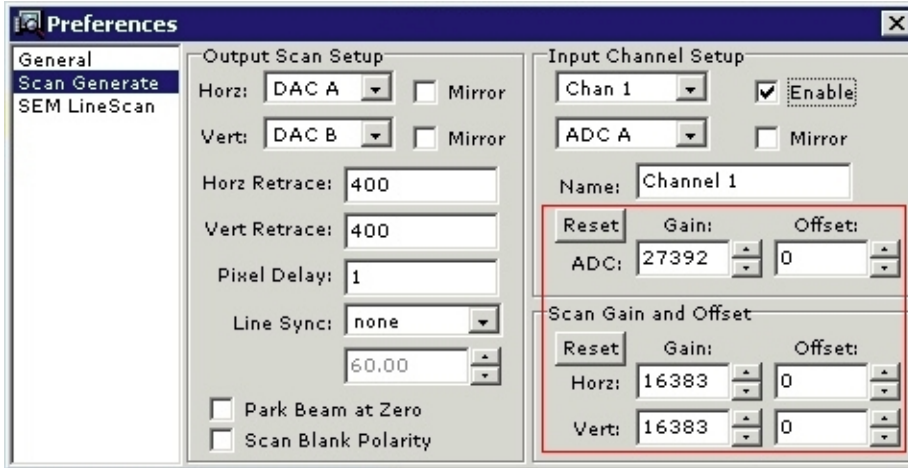


Scan Generate Preferences

[\[download as pdf\]](#)

current for: v1.6.0

The Scan Generate Preferences panel is shown below:



Other Preferences

- [General](#)
- [Scan Generate](#) •
- SEM Linescan

Universal
Spectral
Engine
Only

• *Output Scan Setup*

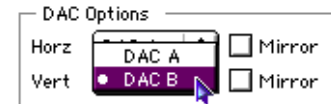
◦ *Horz*

Determines which DAC generates the fast (line) scan. DAC A is default. Swapping to DAC B has the effect of rotating the scan by 90°. Caution: the distinction is important for some microscopes, because there may be limits on how fast the line scan input can be driven. To slow the fast scan down, increase the **Pixel Delay** (see below). The user should select the assignments which cause the preview image to match the microscope CRT image with respect to orientation.



◦ *Vert*

Determines which DAC generates the slow (frame) scan. DAC B is default. Swapping to DAC A has the effect of rotating the scan by 90°. The user should select the assignments which cause the preview image to match the microscope CRT image with respect to orientation.



◦ *Mirrors*. Reverses the direction of scan for the given DAC.

◦ *Horz Retrace [Delay]*. The amount of time the software idles after setting the first-pixel beam-position in **each linescan**. It allows the electron beam enough time to retrace and settle before acquiring the first pixel in **each linescan**. The allowable range is 0-1600 microseconds. Typical values are 100-500. See **Park Beam at Zero** (below) for important additional information.

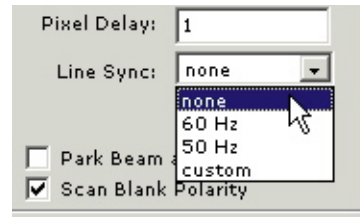
◦ *Vert Retrace [Delay]*. The amount of time the software idles after setting the first-pixel beam-position in the **first linescan**. It allows the electron beam enough time to retrace and settle before acquiring the **first pixel** in the **first linescan**. The allowable range is 0-1600 microseconds. A typical value is 100.

◦ *Pixel Delay*. The amount of time the software idles after setting **each pixel** beam-position in **each linescan**. It allows the electron beam enough time to settle before acquiring **each pixel**, if necessary. The allowable range is 0-800 microseconds. Typical values are 0-10.

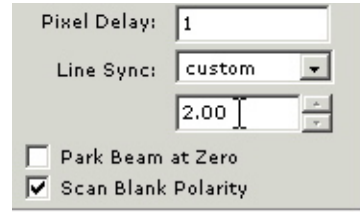
◦ *Line Sync*. If noise appears in an image, this menu can be used to synchronize the beam scan to the noise. Any noise in the system that exactly matches the entered frequency will then appear to be absent from the image (in fact, it will not be absent, but it will no longer be apparent to the eye). Depending on the exact

values for dwell and pixel delay, the values selected here may or may not slow image acquisition.

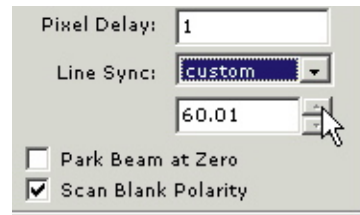
When set to "none" (default), scan generation proceeds normally. If set to 60Hz, each linescan starts on a 16.6667 millisecond boundary. If set to 50Hz, each linescan starts on a 20.0000 millisecond boundary.



User-defined values may be set by selecting "custom" and entering a value from 2.00 to 200.00 in 0.01 Hz increments:



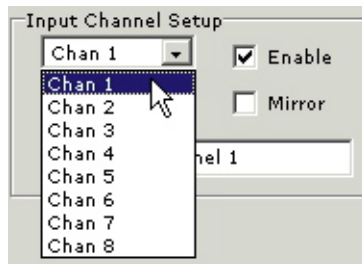
The arrow tools can be used to increment or decrement in steps of 0.01 Hertz:



- **Park Beam at Zero.** In the default mode of operation (unchecked), the Spectral Engine positions the electron beam at the start of a line, then acquires the line, and then leaves the electron beam at the end of the line while the data are transferred. Then, after transfer, the beam is retraced. This checkbox causes the beam to retrace **before** the data are transferred. On Spectral Engine II systems, the effect is to create a very large horizontal retrace delay because of the data transfer overhead. Some microscopes need this extra time for the beam to settle. If a compression distortion over a large fraction of the horizontal scan appears, turn this checkbox on. *Although this checkbox is functional on Universal Spectral Engine systems, it has no practical effect as the USE has no data transfer overhead.*
- **Scan Blank Polarity.** This signal is available on CN11 of Rev2.2 SIUs. Most installations do not use this signal. It is normally 0V before/after scan and +5V during scan. The checkbox inverts this polarity. Requires FPXDriver 5.3 or later on Spectral Engine II systems. *Currently unused on Universal Spectral Engine systems.*

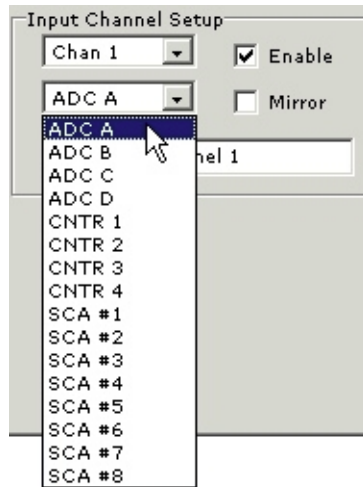
• **Input Channel Setup**

- **Logical Channel and Enable.** Logical channels are numbered **Chan 1 - Chan 8** and define which channels appear on the monitor:



To enable the acquisition of a channel and make it appear on screen, check its **Enable** box. To disable acquisition of a channel, uncheck its **Enable** box.

- **Physical Channel.** Physical channels are the actual analog or digital signal inputs to the 4pi system:



There exist:

- 4 analog inputs labeled **ADC A - ADC D**
- 4 TTL counter inputs labeled **CNTR 1 - CNTR 4**
- 8 SCA inputs labeled **SCA 1 - SCA 8**

The analog channels (**ADC A - ADC D**) are typically connected to detectors such as a secondary electron or backscattered electron detectors and are used by the 4pi hardware and software to generate digital images. Other types of signal sources include absorbed current or cathodoluminescence. The customer must supply access to the appropriate analog signal sources. Often these connections are available via panels supplied by the microscope manufacturer and are terminated with BNC or other standard connectors; however, this may not be the case if the microscope is not configured for external scan control. 4pi can help determine the configuration and make suggestions, but it is ultimately the customer's responsibility to verify configuration with the maker of the microscope. In principle, these details were resolved during the ordering of your 4pi equipment.

The TTL counter signal inputs (**CNTR 1 - CNTR 4**) may be connected to pulse outputs from a WDS (*Wavelength Dispersive Spectrometer*) or EELS (*Electron Energy Loss Spectrometer*) pulse-height analyzer electronics, and are used by the 4pi hardware and software to generate image maps. Counter signals must be TTL-compatible five volt logic signals, and the pulses may be either positive- or negative-going. The customer must supply access and BNC terminations to TTL pulse outputs from their electronics. The Spectral Engine hardware can accurately count pulse rates from the sub-Hertz range up to several hundred kilohertz or even higher in certain circumstances. Such broad dynamic range can create a number of issues with respect to map acquisition and display (for example, ensuring that there are sufficient counts to be visible, or avoiding overflow in the counter registers). Contact [4pi support](#) for more information.

The SCA channels are data pathways from the EDX to the imaging (SEM) side of the Spectral Engine II circuitry; for these systems, SCA channel configuration and use is covered in [X-Ray Image Prefs](#). *Not relevant to Universal Spectral Engine systems.*

Each of the logical channels has a default physical channel assigned to it. For example, by default **Chan 1** is attached to **ADC A**. According to the user's wishes, any physical channel can be assigned to any logical channel for acquisition in any order by using the two menus described above (there is one exception to this rule regarding WDS maps - contact [4pi support](#) for more information).

- **Mirror.** For each channel, the **Mirror** setting defines black and white. Leaving mirror unselected defines a pixel value of zero as black, with higher pixel values shading toward white. Selecting mirror reverses this definition. Set the mirror setting so that the acquired digital image and the microscope CRT image are alike.
- **Name.** Use this edit field to preload the name which will appear as the title of the image window displayed on the screen, and which will be used as the default for the image file name.

• **Universal Spectral Engine Controls**

- **ADC Gain.** Software control of each video channel's gain, which corresponds to the contrast control on a microscope. The values can be changed with either the up/down button controls to the right of the edit field, or by entering a number in the edit field and hitting return. Be sure to select the correct channel in the Input

Channel Setup before adjusting ADC values! The gain value is an unsigned 16-bit number (0 to 32767); lower values correspond to higher contrast. Note that values below 7000 or above 31000 can lead to unexpected results. If more or less gain than is possible from this control is needed, internal USE potentiometers can be adjusted. Contact 4pi support for more information. In general, the ADC gain should be adjusted **after** the microscope contrast is adjusted, so that the computer image is very close in contrast to the microscope's.

- **ADC Offset.** Software control of each video channel's offset, which corresponds to the brightness control on a microscope. The values can be changed with either the up/down button controls to the right of the edit field, or by entering a number in the edit field and hitting return. Be sure to select the correct channel in the Input Channel Setup before adjusting ADC values! The offset value is a signed 16-bit number (-16384 to +16383); lower values correspond to brighter images. Note that values below -15000 or above +15000 can lead to unexpected results. If more or less offset than is possible from this control is needed, it must be accomplished with the microscope controls, as there are no internal USE potentiometers for this purpose; however, offsets as high as ± 3 Volts can be achieved, and are very unlikely to be insufficient. Contact 4pi support for more information. In general, the ADC offset should be adjusted **after** the microscope brightness is adjusted, so that the computer image is very close in brightness to the microscope's.
- **Scan Gain.** Software control of each scan DAC's gain, which corresponds to the voltage slope of the ramp. The values can be changed with either the up/down button controls to the right of the edit field, or by entering a number in the edit field and hitting return. The gain value is an unsigned 16-bit number (0 to 32767); higher values correspond to a steeper ramp and a sense that the image is being magnified in the indicated direction. Note that values below 7000 or above 31000 can lead to unexpected results. If more or less ramp control than is possible from this setting is needed, internal USE potentiometers can be adjusted. Contact 4pi support for more information. In general, the DAC gains should be adjusted so that the computer image matches the microscope field of view, and so that the pixels are square.
- **Scan Offset.** Software control of each scan DAC's offset, which corresponds to the voltage offset of the ramp. The values can be changed with either the up/down button controls to the right of the edit field, or by entering a number in the edit field and hitting return. The offset value is a signed 16-bit number (-16384 to +16383); higher values correspond to a negative offset and a sense that the image is being shifted in the indicated direction. Note that values below -15000 or above +15000 can lead to unexpected results. If more or less offset than is possible from this control is needed, it must be accomplished with the microscope controls, as there are no internal USE potentiometers for this purpose; however, offsets as high as ± 5 Volts can be achieved, and are very unlikely to be insufficient. Contact 4pi support for more information. In general, the DAC offsets should be adjusted so that the computer image matches the microscope field of view.
- **Reset.** The Reset buttons reverts the values for gain and offset back to their defaults.