manually capping the lens. Because of the overwhelming popularity of this feature, it can also be used with our existing line of v-Series cameras, (the Phantom v5.2, v7.3, v9.1, and v10), with the use of an optional external mechanical shutter.

The convenience of not having to cap the lens during a CSR translates into higher productivity and better image quality. Furthermore, it enables doing a CSR in situations where it was previously impossible (with unattended cameras, for example).

Having an Automatic Mechanical Shutter means you can utilize the Automatic Black Reference feature and get a valid CSR each time you put the camera in capture mode – even if you are using the multi-cine feature. This means you always have a valid current session reference for every shot.

### GENERAL OPERATION:

During use, the sensitivity of the CMOS sensor's pixels can drift due to changes in resolution, exposure time and temperature, which can lead to inaccurate color representation and substandard image quality. A Current Session Reference calibrates all pixels that will be used for a given set of camera parameters, and sets them to pure black - an important step in ensuring that the Phantom high speed camera delivers the most accurate image possible.



The image on the left depicts an image prior to performing a CSR. The image on the right shows the same image after CSR has been performed. Notice the removal of the various artifacts in the image providing a high quality image.

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#### IMPORTANT OPERATION NOTES:

The Automatic Black Reference feature is only available for Phantom cameras equipped with the Automatic Mechanical Shutter feature.

Phantom cameras with an External Mechanical Shutter will recognize that a shutter has been installed only when it has been connected to a Phantom Break-Out-Box before the camera is powered up.

To connect the break-out-box to the external shutter:

1. Attach the Power/Control cable of the break-out box to the Power/Control Connector located on the side of the automatic shutter lens mount housing.
2. Attach the 19-pin connector of the break-out box to the 19-pin Capture interface on the back of the camera, and apply power.



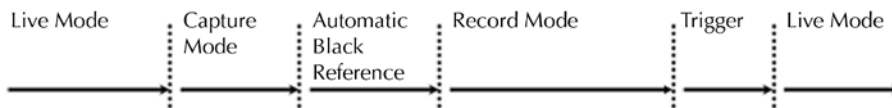
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The Automatic Mechanical Shutter feature will, when a CSR is performed, automatically close the mechanical shutter, perform the CSR calibration, and then re-open the shutter providing a valid CSR for the next shot.

And if the Automatic Black Reference feature enabled, when a cine start recording a CSR slot will be allocated to the cine file, and a black reference operation will be performed with the results being saved into the slot. During the lifetime of the recording stored in DRAM, the CSR slot is kept and all images from the cine file are corrected using the black reference data within. The CSR slots are freed when a stored cine file is specifically deleted or when the camera is placed into the capture mode.

For cameras having an attached Phantom CineMag® operating in the R/S (Run/Stop) recording mode, recording into the Phantom CineMag is delayed until the black reference operation has completed. All frames saved to the Phantom CineMag will be corrected with the obtained CSR (Current Session Reference) as depicted in the timeline shown below.



#### HOW TO ENABLE AUTOMATIC BLACK REFERENCE:

The following procedure describes the steps necessary to activate the Auto Shutter feature:

1. Start the PCC (Phantom Camera Control) application.
2. From the Manager Control Panel select the Phantom camera to be defined by moving the mouse over the desired available Phantom camera you wish to control, then double-click the left mouse key.
3. From the Live Control Panel click on Advanced Settings.
4. Enable, (check), Auto Black Reference.

When enabled, checked, the Auto Black Reference parameter eliminates the need to cover the lens prior to performing a Current Session Reference with Phantom cameras having the Internal or External Automatic Mechanical Shutter option.