

GE CT120 μ CT Respiratory Gating

Quick Operation Guide



Prepare Hardware

- Configure microCT as usual
 - select scan protocol that includes gating
 - currently the protocol named “Respiratory Gating” is the best choice for most cases
 - perform CT Warmup
- Power on laptop running PC-SAM gating software
 - Do not connect laptop to gating unit yet
- Connect power to the SA-1025T gating unit
- Connect BNC cable from SA-1025T to “input ECG” coaxial connector on microCT
 - use “input ECG” for both respiratory and cardiac gating



Configure Laptop

- **After** the laptop has fully booted and logged in, then connect the USB data cable to the SA-1025T
 - connecting prematurely can cause the laptop to see the gating unit as a computer mouse, requiring the cable to be disconnected and the computer rebooted.
 - ONLY use the USB port on the left side of the laptop. The one in the back will not work



- Start the PC-SAM software
- Make sure the “Selected Startup Setup” is “respiratory_gating”
- Then click the “Start Monitor” button
- or configure your own custom setup (left button)



Go To Full Setup Screen If You Need To ...

- Select Signal Traces To Be Used (Build Screen).
- Setup User Defined Traces (Can also right-click the traces).
- Select Respiration Channel Signal Source.
- Create Your Own Name For The Data Folder For This Session.
- Select Serial Communication Port.
- Select Default Stored Setup To Use At Startup.
- Select An Alternate Stored Setup To Use For This Startup.

Selected Startup Setup
Setup 1 | respiratory_gating

Click Here To Show Full Setup Screen

Click Here To Start Monitor with Selected Setup Above

Default Values For PC-SAM Setup

- If gating does not seem to be working, check that the settings match those shown here
- Modifications may be needed for some applications (eg. cardiac gating)

SAM PC Monitor Setup Screen

Cardiac Sweep Rate Trace Window Selections

Cardiac Sweep Rate Gate Display

Need if any cardiac sweep rate selected 39

ECG Trace Selection

None 0

Full Height with Cascade 430

Full Height, Single Trace 223

Half height with Cascade 229

Half Height, Single Trace 121

IBP Trace Selections

BP1 trace in IBP window } 195

BP2 trace in IBP window }

BP3 trace in IBP window }

User Spare (BP3) in separate window 117

Pulse O_x / Pulse Trace Selection

Pulse/PulseO_x Plethysmogram Trace 92

Manual IBP Gain Calibration Factor

1.000 Calibration Factor is 1.000 for standard 5.00 uV/V/mmHg IBP transducers.

User Spare (BP3) Setup

Title/Name... User Display Units Legend... cnts

Scaling... 3 ADC counts per 1 Display Units

Zero Offset... 90 ADC counts for zero ("0") display

Range Adjust Step Size... 10 Display Units

Front End Gain: x 10 x 100

Adjustable Gain Stage: x5.86

Data Folder

Data for this session will be saved in this folder (directory):
PATH: C:\Program Files\PC-SAM\SAM-Data\

FOLDER: 111116A

Unless you.....

Serial COM Selection

COM 1 COM 2 COM 3 COM 4

COM 5 COM 6 COM 7 COM 8

Power Up Initial Setup

Previous Factory Defaults

Setup 1 Setup 2 Setup 3 Setup 4

Respiration Sweep Rate Trace Window Selections

Respiration Sweep Rate Gate Display

Need if any resp. sweep rate selected 39

Respiration Selections

Respiration (e.g., P sensor) trace window 117

E-Resp (tm), ECG baseline respiration 117

User Spare Resp Sample Rate Trace 117

Respiration Source Select

P-Resp (tm) FO-Resp (tm) T-Resp (tm)

User Spare Resp Setup

Title/Name... UserR Display Units Legend... cnts

Scaling... 1 ADC counts per 1 Display Units

Zero Offset... 63 ADC counts for zero ("0") display

Range Adjust Step Size... 1 Display Units

Source: Analog Input T-Resp (tm)

High Pass Filter Output to Resp LED

Front End Gain: x 10 x 100

Adjustable Gain Stage: x8

Use Final x(-2) Gain Stage

Slow Data Displayed

Rate/Prd Value Rate/EtCO2

Trend Trace Window Selections

Temperature T1 81

All Temperatures 81

Maximum Vertical Pixels Available 714

Total Vertical Pixels Selected Above 156

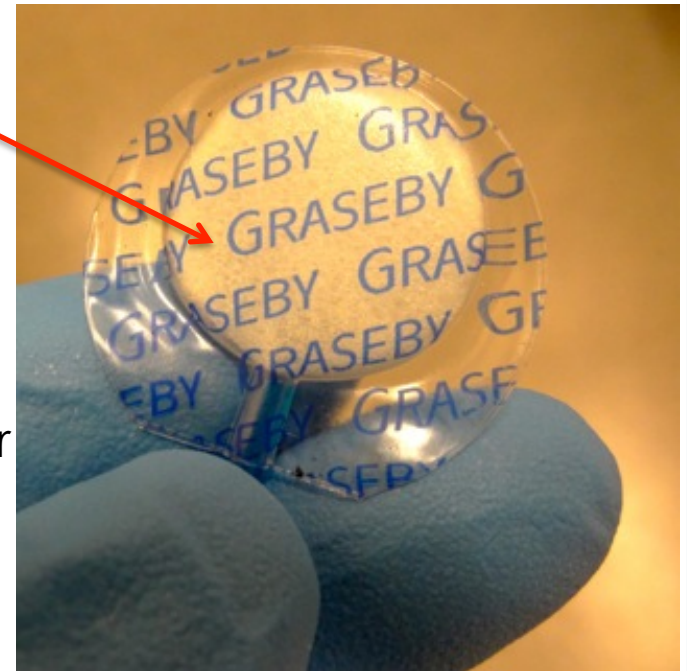
Vertical Pixels Still Available 558

Selected setup and Name or Info (up to 24 characters)

Setup 1 | respiratory_gating

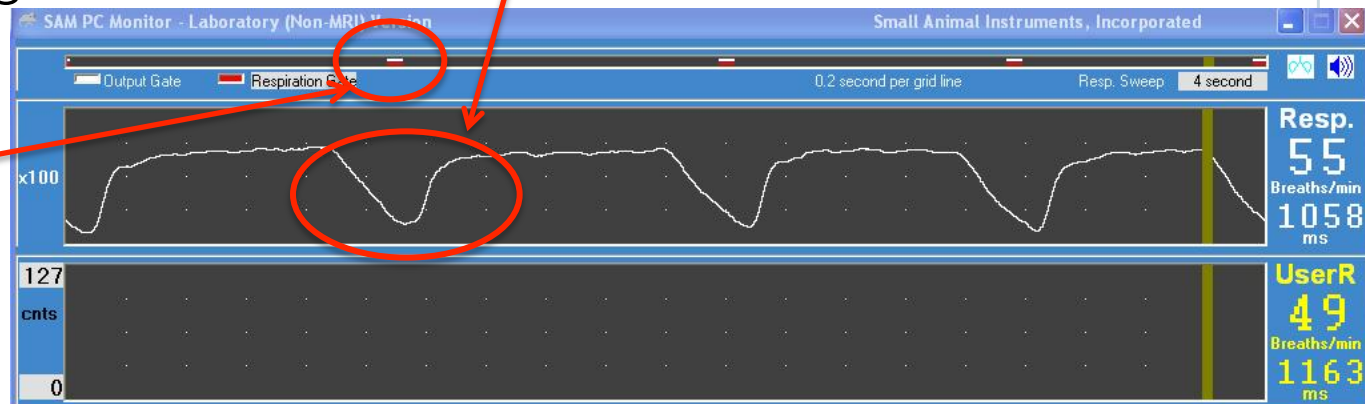
Prepare Animal

- Anesthetize animal and place in supine position in the scanner.
 - the respiratory monitor does not fit well into mouseholder/cradle when mouse is in prone position
- Attach the respiratory monitor to the animal chest.
 - tape works well
 - position in such a way as to allow compression of the monitor during breathing (without excessively restricting breathing)
 - if gating is sporadic or not possible, try repositioning the monitor to allow a larger range of compression during breathing



Adjust Gating Trigger

- Confirm that you see a downward deflection of the waveform during inhalation.
- Confirm that you see a red bar indicating detection of breathing
- Open the gating tab to adjust the timing of data acquisition as needed
- Adjust the “Begin Delay” setting to make the trigger (red/white bar) correspond with desired point in breathing cycle



The Gating Setup Form is shown with the following configuration:

Signal Source	Pulse Invert	Begin Delay	Max. Width	Gates
ECG		0	15	<input type="checkbox"/>
IBP 3 (User)	<input type="checkbox"/>	0	0	<input type="checkbox"/>
Pulse/PulseOx	<input type="checkbox"/>	0	0	<input type="checkbox"/>
Aux. Input	<input type="checkbox"/>	0	0	<input type="checkbox"/>
FiberOptic Aux	<input type="checkbox"/>			<input type="checkbox"/>
E-Resp (tm)	<input type="checkbox"/>	10	0	<input type="checkbox"/>
Respiration	<input type="checkbox"/>	70	50	<input checked="" type="checkbox"/>
User (Resp)	<input type="checkbox"/>	0	0	<input type="checkbox"/>

Gate Outputs: Invert Gate Output, Invert FO Output. Buttons: Advanced..., Inversion Timing.

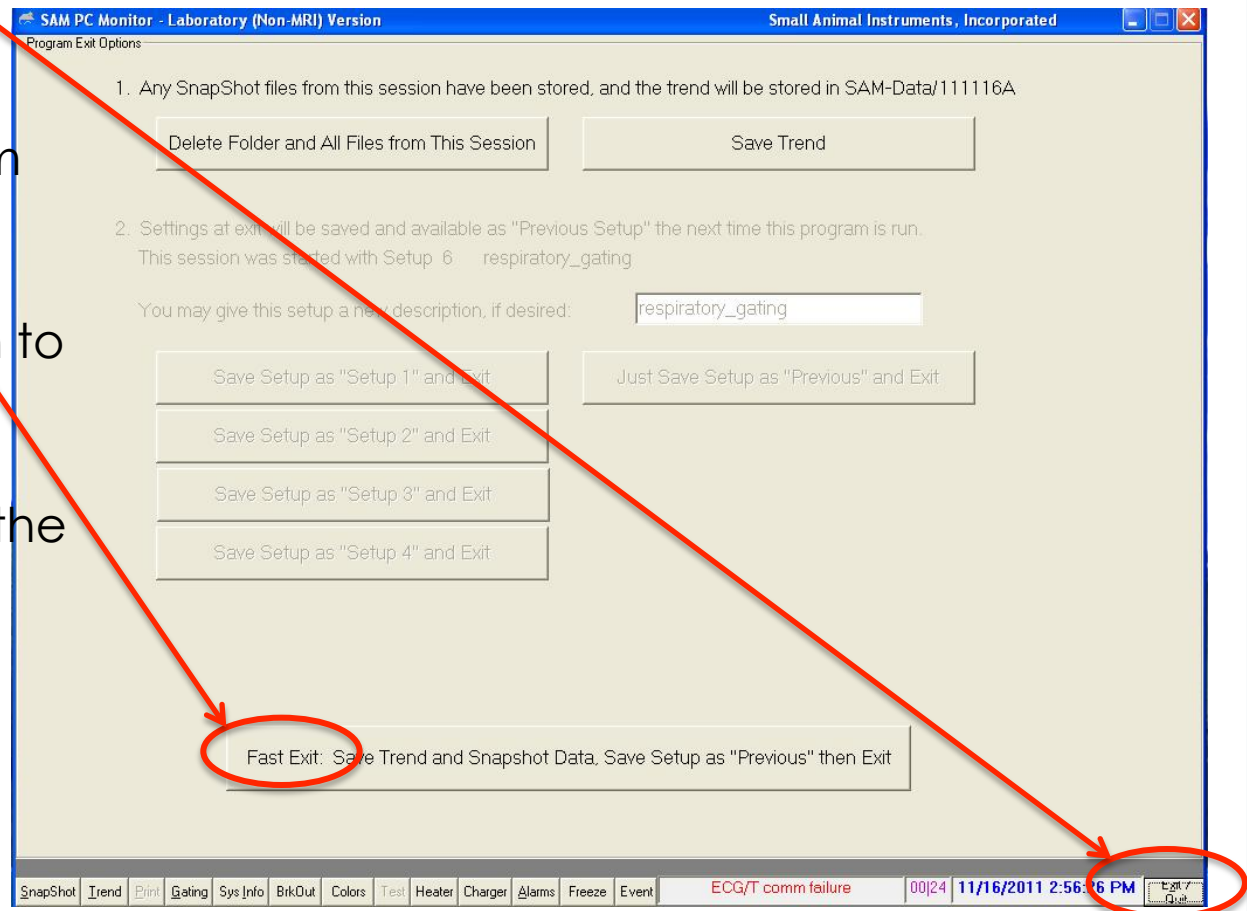
Set Trigger Delay

- In GE console application use “Add Delay” to set a delay of zero.
- A delay of zero causes the microCT to acquire data at the same time it receives the trigger from the 1025T.
- Multiple delays can be specified.
- Each delay corresponds to an entire data set leading to significantly increased scan times and radiation exposure

The screenshot displays the GE console application interface for a CT scan. The top section shows project details: Project: Milton, Exam: 11-16-2011, Specimen: Respiratory Gating 2, Recon Server: Console-0126 Recon, and Save Data To: Console-0126 (CT). The main area is divided into two panels. The left panel, titled '70kVp_Respiratory_Gating', shows a 'Protocol Items' list with 'Gated Step and Shoot' and a thumbnail. The right panel, titled 'Sequence: Gated Step and Shoot', displays various scan parameters: Series Name: Gated Step and Shoot, Modality: CT Gated Step and Shoot, Scan Technique: Short Scan, Number of Views: 220, Increment Angle: 0.877°, Averaged Frames per View: 1, X-Ray Tube Voltage: 70.0 kV, X-Ray Tube Current: 50.0 mA, Detector Bin Mode: 2x2, Exposure Time (ms): 32, Gain: 130, Offset: 120, and Gated Delay Times (ms): 0. The 'Gated Delay Times (ms)' field is highlighted with a red circle, and a red arrow points from the text 'Add Delay' in the first bullet point to the 'Add Delay...' button next to it. Below the 'Gated Delay Times' field are 'Advanced Settings' with three unchecked checkboxes: 'Use cached bright and dark', 'High dynamic range', and 'Run sequence in protocol with no confirmation required'. At the bottom of the interface are several buttons: 'Clear Finished', 'Cancel Job', 'Reconstruct', 'CT Warmup', 'Gating Planner...', 'Run Scout', 'SPECT Fluoro', 'CT Fluoro', 'Run Sequence', and 'Run Protocol'.

Exit Gating Software On Laptop

- After scanning, select “exit/quit” from the lower, right-hand corner
- Select “Fast Exit” from the exit screen
- Disconnect the hardware and return to ATWAI personnel.
- Do not close the software controlling the microCT.



Data Reconstruction

- Use the thumbnail image to select an ROI, as usual.
- If multiple phases were collected the software will automatically reconstruct them using the same ROI for each.