Multi-animal Monitoring and Gating Systems for use with MR, PET, CT, SPECT and Optical

Configurations:

- **MR**
- **Imaging systems other than MR**
- **3 or 4 channels**

Temperature control

Waveform & trend data acquisition

Monitoring

- **ECG**
- **Respiration**
- **Temperature**

Retrospective Gating

- **ECG**
- **Respiration**
- **ECG & respiration**

Multi-animal monitoring and gating systems have been designed to meet the physiological monitoring and gating needs for anesthetized mice, rats and larger animals in the MR, PET, CT, SPECT, Optical and laboratory environments. The Model 1200 is configured with a 3 or 4 channel ECG, respiration and temperature (ERT) data acquisition Module located near the imaging volume and near the animals and with a PC Interface (PCI) Module connected to a PC located near the operator console. The PC displays multiple waveforms, measured values, trends and gating pulses. Data acquisition is controlled by menu driven software from the PC.

ECG waveforms are measured for each animal using two or three leads with sub-dermal needle, gold disk surface or radio translucent surface electrodes. Each ECG waveform is processed to detect the R-wave, generate an ECG gate and to determine the heart rate.

Temperature is measured using either thermistor or fiber optic sensors. Fiber optic sensors offer several advantage but are more expensive than thermistor sensors. The sensor can be located in the rectum or on the animal's skin. Any animal temperature measurement can be used with the Heater System to control the temperature of the animals.

Respiration is obtained from a small pneumatic pillow sensor placed next to the abdomen or in MR from one of the ECG leads for each animal. Each respiration waveform is processed to detect inspiration, expiration, a respiration gate and respiration rate.

Auxiliary input channels allow the user to synchronize the animal's physiological measurements with data from the imaging system which allows retrospectively gated images.

Gating algorithm, which is user configured, allows gates to be generated for each animal from ECG, respiration or ECG and respiration. The user can control the start, stop and width of each animal's gate.

Power for the ERT Module is supplied from either a battery or an isolated power supply.

Specifications:

ECG	range:	40 - 900 BPM
	accuracy:	±1%
	input range:	-2.50 mV to 2.5mV
	input Impedance:	>10 MΩ at 10 Hz
	CMRR:	100 dB at 60 Hz
Temp	probe types	thermistor or fiber optic
	tip diameter	1.0 or 3.0 mm
	range	20 – 60 ºC
	accuracy	+/-0.26 ºC 32 – 42 ºC
Resp	range	13 - 300 bpm
	accuracy	1 count
	sensor type	pneumatic pillow or ECG lead
ERT Module	multiple channels	3 or 4
	power	battery or power supply
	patient isolation	optical
PCI Module	aux gate inputs	3 or 4
	power	+12 VDC
Gating	R-wave to gate delay	selectable - 0 ms to 600 ms
	expiration gate width and delay	selectable - 1 ms step size
Temp	heater control	fiber optic PWM

PC requirements:

Operating system:	Windows any version
Hardware:	>1 GHz processor
	Display ≥1024x768
	USB port

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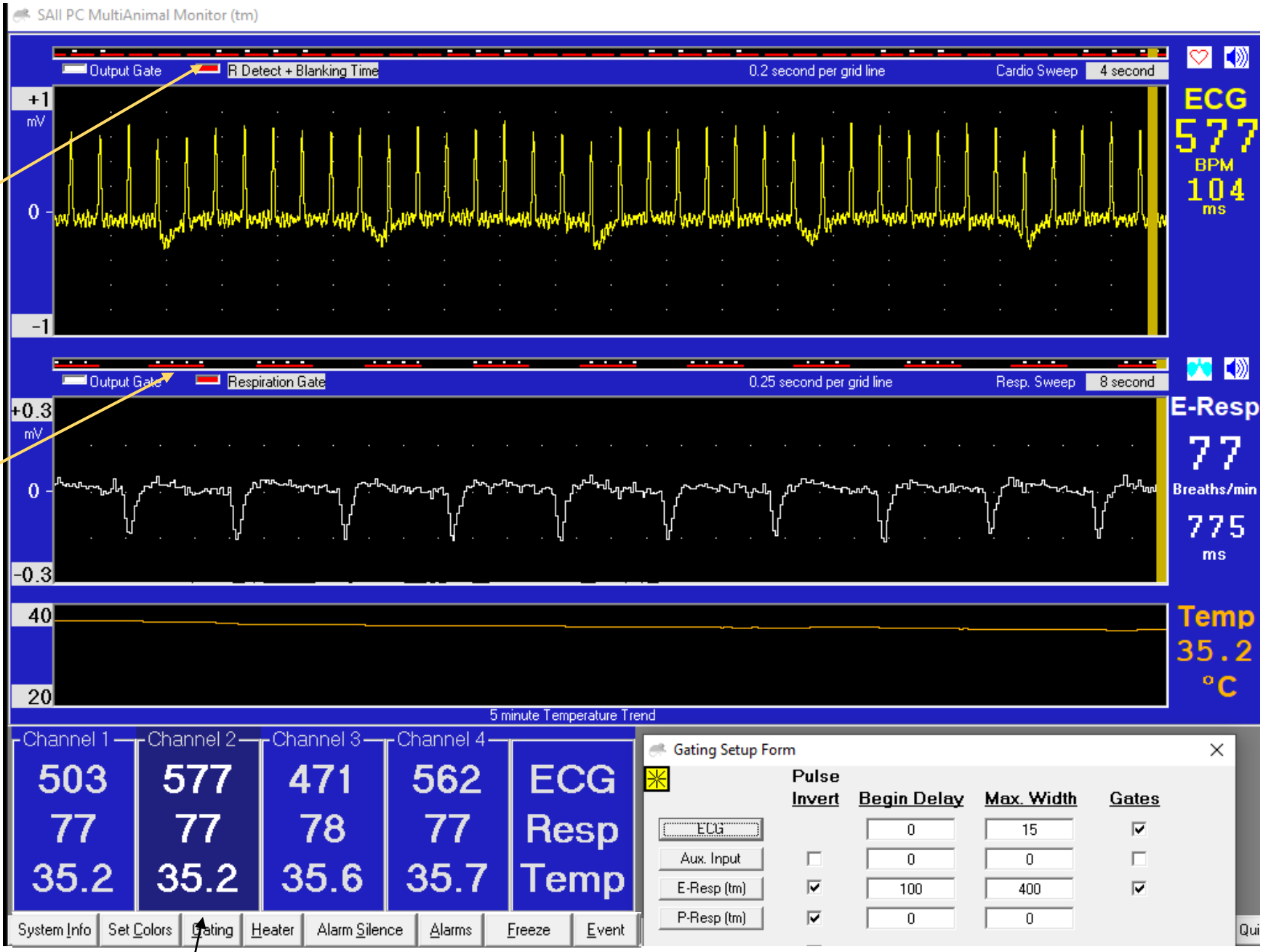
Model 1200 Multi-animal Monitor Display

cardiac gate: red dot when R-wave is detected, white dot when gate is output

respiratory gate: red bar during expiration, white dot when gate is output



ECG, respiration waveforms and temperature trend displayed tor the selected channel. Heart, respiration rates and temperature displayed for all channels.

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