Technical Note

Manufacturer:	Elan g! DVR for HC-Series Controllers
Minimum Core Module Version:	**Version 5.5**
Document Revision Date:	12/30/13

Important: This document refers to DVR setup with HC Controllers ONLY.

Please see the 4.0 DVR Integration Note for version 4 systems.

Please see the 5.0 (g!) DVR Integration Note for version 5.0 HomeBrick Systems.

OVERVIEW

g! DVR is an event-based recording system available in the g! system for compatible IP Video Cameras, as well as analog cameras via compatible IP Video Servers. g! DVR typically utilizes compatible motion detection engines to trigger recording, but can be triggered by other system events. When recording off motion detection, g! DVR utilizes either traditional fixed thresholds or Auto Record Mode based on motion level deviation from the current norm. The Auto Record Mode will continuously vary the motion threshold for high-frame rate recordings based on the average level of motion. This method should help prevent false positives (such as a fan spinning) and only capture true motion events (such as a person walking through room). Recordings can be made on either the internal drive or on a network drive.

IMPORTANT:

The g! DVR is not intended to replace a standalone surveillance system, and is not intended for continuous high frame rate 24/7 recording. It is suggested you install a third-party DVR if you require 24/7 monitoring. The g! DVR is a convenient and basic way to record, search and view video recorded from compatible g! Cameras. Please understand and set the proper expectation of the end-user.

SUPPORTED FEATURES

- **Event-based** recording may be configured for specific frame rates and recording time.
- Fixed or Auto (adaptive) thresholds for motion based recording.
- Up to 16 cameras can be set up to simultaneously record video clips. Note – The number of cameras you record and the more frequently they are recording directly relate to the hard drive space needed and the number of days you can store. Please refer to the notes bellow settings
- Video clips can be stored on a network drive or on internal storage.
- FIFO (First In, First Out) management of recorded clips.
- Time/Date stamping in the Viewer (based on Controller System Time).
- Export of clips as AVI files from the Viewer.
- Up to 50GB of storage may be allocated for these recordings.

UNSUPPORTED FEATURES

- No watermarking of video clips is implemented.
- Continuous high frame rate 24/7 Recording is not supported.

Any feature not specifically noted as “supported” is not supported.

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Note: It is not recommended to enable DVR when using multiple ports from the same Aviosys 9100B server, as the server will enter round robin mode and alternate the frames for each feed. Even if some ports are not used for recording, round robin will still occur and negate the usefulness of frames recorded when the other ports are viewed. *If you must use the Aviosys 9100B for recording, it is strongly suggested you only attach 1 camera to the unit.*

INSTALLATION OVERVIEW

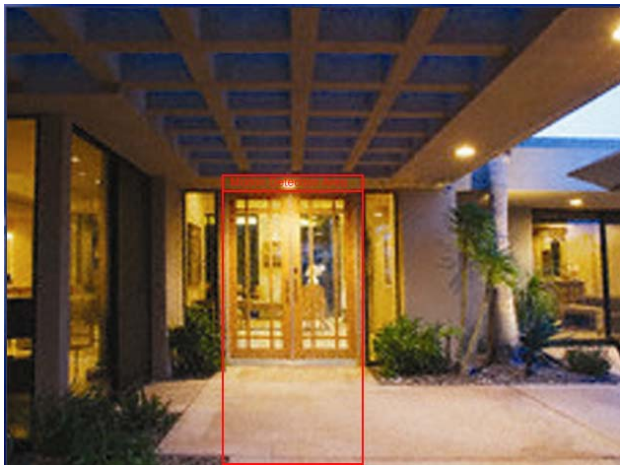
1. Install and configure the cameras and/or video servers for proper standalone operation (see Integration Notes for your particular models).
2. Enable and configure Motion Detection (if supported). See **Configure Camera Motion Sensitivity** below for details.
3. Configure the cameras in the **g!** system and test proper operation.
4. Setup folders for capture and storage of the video clips, and specify limits for storage in Global Options on the Video Tab. See **Record Location** below for details.
5. Enable DVR on desired cameras, and set other options as required. See **Enable DVR** below for details.
6. It is important to go back a few days after setting up recording and check the DVR to ensure you are capturing video as desired. Adjust motion sensitivity, camera or DVR settings as needed.

You may also wish to read **Additional Information** at the end of this document for added detail on g! DVR functions.

CONFIGURE CAMERA MOTION SENSITIVITY

When using g! DVR, best results are obtained from IP Cameras and Servers which contain compatible Motion Detection engines. With such devices, the cameras firmware will analyze each frame for the percentage of change (in pixels) from one frame to the next, and assign the amount of change a numerical percentage. g! uses this Motion Detection percentage number with both Auto Record Mode and Fixed Threshold trigger methods to know when to record, and as such Motion Detection must be enabled in the camera, and configured with correct sensitivity so that it can provide good data to g! and allow g! to record at the appropriate moment.

- **Follow any steps noted in the Integration Note for your particular equipment to enable Motion Detection support**. In addition to any settings in the integration note, observe the following important considerations below.
- **Draw a Motion Detection area**. Certain devices support drawing a motion detection box on the image frame to limit motion detection to a certain area. It is suggested to exclude items that you know will provide regular movement whenever possible when creating this box, like ceiling fans or trees. Note that if the camera is PTZ, this motion detection area will typically stay the same regardless of camera position, and this may have an effect on you recordings.



In this example, the Motion Detection Area (red box) has been drawn to avoid foliage that may generate false recordings blowing in the wind. The doorway and walk will still trigger recordings.

- **Configure Motion Detection Levels in the Camera**. It is critical to setup proper sensitivity settings in the camera/server for motion detection. All cameras have one or more slider bars for control of the sensitivity, and some sort of sensor indicator to show what level of motion is currently being detected. For best results, have an assistant create a **normal motion** in front of the camera (such as person walking through room, rather than doing jumping jacks). Observe the level of motion that is reflected, and adjust the sensitivity levels in real time. See the examples below. While these samples may not be a perfect match for the sliders or motion readout in your particular camera or server, the concepts they illustrate are applicable to all devices.

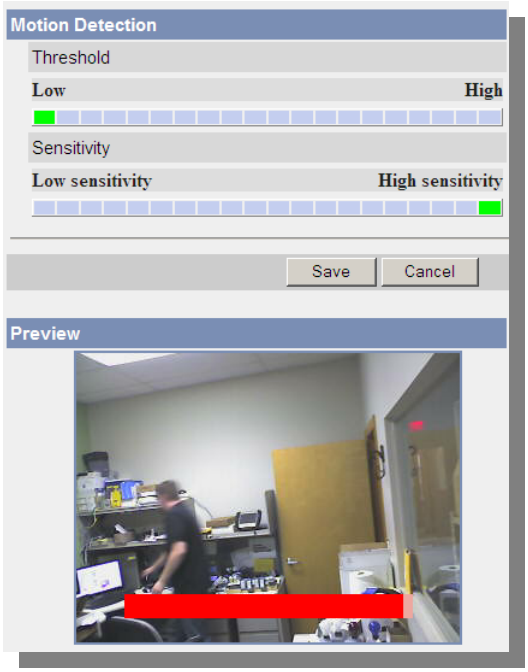


Figure 1: In this example from a Panasonic Camera, the sliders are set at their most sensitive. As someone enters the office, the motion detection almost fills the bar—this setting is **too sensitive** to correctly capture normal motion, and will be prone to false trips and excessive motion levels that may mask true motion. Particularly when using the auto motion detection engine, the lack of headroom in a setup like this could cause the DVR to fail to record as desired.

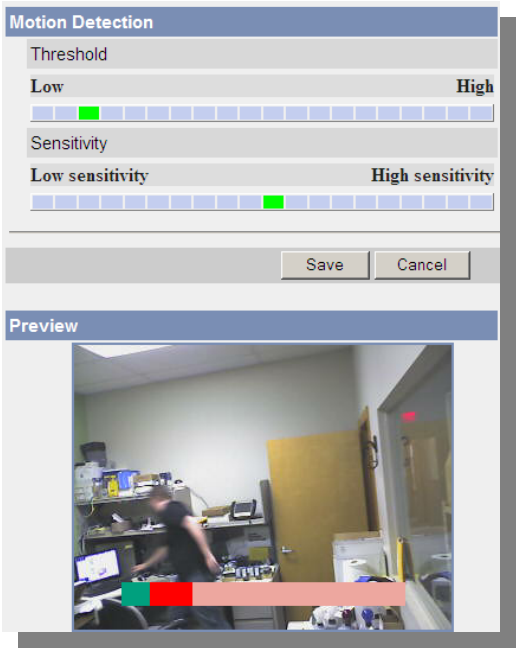
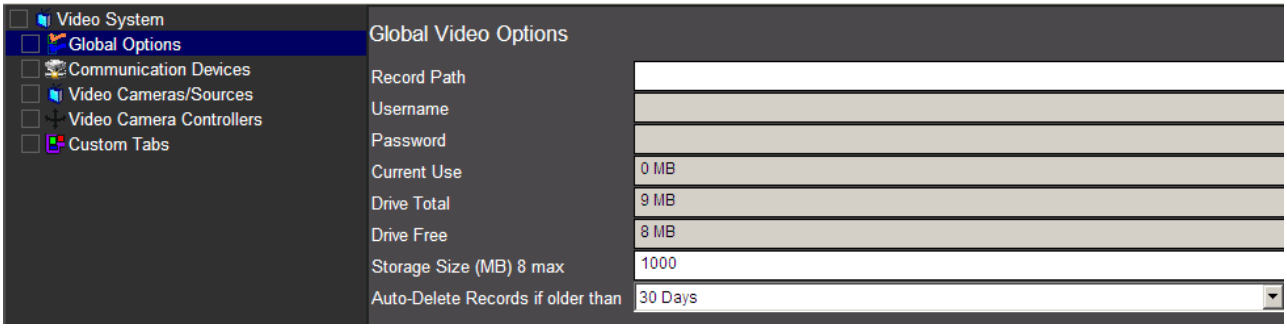


Figure 2: The levels are adjusted so that a person walking into the office will trip motion detection (bar turns RED), but the levels are not so sensitive that the *entire bar is RED*. This setup will generate far fewer false positives and will help g! DVR only capture true motion events.

RECORD LOCATION

Once the cameras are configured, go to the Video tab in the Configurator. Choose the heading labeled Global Options- the following will show on the right.



The **Record Path** is the working directory for the DVR. Files in this folder will be in a proprietary format designed for fast playback in the **g!** DVR player and will be erased as space is needed on a First In/First Out (FIFO) basis. Current Use, Drive Total, and Drive Free are all calculated internally based on the physical size of the drive entered in the Record Path.

Note: The screenshots below depict usage of a network drive. The steps are the same whether the drive is local or on the network, but your paths may be different. If you are recording on the HC-Controller, you will use the local path to access them (ex. `\HARD DISK\FILES\DVR`), because the folders were created on the HC-Controller itself. When using Network Drives, your path will be a network path, and typically be structured like `\\networkname\sharedfolder`.

For more Information on the types of storage usable in g! and how to configure them, see **Storage Options** below.

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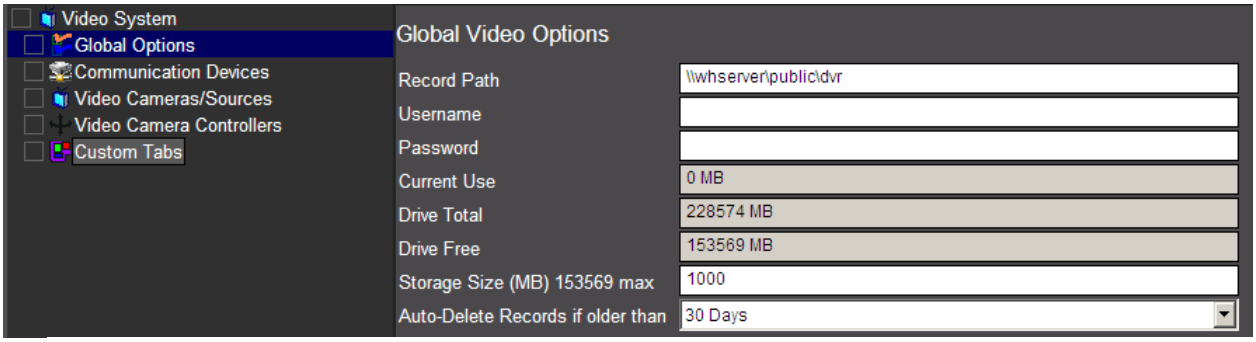
1. To setup recording for DVR, enter Configurator and click on the Video Tab and open Global Options. Enter the Record Path; so g! knows where to save the files.

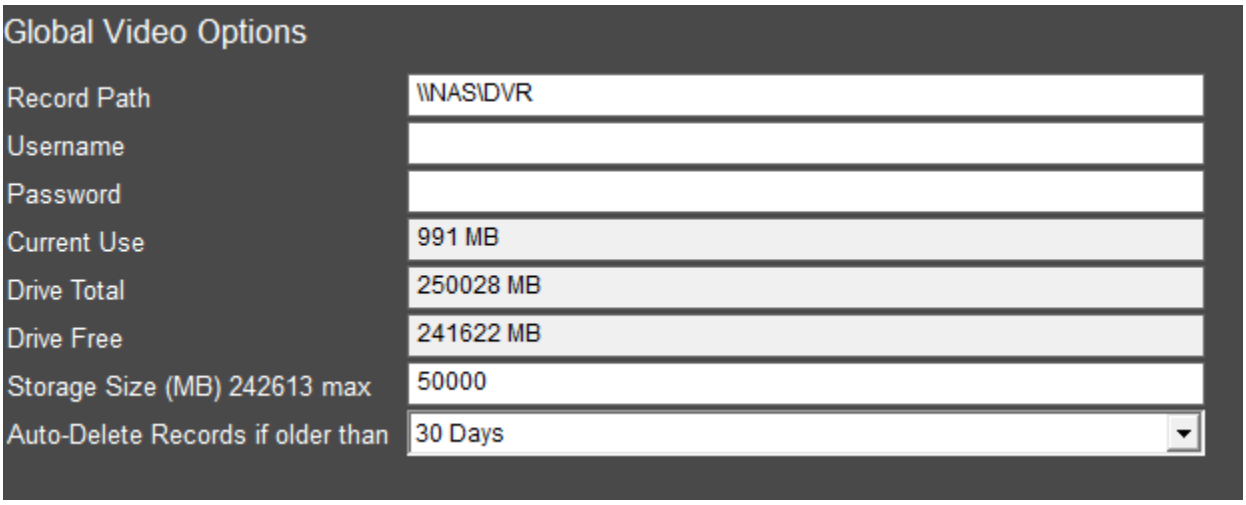
IMPORTANT: The Username and password fields allow entry of login credentials for network shares. This feature is currently in testing and is not recommended. **Network shares should ALWAYS be configured *without* password requirements as open shares.**

2. Once you have entered the path for Recording, click Apply. If the path you have entered is valid, the Drive totals will populate the actual megabyte information of the drive. If the drive totals stay at 0mb, the path you have entered is invalid.



3. Next, setup recording limits for g! to automatically delete files based on either drive space, file date, or both. If you make settings in both the size and date fields for managing videos, the system will delete files based on whichever setting it hits first.

    - Set the storage size (MB) to the maximum amount of space, in **megabytes**, on the drive you would like to dedicate to video files (Default: 1000mb, or 1gb). Files in excess of the size setting in this field will be deleted as new files are recorded in a FIFO fashion. **Elan recommends setting a maximum of 50GB (50000 MB) of storage for reliable operation.**
    - The "Auto-Delete Records if older than" field defaults to "30 Days". This field will adjust how g! deletes files to manage disk space, as files older than the days setting in this field will be deleted as new files are recorded in a FIFO fashion. **Elan recommends keeping files for 30 days or fewer.**



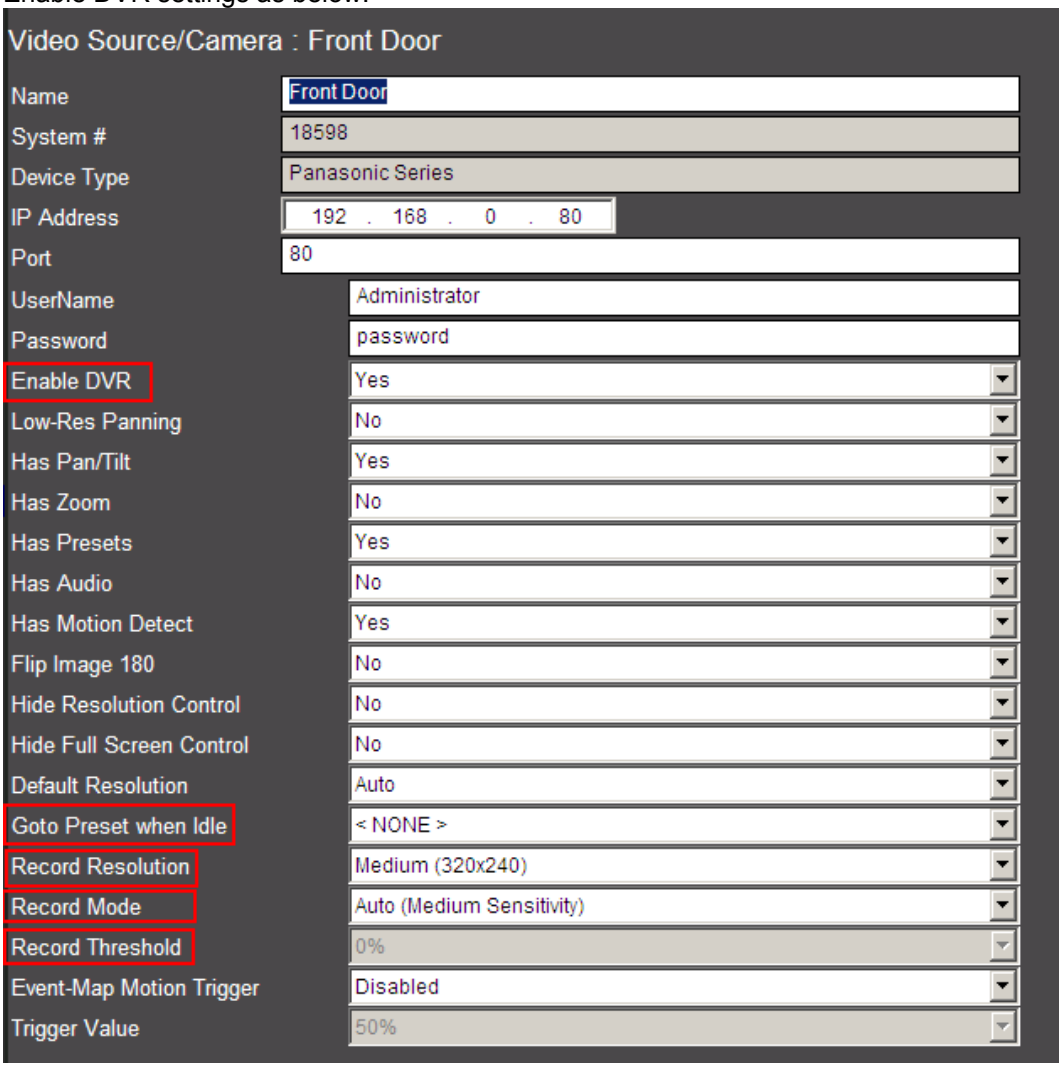
Note: Number of video cameras and the frequency of recording and their effect video storage.

The g! System provides a nice and simple way to record compatible g! cameras. There are some limitations on how much video you can store and how long you can store it. The factors that go into determining this includes the number of cameras you record, the resolution, and the frequency or volume of recording. We support up to 50 Gigs of space be allocated for recording. This might allow you to record 90 days' worth of video from one camera or only a couple or few days of video from 16 cameras. Again, the amount of storage is determined by the number of cameras and the frequency of which motion records the footage. Only experimentation in your project will determine that actual results. Exceeding 50 Gigs of storage can cause the system to slow down so please be aware of this if you choose to exceed 50 Gigs of video storage.

ENABLE DVR

The steps below describe setting up DVR using Motion Detection on compatible cameras. DVR may also be configured using event maps for other triggers or set to custom recordings. See **Event Map Options** below for more detail.

1. If you have not already done so, add the appropriate cameras on the Video tab of Configurator according to the Integration Note.
2. For each camera you wish to use DVR function on, Enable DVR in Configurator. The steps below describe **two options** for doing so; **Auto Record Mode** (**A**), which uses a variable motion threshold (recommended), or a **Fixed Threshold Value** (**B**). Only settings that are applicable to the option of DVR recording you are using are detailed below.
3. Enable DVR settings as below:



- **Enable DVR: Set to Yes to enable DVR recording.** Enabling DVR will begin continuous recording at a rate of 1 frame per minute. When motion is detected, recording will accelerate to a high frame rate. The length of high frame rate recording and the frame rate are determined dynamically based on motion.

- (*Optional*) **Configure** "**Goto Preset when idle**". This setting tells the camera to reset to a certain preset Pan/Tilt/Zoom position (on supported cameras) when the camera is not currently being monitored from the Viewer. This setting can be important if you desire the camera to record a specific area, but the customer may pan the camera away from that area from time to time. Use of this feature requires that you have a camera that supports presets in g!, and you have set the preset properly from the Viewer.
- **Choose a Record Resolution.** This controls the size and detail of the frame being recorded. Medium is recommended if you are unsure what value to use.
- **Set the desired Record Mode.**

<table>
<tr><th>(A)
Auto Record Mode (recommended)</th><th>(B)
Fixed Threshold Value</th></tr>
<tr><td rowspan="2">Choose the Record Mode. Auto (High, Med, Low) will use the adaptive method for recording with three sensitivity levels. When using the Auto method, g! will trigger high frame rate recording based on the level of deviation from the current average motion level. Set to Auto (Medium Sensitivity) for Auto Record Mode (you may adjust to use the Low or High sensitivity option later if desired).</td><td>Choose the Record Mode. Fixed will allow the selection of a fixed threshold of motion percentage to trigger recording. When using this method, g! will trigger recording when a specific percentage level of motion is exceeded. Set to Fixed Threshold Value for Fixed mode. The Record Threshold drop down becomes available.</td></tr>
<tr><td>Set the Record Threshold. When using a Fixed Threshold Value to trigger recording, use this dropdown to select the motion level percentage that must be exceeded to trigger recording. Bear in mind that a lower percentage is more sensitive.

For more information on properly setting motion level, see Motion Detection Configuration Tips below.</td></tr>
</table>

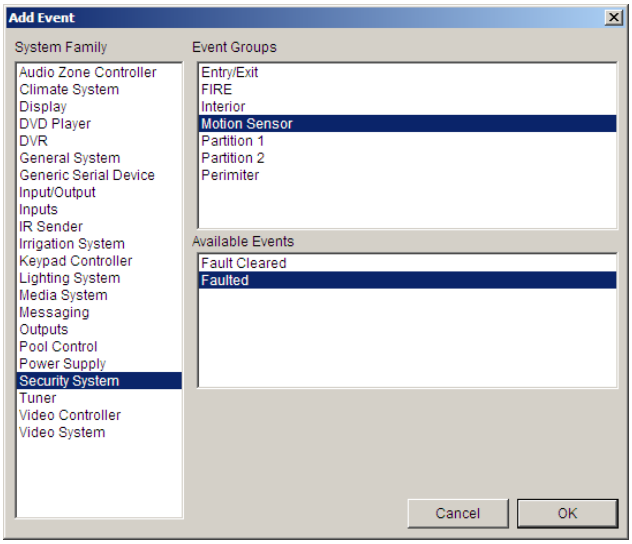
Important: It is strongly recommended to go back and check recordings a few days after initial setup to verify the recording is working as intended. Make adjustments to your motion detection sensitivity as necessary. Note you may need to adjust motion sensitivity in your camera, or if using a Fixed Threshold Value, in Configurator. ***For more information on properly setting motion level in Configurator, see*** **Motion Detection Configuration Tips** ***below.***

EVENT MAP OPTIONS -OTHER TRIGGER OPTIONS

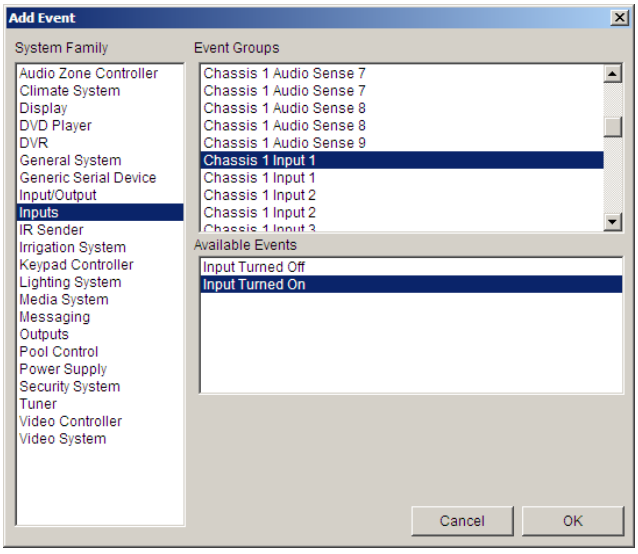
These steps are only necessary if you have a camera/server that does not support Motion Detection, or wish to use additional triggers (such as a security sensor) in addition to Motion Detection.

Create an event map with one of the following alternative **triggers,** then **Add Commands** to the event map as below:

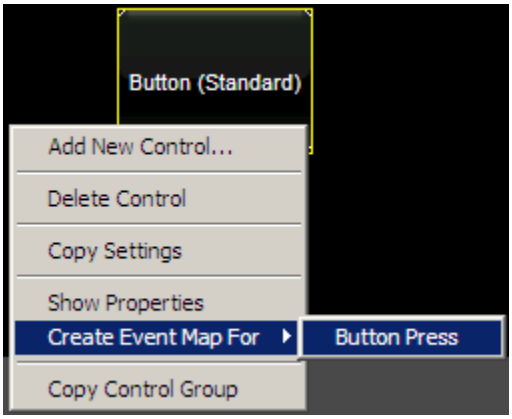
- **Security trigger**- Trigger recording off of a faulted motion sensor or zone in a g! controlled security system. Setup an Event with System Family **Security System**, Select the desired zone, and choose the **Faulted** event as pictured:



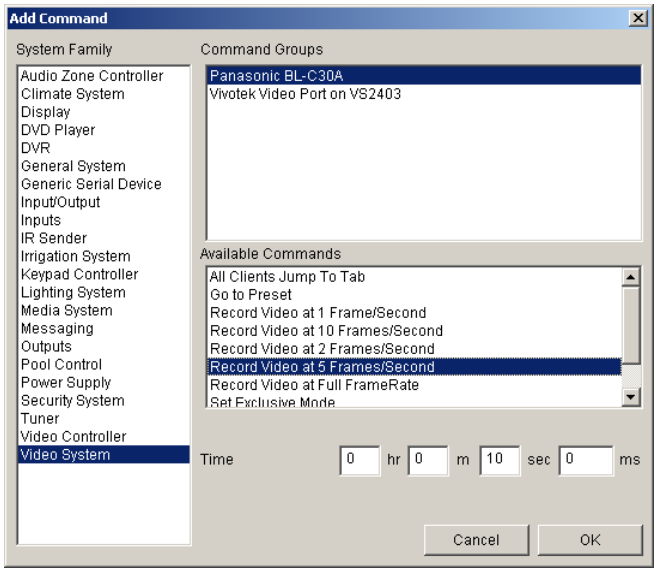
- **Contact Closure:** If a gate, garage door or other entryway is controlled by a relay g! can sense, such as a UPB Input/Output module, or Global Cache Relay, you may setup an Event based on the shorted status. Choose System Family **Inputs**, and select the desired input and shorted state.



- **Button Press:** Trigger recording off of a button press in a custom interface or tab. Create a Custom Interface or Tab and add a button control such a Button (Standard). Right-Click on the button and choose Create Even Map For> Button Press. This typically will not be used in a real system, but can be useful as trigger option if a user requires the ability to record on-demand, or in a demo to create some clips for test purposes.



- **Add Commands:** In the bottom third of the "Edit Event Map" window (the "Commands" section), click the "Add" button to add a command to execute when motion is detected at the camera. The following window will be displayed:



a. From the "System Family" window, select "Video System". In "Command Groups", choose the camera you are setting up to record video. Under "Available Commands", select "Record Video" at the desired frame rate, keeping in mind that the higher the frame rate is set, the better the quality, but the more space the files will occupy on the hard drive. Elan recommends five frames per second as a good compromise between usability and drive space considerations.

b. Lastly, set the time that you want the camera to record. This setting will be the length of time the camera will record after it no longer senses motion. You may set this to any length you wish, but typically Elan recommends a starting value of 1 minute (you may adjust settings later in the Event Mapper).

EVENT MAP OPTIONS – USING MOTION DETECTION TO TRIGGER OTHER EVENT MAPS

It is possible to use a compatible IP Video device's built in motion detection engine to trigger other events, such as turning on lights. To do this requires setting up a few options on the Video tab for the desired camera. Note that enabling this option will create additional streams to the camera, and will use system resources and increase network traffic, so this option should only be enabled if you are going to use it. ***These settings have no effect on DVR recording for Auto or Fixed Record Modes and are not required for g! DVR.***

1. On the Video tab, select the desired camera. *Motion Detection must be supported and properly configured in the camera.*
2. From the **Event-Map Motion Trigger** dropdown, select **Enabled**. The **Trigger Value** dropdown will become available.
3. Set the **Trigger Value**. Use this dropdown to select the motion level percentage that must be exceeded to trigger recording. Bear in mind that a lower percentage is more sensitive.

MOTION DETECTION CONFIGURATION TIPS

Note: These steps are only required if using Motion Detection cameras with the Fixed Threshold Value Record Mode, or if using Motion Detection to trigger non-DVR Event Maps as above. If you are using the Auto Record Mode these steps are not required.

Determine the proper Software Motion Trigger setting as follows. Right Click the camera to be configured and select "Show Communication Status, and watch the Motion percentage. Use these values while watching the Viewer to determine an appropriate motion detection level.

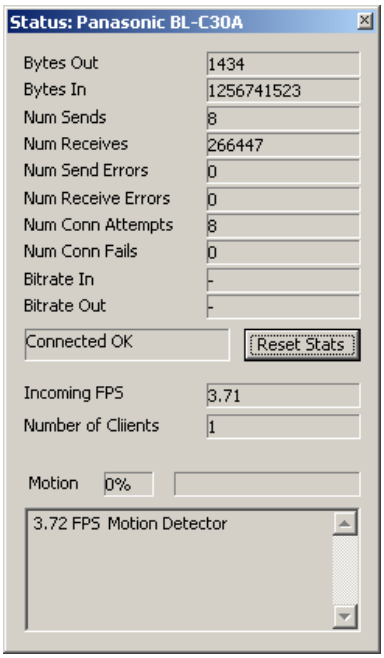


Image 1: No Motion.

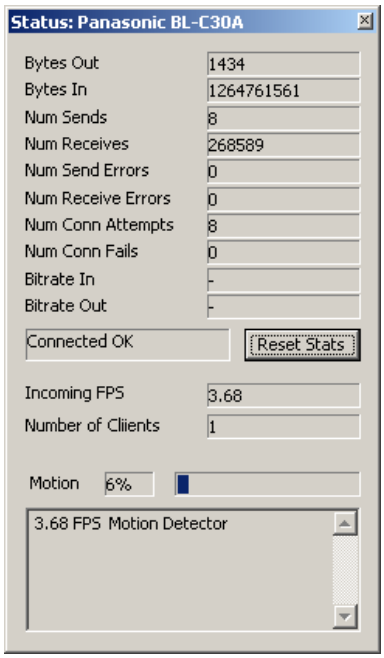
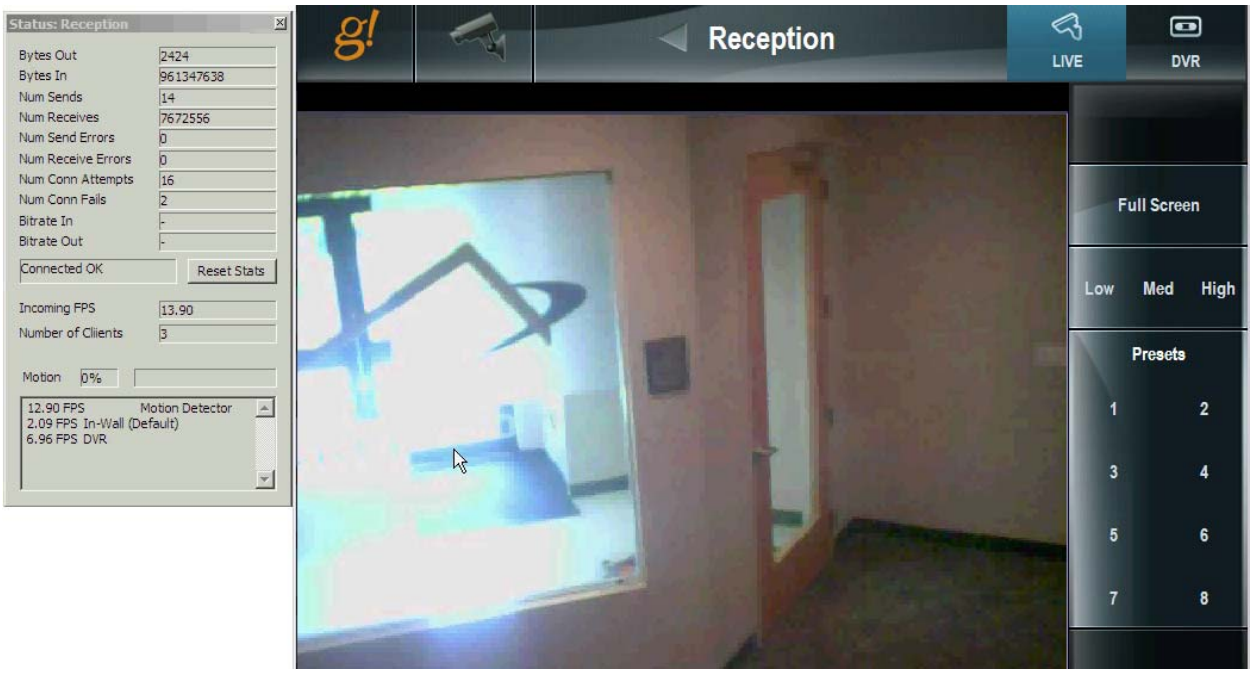


Image 2: 6% Motion.

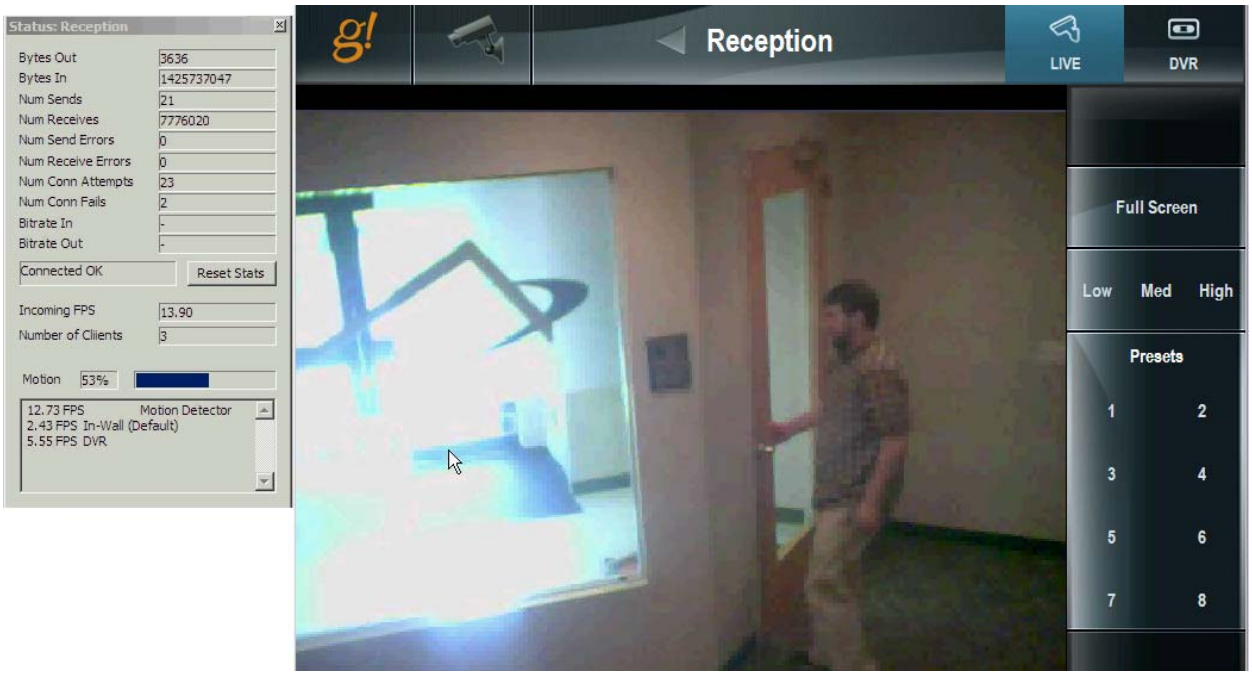
Watch the camera in the viewer and the communication status window at the same time to determine the level (percentage) of motion which will trigger the motion detector. The level should be set so that background motion, such as trees blowing in the wind or road traffic do not trigger recording, but a person or vehicle entering the property will. **It strongly suggested having an assistant create the desired motion in front of the camera to set this value properly.**

See the following example:



Arrange the windows like above for easiest motion detection setup. This screen shows the static view of the camera with no Motion.

As people go through the door, the motion spikes to 73%.



The test is repeated and the motion is 53%.

By repeating the test above with an assistant triggering the motion in the same fashion a few times, you can gain an understanding of what sort of movement will trigger what level of motion in the camera.

Note: It may be helpful to repeat the test at different times of day, as scenes from different times of day may create different levels of motion due to changing light levels.

If we repeated the above example multiple times and found that typically a person entering the premises caused motion in the 50 - 75% range, we can then set our motion detection levels. In this example, 50% would be a good starting level if our primary desire is capture people entering the premises.

Important: It is strongly recommended to go back and check recordings a few days after initial setup to verify the recording is working as intended. Adjust motion detection percentages down (lower percent) if you feel you have missed events, or adjust up (higher percent) if you find the recording is being triggered too frequently. This is also the best way to see the effect of changing light patterns from sunlight or house lighting. Note that you may need to adjust settings in the camera if you cannot arrive at good trigger values, or you may wish to use the Auto Record Mode to automatically adjust for changing light patterns (etc.) that make it difficult to use a Fixed Threshold.

STORAGE OPTIONS

Note: External drives cannot be connected directly to the HC-Controller.

I. **NAS Drive.** For maximum reliability, Elan recommends the use of a NAS (Network Attached Storage) drive. NAS drives are essentially external hard drives with enough logic built inside to manage a network connection, and appear as a shared network drive to all computers on the network.

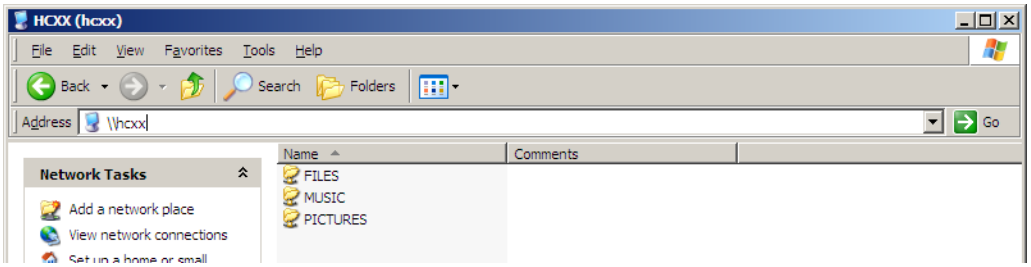
1. It is important that the NAS is left **ON 24 hours a day, 7 days a week** to prevent recording interruption. Loss of connection to a network share will prevent access to existing DVR clips in the Viewer, prevent recording of new clips, and may cause other issues.
2. The NAS must be configured as an open share (no authentication).
3. To setup recording for DVR with a NAS drive, enter Configurator and click on the Video Tab and open Global Options. Enter the network share into the Record Path field. A network path is typically formatted like: `\\COMPUTERNAME\SHARENAME`.
4. The NAS drive must be connected to the same network as the HC-Controller. Note you must use the UNC name as IP addresses are not valid paths from HC-Series Controllers.
5. If purchasing a NAS drive, professional or enterprise versions are recommended. Consumer models are typically intended for menial tasks like backing up family photos, and are typically much slower.

II. **Network Drive Attached To Another Computer *(Not Recommended)*.** It is possible to use a drive on a local computer for storing DVR recordings.

1. If you decide to use a hard drive connected to another computer (internal or external), it's important that the computer is left **ON 24 hours a day, 7 days a week** to prevent recording interruption. Loss of connection to a network share will prevent access to existing DVR clips in the Viewer, prevent recording of new clips, and may cause other issues.
2. The computer should preferably be dedicated as a file server and not used regularly.
3. To setup recording for DVR with a NAS drive, enter Configurator and click on the Video Tab and open Global Options. Enter the network share into the Record Path field. You must enable sharing for the folders as an open share (no authentication) where the files will be stored and enter the network path to each folder. A network path is typically formatted like: `\\COMPUTERNAME\SHARENAME`.
4. This computer must be connected to the same network as the HC-Controller. Note you must use the UNC name as IP addresses are not valid paths from HC-Series Controllers.
5. ***NAS Drives are strongly recommended over the network computer option****, as any use of the network computer will strain its resources and slow it down, and any issues (such as reboots) will interrupt its availability to g! and cause problems.*

III. HC-Series Controller Hard Drive (applicable models). *Bear in mind not all HC Controllers have an internal hard disk, and NAS drives must be used in some situations.* Folders can be created on the HC-Controller in the following manner:

1. On a computer connected to the same network as the HC-Controller, open an explorer window in Windows by right clicking My Computer in Windows XP or Computer in Windows Vista and selecting "Explore". In the Address bar at the top of the window, type `\\hcxx` and hit the "Enter" key:

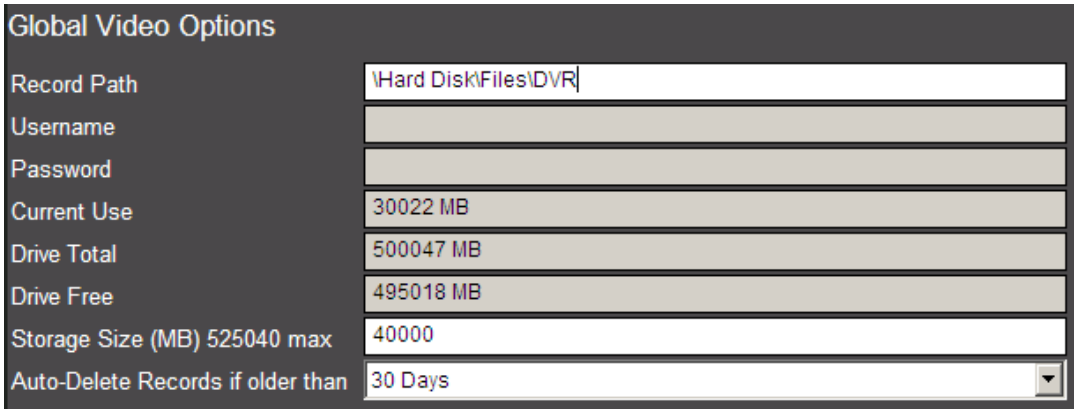


2. Double left click the folder named "Files" in the right hand pane of the explorer window; the Address bar will change to read `\\hcxx\FILES` indicating that you are browsing the FILES folder on network computer HCXX.

3. Right click inside the right hand pane of the window and choose "New>Folder" from the pop up menu. A new folder will appear named "New Folder":

4. The name of the folder is highlighted, indicating that it is ready to be renamed. Type "DVR" and then hit the "Enter" key to rename the new folder "DVR":

5. Finally, add the local storage folder to Configurator. Note you will use the **local** path in Configurator, and not the network share path as described above. The local path for the above location would be:
`\Hard Disk\Files\DVR`



ADDITIONAL INFORMATION

Additional information on Auto Record Mode:

g! DVR will constantly record 1 frame per minute on all cameras with DVR enabled and constantly monitor the motion detection levels. The g! DVR engine will dynamically adjust the motion detection threshold based on recent motion level data, in order to better filter out background “noise” motion, such as a fan spinning, television on, or things moving in the breeze. Motion detection levels must deviate from the norm to a certain degree in order to trip recording, with three deviation sensitivity levels. As g! is constantly reading the motion detection levels, the motion detection trigger level is constantly re-calculated based on recent time data.

This automatic method of motion detection should help to greatly reduce false positives, and simplify motion detection setup. Note that with this method, the sensitivity settings in the IP Camera or IP Video Server are much more important, and must be setup effectively.

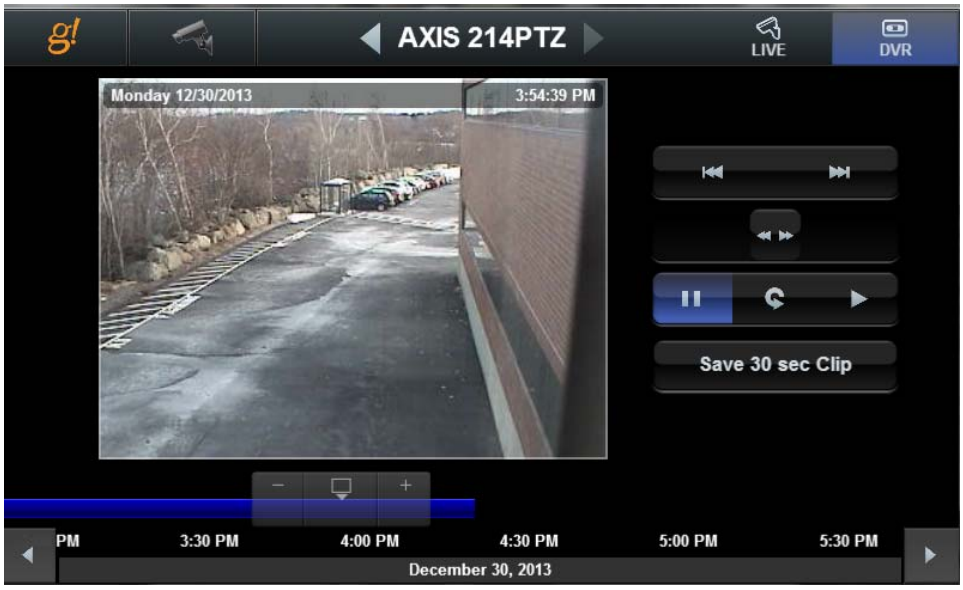
Note: Due to the constant nature of writing files, there may be a delay of several minutes before a recent clip will appear in the DVR in Viewer.

Camera Viewing and its effect on DVR **Record Resolution:**

The g! System DVR function supports setting a Record Resolution when it initiates the video stream for recording. In version 4, if a Viewer window opened to the same stream being recorded and requested a different resolution, the DVR stream would also change to this new resolution. In Version 5, this is not strictly the case. **If your camera/server supports multiple simultaneous streams** with different resolution, g! will automatically open a new stream to the device with altered resolution, and **recording will not be affected**. However, if your camera/server does not support streaming multiple resolutions at once (ex. Aviosys), then all streams will change to the new resolution, including the recording.

Saving AVI Clips from a PC Viewer

g! DVR supports saving AVI clips of DVR video from a PC connected using g!Connect Viewer software. With the desired camera DVR open in the Viewer, zoom to the desired playback speed (note that the zoom level is important, as this will affect playback speed). Click the Save Clip button and then choose a location to save the file from the Save As dialog box that appears. The Viewer will attempt to export a 30 second clip, though the exact timing may vary somewhat—this is contingent on the amount of motion present. It is typically recommended to use the Next/Previous clip buttons to go to a location with motion to get a good clip.



COMMON MISTAKES

1. Incorrect Path. If they paths are valid, you will see drive information (Disk Size 83455mb etc.). If they are not valid, the totals will all read 0mb.
2. Motion not enabled properly in camera. If you cannot get the motion level to change from 0% in g!, login to the camera web GUI and confirm that motion detection is properly enabled. See the Integration Note for your camera/server for details.
3. Recording too much or too little:
    1. **Check sensitivity levels configured in the camera first, as these are the basis for all recording in g!.**
    2. You may also wish to change your Motion Detection settings for the Auto Record Mode sensitivity (high-med-low), or set a new level if using Fixed Threshold Record Mode. See **Motion Detection Configuration Tips** and **Camera Motion Detection Sensitivity** in this document for more info.
    3. Setup redundant clip triggers. In addition to setting up motion based recording from the camera, if other inputs are available like a Security zone, it is strongly recommended to setup Event Maps to trip off these sensors as well. See **Event Map Options -Other Trigger Options** for more info.
    4. **Always go back a couple days after changing sensitivity/record modes to evaluate if you are getting the recording detail you want**. It is far preferable to be proactive about this than realize after the fact your settings are not adequate. Bear in mind that if g! doesn't get motion or other recording stimulus, it records only 1 frame per minute.