Post Triggering and the Phantom Cameras

Overview

This document does not take into account cameras configured to start and wait in Pre-trigger mode.

Objectives

At the end of this tutorial, you the user will be able to:

- Specify how the Post Trigger feature operates within Phantom cameras
- Explain the image flow within a Phantom camera,
- Describe the memory allocation process
- Define trigger, and triggering techniques
- Explain how post-triggering works
- Example Post Trigger Application
- Restarting the Capture process

Image Flow

In order to understand the Post Trigger mechanism, utilized by the all Phantom camera models, one must understand a Phantom camera's image flow.

The Initial Step of the Image Flow Process

By default, as soon, and as long as a Phantom camera is powered up and the sensor is exposed to light, (or in other words receiving an image), and the camera is placed into the Capture state, The status bar, located just below the live preview panel, in the Setup and Recording dialogue window display that the camera is "Recording cine *n*, Waiting for a Trigger". During this state, the images will be digitized, via an analog-to-digital converter, and subsequently stored continuously in the cameras DRAM (Dynamic Random Access Memory) buffer. *(See Figure 1).*

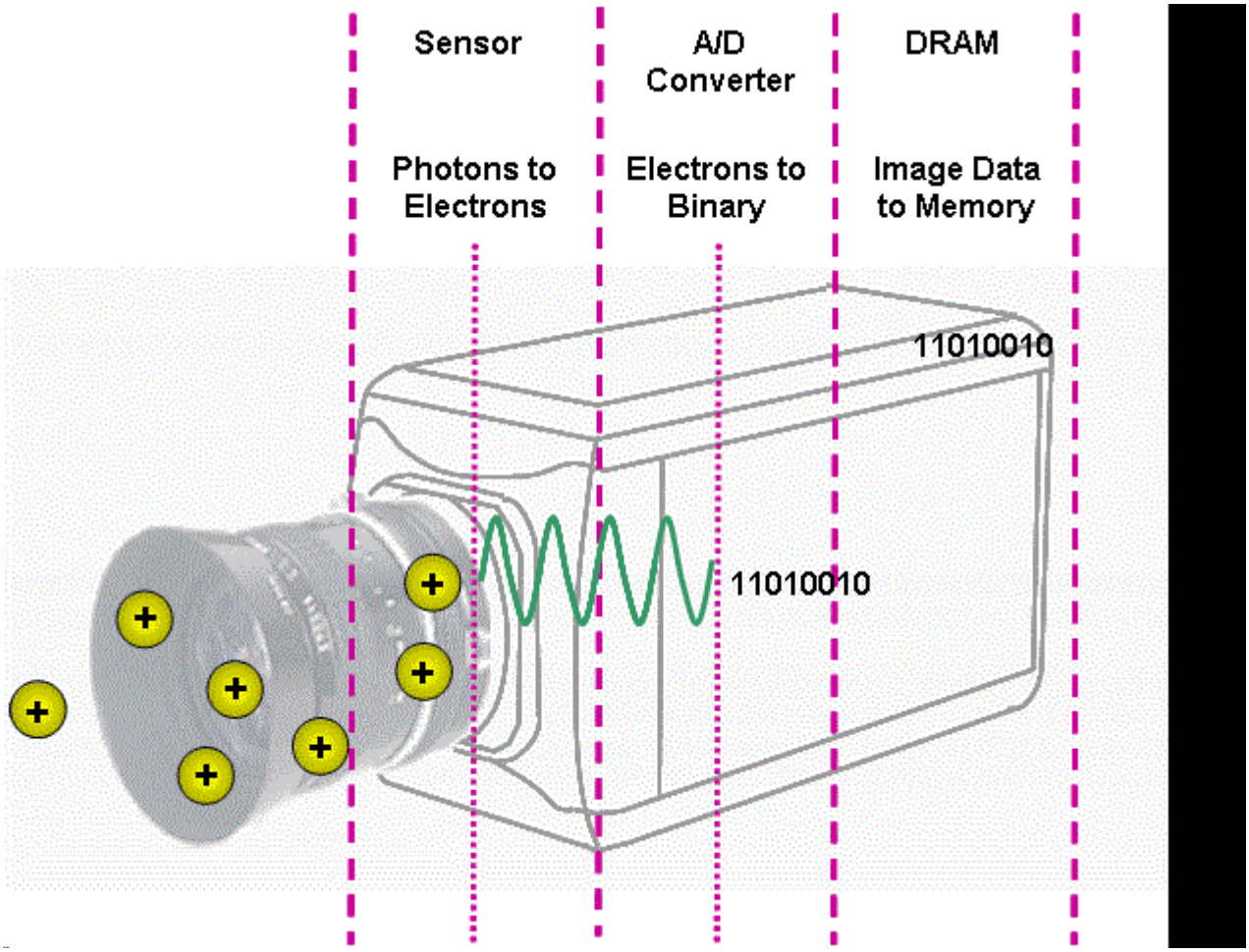

Figure 1: Image Digitalization Process

This image data is sent to the camera's memory and it fills its buffer in a scrolling fashion. What this means is when the buffer fills completely, when full, fresh image data will overwrite the oldest existing data. This process is referred to as the Capture, (recording) process. *(See Figure 2).*

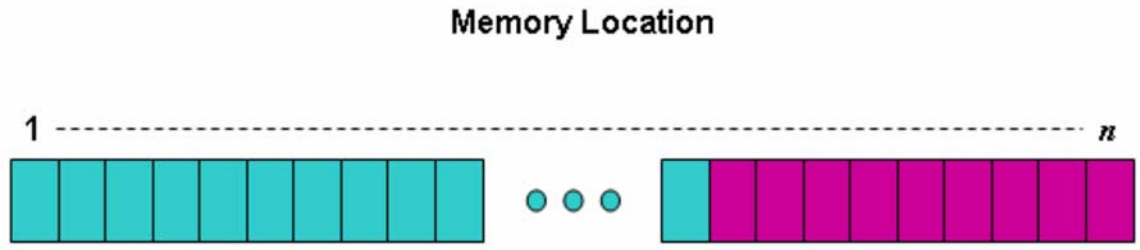

Figure 2: Scrolling Buffer in Capture (recording) Process

The images will also be sent concurrently to the attached Phantom Camera Control unit and/or an attached video monitor via the Continuous Video or HD/SDI (High-Definition/Serial Digital Interface) or simple SDI (Serial Digital Interface) output, where the subject of interest can be monitored.

Memory Allocation Process

The resolution, frame rate, image bit depth, and memory size determine the maximum image count that can be recorded, or stored into the memory buffer, and how long it will take, (the duration), to fill the memory buffer at the specified sample rate.

For example:

Let's say that you are using a Phantom v7.3 camera, with 8-gigabytes of DRAM set to record 800 x 600, 8-bit images at it maximum sample rate of 6,688pps (pictures per second). It will take 2.7 seconds to record a total of 17,731 pictures or images.

All Phantom cameras will perform the calculations for you, and display both the recording duration time and the number of images that can be recorded.

Note

Vision Research has a Recording Time Estimator Calculator that estimates recording time and maximum frame rates for several Phantom camera models at the following link:

http://www.visionresearch.com/index.cfm?sector=tools&page=timecalc

The Second Step of the Image Flow Process

The recording or capturing process is controlled by one of three triggering techniques. When the camera detects a valid trigger signal, (*t*0), the camera immediately stops capturing and storing image data, (See Figure 3), unless otherwise instructed to continue capturing for a specified number of frames via the Post Trigger setting.

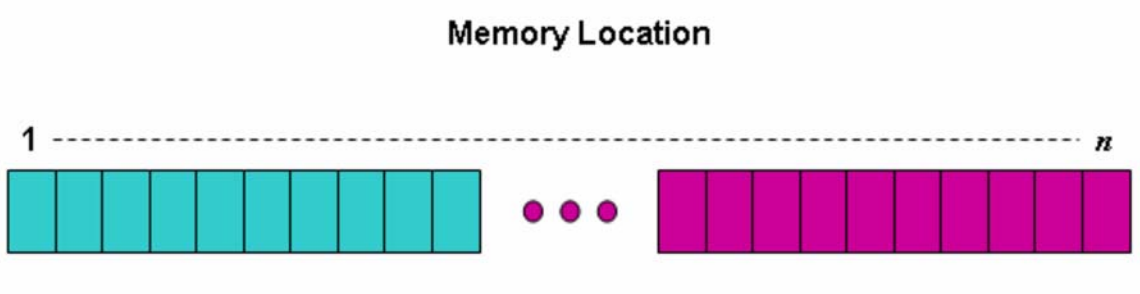

Figure 3: Trigger with Post Trigger value of zero

All Phantom cameras can be triggered in one of three methods:

- a soft trigger, whereby the end user send a trigger to the camera via the Phantom Camera Control software, or
- a hard trigger, whereby a switch closure through the 19-pin Capture cable, or
- an electronic trigger, whereby a triggering device transmits a TTL pulse to the camera via the 19-pin Capture able.

Note

It is important to remember that a trigger instructs the camera to stop recording image data, unlike traditional high-speed film cameras where it instructed the camera to start the filming process.

Understanding Post Trigger

When a Post Trigger value is defined in the Phantom Camera Control software, the camera will continue to record and store, to the camera's DRAM buffer, image data after a trigger signal is detected for *n* fames, where *n* is the number of post trigger frames.

After the trigger signal is detected by the camera, recording continues for an exact number of frames, *n*, and stored in the image buffer, then recording stops; *n* depends on the Resolution, Sample Rate, Image Bit Depth settings, and the buffer, (amount of DRAM memory), size.

It's important to note that the camera can only store a finite number of images into the memory buffer based on the resolution, sample rate, image bit depth settings, and the memory size.

When a post trigger value has been defined the camera will only store the maximum image count allowed, for the particular capture settings. The camera will only display the frames stored in the memory buffer, the last *x* images,

where *x* is the total number of images recorded or stored in the image buffer.

At this point the recorded images can be viewed or saved into a file on the Phantom Camera Control Unit or, optionally saved to built-in non-volatile flash memory.

Example Post Trigger Application

The user needs to record 35 seconds of event time at a required sample rate that will only allow the camera to record 10 seconds of the event. The good news is the user has multiple cameras that he/she can network to together to record the event. The cameras are synchronized, and will be provided with the same hard trigger, so that to will be the same for all cameras.

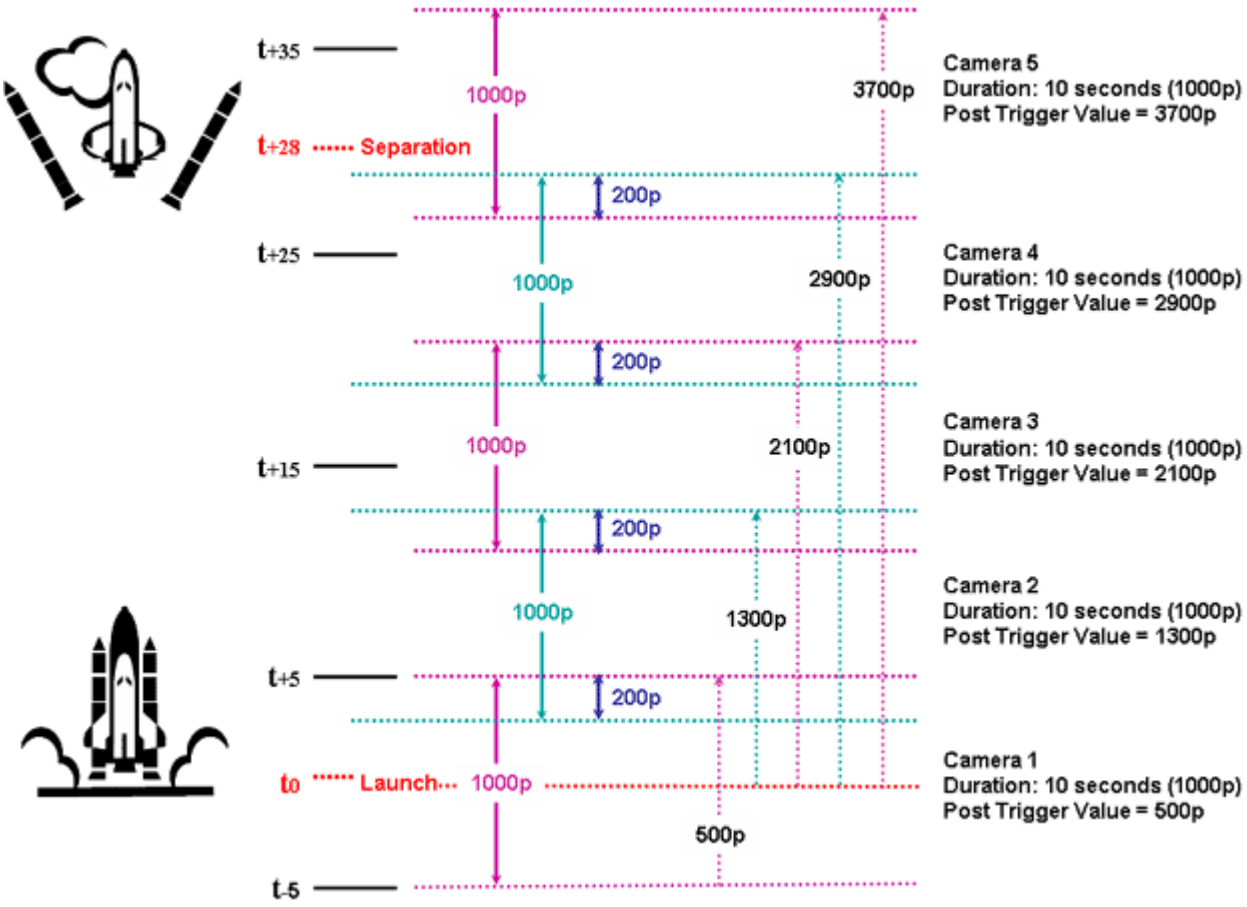

Figure 5: Post Trigger Example Application

Restarting the Capture Process

After the trigger and the prescribed number n of frames, the recording process is stopped. In order to re-enter the "Recording cine *n* - Waiting for a Trigger" mode and allow the camera to refill its buffer with new images, you will need to click on the "Capture" button in the Setup and Recording dialogue window in the Phantom Camera Control software.