

# NEXUS v1.1 Feature Notes

Rev. B

1.1 Modifications are shown in **Blue**.

**Technical & Developer's** Notes have been added for this revision.

## CONNECTIVITY

NEXUS connects to AXT thermal imaging cameras via Ethernet.

### **Specify an IP Address**

Manually enter the IP address of the camera you wish to command.

### **Use the most recent**

NEXUS remembers the IP address used during the previous session.

### **Display a list of available devices**

NEXUS will search your LAN for all available AXT cameras and display them along with device information.

#### **Model Number**

The model number of the camera.

#### **IP Address**

The current IP address of the camera.

#### **MAC Address**

The MAC address of the camera (also located on the back of the device)

#### **Image Size**

The native image size, in pixels, of the camera

#### **Lens**

The current lens FOV.

#### **APM Flags**

Specifies whether the camera is equipped with Active Pixel Matrix and its modules.

#### **Version**

The firmware version of the device.

## ACQUISITION

## Hostname

Displays the current hostname or IP address of the camera.

## Base Port

Specifies the TCP/IP port in use to communicate with the camera. NEXUS also uses a supplemental port whose number is two above the base.

**TECHNICAL NOTE:** If you use InternalWeb to change the data port from 1972, NEXUS will not detect this and camera connections will fail.

## Camera ID

This designates the identity of the camera you are currently using. The camera ID is the last four digits of the MAC address. You can launch multiple instances of NEXUS to monitor and record data from multiple cameras. However, two instances of NEXUS cannot communicate with the same camera simultaneously.

## Data Conditioning

The following parameters refer to the nature of the data you receive. NEXUS commands the camera to condition data according to your preferences in Basic Conditioning. NEXUS further conditions the data after it arrives according to your preferences in Advanced Conditioning.

**DEVELOPER'S NOTE:** Everything you change in the Conditioning area **ACTIVELY AFFECTS THE NATURE OF YOUR DATA**. You cannot “undo” or change parameters after data is acquired. For each parameter, decide on settings you find suitable and avoid changing them “on the fly,” **ESPECIALLY** as you capture data clips or sets. Using conditioning responsibly guarantees consistency in your data.

## Basic Conditioning

These parameters update in camera memory and can also be set with InternalWeb in a Web browser.

### N-SAMP

This value, between 1 and 128, controls the ratio between frame rate and noise. A higher setting reduces both and a lower setting increases both.

**TECHNICAL NOTE:** Changing N-SAMP will cause the camera to enter an adjustment phase lasting approximately 60 frames of time. During this time, the camera will deliver abnormal data.

DEVELOPER'S NOTE: It is recommended to select an appropriate N-SAMP value first, before doing anything else. Your application dictates what the value of N-SAMP should be. It may be wise to also allow NEXUS to average frames of data to reduce noise.

#### LOW N-SAMP SCENARIOS (<32)

- Your target's temperatures are significantly high (over ~45 degrees Celcius)
- Your targets are moving quickly
- You are shooting fleeting targets, such as splashes, surges, or chemical reactions
- The exact time at which thermal events occur is significant to your analysis
- One iteration of your process only lasts a short period of time

#### HIGH N-SAMP SCENARIOS (>64)

- You only require new data every half second or greater
- Your targets are cooler or not much warmer than the scene background
- Your targets are changing temperature very slowly
- Your target is moving slowly, infrequently, or stationary
- You are not concerned about capturing fleeting events, or "spikes"
- The host PC's performance is an issue

N-SAMP controls noise along with Averaging (Advanced Conditioning). It is wise to spend a little time creating a balance between N-SAMP and Averaging to achieve suitable image and data quality.

#### Data Output Stream

The data you receive by default is temperature in degrees. You may also request data from the camera in spectral radiance, defined as watts per square centimeter per steradian integrated over the spectral band. Additionally, you may request data as counts, which are arbitrary raw values directly proportional to detector voltage, approximately 122 microvolts per count. This is zero-die data, implying that zero reflects radiances that match the temperature of the sensor (also referred to as the "core" temperature).

**TECHNICAL NOTE: InternalWeb does not have access to Data Output Stream and NEXUS does not remember this parameter. Other Basic Conditioning parameters are stored in-camera and are recalled by NEXUS.**

**When Data Output Stream is in counts, it is optimal to keep N-SAMP above 7.**

**When Data Output Stream is not temperature, certain displays will still use terms like "temperature" and the degree symbol.**

DEVELOPER'S NOTE: When acquiring data in counts, you may notice fixed pattern noise, or FPN. Consider using background subtraction to eliminate this effect (Advanced Conditioning).

## Measurement System

Designates the Celcius or Fahrenheit temperature scales.

**TECHNICAL NOTE:** Does not apply when Data Output Stream is not temperature.

## Downwelling

Specifies the temperature of the background, usually the room or sky, in Celcius. Also known as the reflected temperature.

**TECHNICAL NOTE:** Using a value of -999 will cause the camera to follow the temperature of the lens for Downwelling.

## Emissivity

Settable between 0.1 and 1.0 according to the target material. Emissivity implies the influence of the Downwelling temperature on the target. Low emissivity suggests high Downwelling influence.

**DEVELOPER'S NOTE:** If your target is of a known material and thermal accuracy is important, the emissivity of your target can be determined using tables found in references or on the Internet. Additionally, if you are measuring your target using other means such as direct contact, emissivity can be used to correct your camera data.

## Advanced Conditioning

Data has arrived preconditioned by the camera according to your preferences in Basic Conditioning. NEXUS gives you additional options for manipulating your data, and performs conditioning operations in the order given below.

**TECHNICAL NOTE:** Currently, NEXUS does not remember your preferences for these parameters. You must remember to respecify them when NEXUS launches.

### Background Subtraction

Subtracts an evolved background frame from incoming data.

#### Enable Subtraction

Subtraction must be enabled before you can evolve a background frame.

#### Evolve Background

Press this button to evolve a background frame. During evolution, acquisition pauses while NEXUS collects frames. Pressing the button again restarts acquisition with the newly acquired background frame subtracted from

incoming frames. Evolve the background at any time with this button, or disable and re-enable subtraction to start a new background frame.

### Count

The number of background frames collected. NEXUS averages these frames to produce the background frame. More specifically, NEXUS adds frames to a sum frame and divides by this number when evolution is complete.

### Restore

Background subtraction is designed to produce a zero-background frame, which may be undesirable as absolute pixel values are lost. If you wish, use restore to add the mean of the background frame back to the image. For example, if your background frame average is 23 degrees Celcius (or equivalent), NEXUS adds this constant back to the frame to restore absolute values.

DEVELOPER'S NOTE: The most common use for background subtraction is to eliminate fixed pattern noise. Placing something flat in front of the camera and using background subtraction can clean up your image for superior image quality, even when you are acquiring fully calibrated temperature data. However, this tool may apply differently to you depending on your application. For example, when your target is "nominal" you might take a background frame with the target present, and subsequent data reflects how your target deviates from "nominal" in time. This example, of course, is with the Restore box unchecked.

TECHNICAL NOTE: Keep in mind, the background frame ages with time. It is wise to at least evolve if not take new background frames when appropriate.

### Clipping

Temperatures above or below the bounds will be coerced to those values. Best used to ignore very hot or cold objects in the scene that are not targets.

You may want to clip if you notice rogue targets contaminating your statistics. Some prefer to clip out the background so background statistics stay very flat. You will also notice that when you change N-SAMP while clipping, all pixels stay within your thermal domain.

TECHNICAL NOTE: The golden rule of clipping: Only clip when you are not concerned with values outside of the clip bounds! Data that is out of bounds CANNOT be recovered.

If you change Data Stream Output, the clip bounds must be modified for the new data type.

## Averaging

NEXUS will average up to 64 frames to reduce noise. This is a sliding buffer, so frame rate does not suffer. Averaging should be used in concert with N-SAMP- only these two parameters affect image noise, with N-SAMP also controlling frame rate.

### Frames

The number of frames to average. The buffer never clears- decreasing this number only deletes those older frames. Increasing this number allows the buffer to slowly fill. After the buffer is full, it begins sliding.

### Weight

Simple averaging is very effective at reducing noise, but lowers the response of the system. A target that moves from one location to another will leave a “burned in” image of itself for a short period of time. Weight uses a decay function to deprioritize older frames, therefore balancing the effects of averaging without the image and data appearing “sluggish”. Low weight is maximum preference on performance. High weight delivers maximum performance for noise.

DEVELOPER’S NOTE: Averaging can deliver creative information about your scene. For example, if you are framing at 5 Hz and shooting a moving target of 100 degrees, set averaging for 10 frames with max weight. When the target reads 100 degrees, it has been stationary for 2 seconds.

## Ranking

Converts image data to rank, where each pixel is a number between 0 and 1023. Use when temperature isn’t as important as temperature differentials among targets. Also good for focusing, as it exposes the “halo” that blur creates around target edges.

## IMAGING

### Smoothing

The incoming frame can be upsampled and smoothed by a factor of 1 to 16. This will result in an image with a native resolution of 32x32 pixels to become an image up to 512x512 pixels. The frame rate of the display is limited only by the host PC performance.

**TECHNICAL NOTE:** Smoothing affects aesthetics only and does not actually resample image frames. All data processing is performed on the native frame regardless of smoothing.

DEVELOPER'S NOTE: Smoothing affect host PC performance most. Optimal factors would be between 2 and 4, assuming you don't prefer viewing native pixels. This keeps the illusion of sharpness while giving you the resolution boost you need.

### **Color Palette**

Specifies the false color scale to be applied to the image. The color palette is selected and processed in the order given below.

DEVELOPER'S NOTE: Color palette and scaling affect the image look and feel. Careful tuning of their parameters can turn a noisy image into a smooth, quiet image. Because the colormap is a major player in image presentation, NEXUS now has additional power over its properties.

### **Selection**

Available color palettes include:

- 256 Gray
- Bone
- Cool
- Flow (1, 2, 3, 4)
- GrayRain
- Hot
- HotCool (1, 2)
- Iron

NEXUS offers these additional color palettes:

- Camo
- Crayon
- Doppler
- Flow 5
- IronBold
- IronPro
- IronRain
- IronSoft
- IronVibe
- Islands (1, 2, 3)
- Photonic
- Polar
- Rainbow
- Skin Tones
- Sunrise
- Sunset

## Import

NEXUS can import any image as a color palette. A JPG, PNG, or BMP image that is exactly 256 pixels wide can be converted into a color palette. NEXUS creates a LUT file for the new palette and loads it in the future. For example, Sunrise and Sunset were created from real images of a sunrise and sunset.

**TECHNICAL NOTE:** Imported palette images with a name matching one of the stock palettes will only be used for that NEXUS session. They will be overwritten when NEXUS launches. Also, if you browse for an image to import and take longer than 100 frames' time, acquisition suffers and may pause.

## Invert

The color scale polarity can be reversed to reassign hot colors as cool colors.

## Quality

You can destroy the quality of the color palette to limit the number of colors in the scene.

**DEVELOPER'S NOTE:** Quality runs from 1 to 8 and is designated in bits. A quality of 1 returns 2 colors plus the out of bounds color. A quality of 2 returns 4+1, then 8+1, and so on. Try using this with the Photonic palette. A quality of 3 with a scale spanning 8 degrees returns 1 "degree per color."

## Compression

Compresses the color palette to enhance contrast within a certain thermal domain. Compression allows you to clean up the scene without changing the scale.

**DEVELOPER'S NOTE:** This feature should not go overlooked. You would be surprised how much better an image can look just by setting compression on "highs". You can quickly check in on the detail of a target without changing the image scale, especially if you have a hot and cold target in the same scene.

## Scale

The scale maps temperature to color according to a static or dynamic range.

### Automatic Scaling

The image will be automatically adjusted every time a new image arrives.

## Smart

The image will only rescale if the maximum or minimum values are exceeded. The scale will remain mostly static and rescale only when necessary.

**TECHNICAL NOTE:** Actions like changing data conditioning (especially N-SAMP) parameters will require a reset to the smart scale.

### **Reset**

The nudging process can be reset if the scale becomes too broad.

### **Percentile Scaling**

This is somewhat of a semi-automatic scaling process. You will notice the scale bounds are now presented as percentiles- these numbers remain constant as new images arrive. Rescaling only occurs when you change these values or click anywhere on the image.

**TECHNICAL NOTE:** You may manually enter any decimal value, but the display will be rounded. When you nudge the left box, values nudge by 1%, but when you nudge the right value, the value nudges by 0.5%. It does not matter which boxes are high and low.

### **Manual Scaling**

Maximum and minimum values can be specified. The scale will be fixed and never move from frame to frame.

**DEVELOPER'S NOTE:** It is wise to use intelligent scaling functions to arrive at a scale you feel comfortable with, and then switch to manual- ESPECIALLY if you plan on using thresholding. Keep the scale constant as best you can and use colormap controls to change the look of the image. Remember, scaling is not clipping- you are not modifying incoming data.

### **Frequency Scale**

Located adjacent to the temperature and color scales, the frequency scale indicates how frequently a given temperature occurs in the image. This is the pictorial equivalent to a distribution histogram.

### **Frame Statistics**

The following statistics are calculated for each image and displayed.

#### **Pixel Count**

The number of native pixels in the frame.

#### **Minimum**

The lowest temperature in the frame.

**Mean**

The average temperature in the frame.

**Median**

For all temperatures placed in ascending order, the middle value.

**Maximum**

The highest temperature in the frame.

**Range**

The minimum temperature subtracted from the maximum.

**Standard Deviation**

Images that contain temperatures that are more alike have a lower standard deviation.

**TECHNICAL NOTE:** For Windows Vista, the nature of the font may prevent standard deviation from being visible, but it is still available, calculated and logged.

**Reticle**

A crosshair can be placed on the image, pointing out the temperature at its location. An overhead display reads out the value and location of the reticle in native pixel units. The location (0,0) refers to the top-left pixel.

**TECHNICAL NOTE:** The reticle zeroes in on the top left corner of a pixel, not the center. When NEXUS launches, the reticle is placed in the center of the image, but displays data at (0,0) until you move it.

**Overlays**

The following visual elements can be superimposed on top of the live image. NEXUS will still calculate and process these elements even if they are hidden.

**Reticle**

A crosshair will appear as two long intersecting lines, pointing out the reticle's location.

**APM Grid**

If defined, the Active Pixel Matrix will appear as colored hollow squares. Each square represents a native pixel, and the color represents its regional affiliation.

### **Fill**

The Active Pixel Matrix pixels can be filled, defining the region but blocking the pixel underneath.

### **APM Path (RX)**

If defined, the APM path will appear. The APM path refers to a *sequence* of pixels.

### **Threshold**

If defined, the pixels within the threshold bounds will be colorized with the threshold color.

**TECHNICAL NOTE:** Threshold calculations are done on the native image, not the higher resolution smoothed image.

## **THRESHOLDING**

### **Threshold**

This refers to a position of interest on the temperature scale. The threshold slider is located on top of the color scale and, if thresholding is active, can be positioned along the current scale. It does not necessarily reflect a temperature- it is a *percentile* of the current temperature scale and has 8-bit resolution.

### **Bounds**

The threshold, temperature scale, and threshold type work together to determine the threshold bounds, which are temperatures. For manual scales, the bounds will remain constant. During autoscaling, the bounds will be different for each frame. When smart scaling, the bounds will evolve along with the scale.

### **Color**

Pixels within the threshold bounds will be colorized according to the chosen value.

### **Type**

The threshold type will determine how the threshold will be interpreted when calculating the threshold bounds.

### **Over**

All temperatures above the threshold will be colorized.

### **Under**

All temperatures below the threshold will be colorized.

### **About**

Only temperatures at the threshold will be colorized.

### **Width**

Specifies how tolerant the threshold will be towards adjacent temperatures.

### **APM Export**

Pixels within the threshold bounds can be declared as an APM region for immediate statistical computation. This is a useful alternative to manually painting regions.

### **Overwrite**

If engaged, this will erase the region first, leaving all other regions intact. Otherwise, the region will be replaced by the newly defined region.

### **Threshold Region (RY)**

You do not necessarily have to export a region to get statistics on your target. The APM is automatically calculating statistics for the region defined by the threshold in real-time. This means you can get instant statistics on a target as it moves around the scene.

## **DISTRIBUTION**

### **Frame**

This graph depicts how frequently various temperatures occur in the frame. A cursor and overhead display indicate the native pixel count and thermal domain. Often referred to as a histogram.

### **Temporal**

This graph indicates how often a particular value of a signal occurs in time. Temporal distribution is calculated for whatever signal is displayed in the temporal analysis graph. A cursor and overhead display indicate the sample (frame) count and domain.

## **PROFILING**

### **Reticle Row**

All native horizontal pixels at the reticle position are plotted side-by-side.

### **Reticle Column**

All native vertical pixels at the reticle position are plotted side-by-side.

### **APM Path (RX)**

If defined, pixels along the APM path are plotted side-by-side. This is a very powerful tool for condensing a complex two-dimensional target or scene into a simple one-dimensional graph, or declaring multiple targets as points.

**DEVELOPER'S NOTE:** The Distribution and Profiling graph rescales only when the mouse enters the area or when you click anywhere on the graph.

## **TEMPORAL ANALYSIS**

Any variable NEXUS calculates or measures can be visualized as a signal in the time domain and plotted. NEXUS will continuously build all signals even though only one is shown on the graph.

### **Size**

Refers to the number of samples (frames) for which time data is acquired. Even though the buffer size remains constant, the time period it represents changes as a function of acquisition time. The buffer size is limited only by the host PC performance.

### **Signals**

The following signals are continuously tracked through time.

#### **Thermal Statistics**

All statistics for the frame (R0), each APM region (R1-8) and threshold region (RY) are tracked in time.

#### **Timestamp**

This value in seconds, is the amount of time elapsed since midnight on January 1<sup>st</sup>, 1904 (Local Time). Also known as the absolute timestamp of the frame.

#### **Acquisition Time**

Expressed in milliseconds, this refers to the time elapsed since the last frame was gathered.

#### **System Processing**

Refers to the time taken for NEXUS to acquire and process the frame.

### **Core Temperature**

Refers to the temperature of the focal plane array.

### **Lens Temperature**

Refers to the temperature of the lens or ambient temperature.

### **CPU Health**

Tracks the processor performance of the host PC.

### **System Health**

Refers to NEXUS's ability to process the frame against real-time acquisition.

**TECHNICAL NOTE:** NEXUS is not authorized to skip frames if PC performance drops. However, if system health reaches zero, acquisition suffers and may pause until health is restored.

### **Threshold Fill**

Refers to the percent of image pixels within the threshold bounds. This value will be zero if thresholding is disabled. Threshold Count used to be expressed in pixels- it is now Threshold Fill, expressed as a percentage.

### **Reticle Temperature**

Refers to the temperature of the pixel at the crosshairs.

### **Timespan**

Refers to the amount of time the temporal buffer represents, in seconds. This is the sum of Acquisition Time.

### **Percentile Low & High**

Refers to the values at the percentiles defined in Percentile Scaling.

### **Threshold Location X & Y**

Pixel locations within the threshold region are averaged to deliver the location of the center of the target. This essentially returns the location of the target in the image.

### **Clear Buffer**

This will clear the buffer and begin building again. Useful when you change the nature of your data. If you don't want to lose the entire buffer, reduce buffer size to delete old data, then reset your buffer size to its original value.

### **Temporal Statistics**

Similar to spatial statistics, NEXUS will calculate time statistics for the selected signal as well. For example, NEXUS can return the average maximum frame temperature for a period of time.

## **ACTIVE PIXEL MATRIX**

NEXUS boasts Active Pixel Matrix technology, similar to that which is available as an internal camera upgrade. NEXUS offers the following control parameters for creating an APM grid.

**TECHNICAL NOTE:** NEXUS remembers the APM grid you paint for the next launch. However, NEXUS currently does not remember the APM Path you may have defined.

### **Region**

Eight regions are available for painting. These regions are identified as eight colors taken from the rainbow: Red, Orange, Yellow, Green, Cyan, Blue, Violet, and Pink.

#### **Clear Region**

Clears and erases only the selected region from the APM.

### **APM Path (RX)**

The APM path is a powerful addition to the Active Pixel Matrix (Defined as Region X). This special region identifies a path of pixels on the image. Using this in conjunction with **Profiling: APM Path** allows you to view a meandering line profile on a single graph. Notice that pixels can be reused or skipped. Draw a spiral on a spiral-shaped target and view its profile, or select multiple point targets in a scene to view them as a single bar graph. The APM Path's first pixel is marked by a blue point, with subsequent pixels marked by points connected by lines to indicate order. The final pixel in the path is marked by a red point.

**TECHNICAL NOTE:** NEXUS does not calculate statistics for the APM Path. However, you may paint a region underneath APM Path pixels, and use statistics from that region. Additionally, you may not remove pixels from the path, only add pixels or start over.

### **Brush Size**

Specifies the size of the brush in square native pixels. Use a 1x1 brush up to a 4x4 brush. Hold the SHIFT key while painting to erase pixels from the grid.

**Grid Lines**

Overlays a grid of lines identifying native pixel areas.

**Clear Grid**

Clears and erases the entire APM Grid.

**Regional Statistics**

Similar to frame and temporal statistics, separate regional statistics will be shown for each of the eight APM regions, if defined.

**EVENT LOG**

NEXUS will keep a textual log file recording actions and events of interest.

**TECHNICAL NOTE:** Currently, NEXUS only logs when it is opened and closed, or when quick clips are recorded.

**Date & Time**

Displays the date and time of the log entry.

**Entry Type**

Specifies the class of the entry, be it a notification, alarm, error, warning, or custom entry.

**Description**

A string of data indicating the contents of the log entry.

**DATA EXPORTING****Snapshot**

NEXUS allows a snapshot to be taken, which includes a collection of images and raw data files. When you take a snapshot, NEXUS asks you to name your snapshot as an extensionless name. Then, NEXUS “explodes” your snapshot data into their respective folders, so likeminded files are grouped.

**Application Screenshot**

A JPG of the entire NEXUS application as it stands.

## Image Screenshot

A JPG of the image window with temperature scale- useful for grabbing a shot for a report.

## Camera Data

Raw data of the thermal image is saved as a TAB-delimited text file and single-precision binary file. Only native pixels are saved. Text files can be read by many popular programs such as Notepad, Microsoft Excel, and others. Binary data is easily read by Matlab or any other capable program.

DEVELOPER'S NOTE: This data can be read by ImageJ, a freely available image analysis tool developed by the US National Institute of Health. NEXUS works very closely with this software for post-acquisition analysis of radiometric thermal images and video.

## Temporal Analysis

All single signals are saved as an ASCII TAB-delimited text file. Each column of this file is a signal as described in **Temporal Analysis: Signals**. File size is defined by Buffer Size.

## Temporal Statistics

The statistics of the frame, each APM region, and the threshold region are saved as individual ASCII TAB-delimited text files. Each column is a statistic as described in **Frame Statistics**. File size is defined by Buffer Size.

**TECHNICAL NOTE:** NEXUS does not save APM Path pixels through time as part of a snapshot. APM Path data can only be exported through trending.

## Record Video (Quick Clip)

If you have ImageJ installed (in C:\Program Files\ImageJ or C:\Program Files (x86)\ImageJ), the Record Video button is visible. This allows you to, at absolutely any time, record incoming data to a streaming binary file. After recording is complete, the acquisition is loaded into ImageJ automatically for viewing and analysis.

**TECHNICAL NOTE:** ImageJ only imports the first 15,000 frames of a quick clip. You can manually import the entire clip located at C:\NEXUS\NewestACQ.bin. During acquisition, you can import the clip so far, located at C:\NEXUS\CurrentACQ.bin. It is wise not to adjust Conditioning parameters during acquisition.

DEVELOPER'S NOTE: Use ImageJ to save your video clips if you like them. ImageJ can also colorize, scale, and transform your thermal video, as well as export images or AVI movies. ImageJ can also perform simple or complex calculations for your video clip.

## Signals & Trends

When you require data exactly as you see fit, you can use trends. Trending combines signals of interest with video data to create custom acquisitions.

## **Signals & Signal Management**

Everything NEXUS calculates is available as a signal. You are creating custom data files when you declare and manage these signals.

### **Available Signals**

- 10 Regions with 7 spatial statistics
- 20 Other signals
- 8 Temporal statistic options for each signal

This returns 720 possible signals to choose from. Provide custom names for your signals: NEXUS processes them in real-time and builds your signal data in a spreadsheet text file.

## **Video Data**

NEXUS streams thermal video to a binary file in concert with building your signals file.

## **APM Path Data**

NEXUS streams your APM Path data to a spreadsheet text file, where each column is a pixel along the path.

## **Trigger Source**

When you build a trend, you have superior control over when data is added to your acquisition. Only one trigger source can be specified, and every time you change the trigger source, trending is paused until you reactivate the new trigger source.

### **Manually Triggered**

You can build a trend on command by pressing the “Update Trend Data” button.

#### **Sticky**

When enabled, trends build until you press the button again. Otherwise, trending occurs once only.

### **Time Triggered**

You can build your trend at certain time intervals.

### **Trigger Active**

Trending is paused unless this box is checked.

#### **Interval**

Your time interval can be declared in seconds, minutes or hours.

#### **Time Remaining**

Indicates the amount of time remaining until the next trend event.

#### **Reset**

Restarts the clock. If the trigger is active, trending also occurs at this time.

#### **Signal Triggered**

The most powerful trigger source. Any signal you created can be declared as the trigger signal, and trending only occurs when the condition is met. For example you can trend only when the target is in the center of the frame, or only when temperatures of interest are present.

#### **Trigger Active**

Trending is paused unless this button is checked.

#### **Signal Selection**

This menu actively shows you available signals. Must be specified for trending to occur. Certain signals, such as the date, make no sense as a trigger signal- it should be numeric in nature.

#### **Condition/Event**

Allows you to decide whether to trend while a condition is true or only once when an event occurs.

#### **Threshold**

Indicates the value of interest regarding trend events or conditions.

#### **Trend Events**

Indicates how many trend events occurred for the current trend you are building (expressed in frames).

#### **Export Trend**

Indicates trending is complete and allows you to specify a name for the trend. NEXUS then “explodes” signal data, video data, and APM Path data into their respective folders under your name.

**TECHNICAL NOTE:** If you exit NEXUS without exporting your trend- it is not lost. When you launch next, NEXUS asks you whether you want to add new data to the trend, trash the trend, or export the trend as completed data.