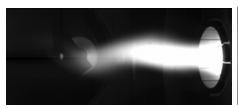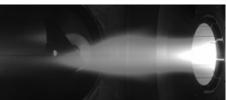# FEATURES

EDR - Extreme Dynamic Range™

INTRODUCTION:

EDR is especially effective where "hot spots" do or potentially, exist. By selecting an EDR exposure time that is one-half to one-quarter of the global exposure time, the user can reduce the number of saturated pixels within the scene. This allows the user to extract data from an area where otherwise, the data are lost due to over exposure. The surrounding pixels remain unaffected and are exposed normally. Traditionally, users had to choose between exposing for the bright areas and under exposing the rest of the scene, or exposing for the overall scene and sacrificing the data in the overexposed areas. With EDR, a good exposure is possible for both simultaneously within the frame.

The following images illustrate the result of using the EDR feature.

The image on the left has been determined to be the best exposure for recording this particular subject, but it is a compromise between light and dark like most high contrast subjects are. No EDR is used. In the image on the right EDR has been activated. Notice the increased visible information in the flame and plasma area, while details in the darker parts of the scene have been retained. In the full resolution images, very good detail can also be observed in nozzle segments on the outer side of the combustion area.

EDR doesn't just apply to self illuminating or explosive events. Any subject that varies greatly in brightness levels can benefit from this feature, color or monochrome.

GENERAL OPERATION:

To accomplish this the camera resets all pixels that are above a preset threshold, calculated at a certain time during the frame exposure, back to that threshold and then allow all pixels to continue being exposed. This preset threshold is set at the factory to a level that is about midway between black and saturation. Essentially what this does is slow down those pixels that are charging so fast and destined to become saturated before the exposure time expires. It makes them back up little,

EDR APPLICATIONS:

Applications that benefit most from EDR include:

- Rocket engine plume analysis

- Missile and spacecraft launches

- Ordinance testing where a fireball is present

- Ballistics testing where muzzle flash is present

- Recording of objects with highly reflective surfaces

- Any scene where "hot spots" are present

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then keep going. This will reduce the possibility of those pixels from becoming saturated allowing the details in the "whites" of the image to be as good as those in the "blacks".

Keep in mind that the ratio of the EDR exposure to the global exposure will affect the overall image quality. As the ratio increases, the contrast will be reduced resulting in a "flatness" of the image. At very high ratios (greater than 3:1) the image will display noise that appears as graininess in the image. For some applications, reduction of image quality may be unacceptable. However, the effect of EDR in capturing valuable data that would otherwise be lost due to saturation, may be deemed worth the degradation in overall image quality.

HOW TO SPECIFY AN EDR EXPOSURE SETTING:

The following procedure describes the steps necessary to set an EDR exposure setting:

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 Cine Settings selector, if not already open, then

4. Specify the Phantom camera's EDR exposure setting:

   a. Click the down-arrow to the right of the EDR exposure time entry window and select a predefined EDR exposure time from the pull-down selection list.

   b. Alternately, the end-user can enter any number in increments of 1 from the minimum to maximum value displayed in the list box. These values can be in 1μs increments, or a percentage of the Exposure Time value.

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IMPORTANT OPERATION NOTES:

Optimum EDR settings usually require some experimentation but are usually between 1/2 and 1/10 of the Exposure time. Settings larger than this will not have much effect.

EDR exposure times should be set at approximately 1/2 of the Exposure time as a starting point. By setting the EDR exposure to 1/2 of the Exposure time the brightest pixels in the image will be exposed for one stop less than the darker pixels.

EDR will not work correctly if the Exposure time is set to the maximum allowed exposure for a particular sample rate setting. However, by decreasing the exposure some (1μs will do the trick), EDR will work properly.

EDR may cause cameras with color sensors to experience variations in the color of the images.

EDR works with most Phantom cameras. Exceptions are cameras with a progressive shutter (Phantom 65 and Phantom HD Series) and the Miro eX1 or Miro 1 – where it is turned off.

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