

# Power Lab Physiological Data Collection Setup in Mock Scanner

## Power Lab introduction

### Data acquisition system

- Allows for real-time display of experimental data, online and offline computations and, reversible data manipulation
- The Chart software controls the PowerLab hardware and displays on the computer screen those electrical signals measured by the PowerLab

### Chart Features

- Virtual chart recorder with up to 16 channels
- Quick, easy set up of recording parameters
- Recording directly to disk
- Online calculation of heart rate, mean, systolic and diastolic pressure and more
- Easy unit conversion (2 point signal calibration)
- Flexible triggering and stimulation options
- Comment fields during or after recording
- Automation of experimental procedures
- Data analysis and display features which include: statistical measures, data smoothing, interchannel arithmetic and data exclusion

## Basics of data acquisition

**The purpose of the PowerLab system is to acquire, store and analyze data.**

How does data acquisition occur?

- Chart records voltage data from an external source (like a pulse transducer) this raw input signal is in the form of an analog voltage whose amplitude varies over time.
- This voltage is monitored by the hardware and through signal conditioning can amplify, filter, zero... to remove any unwanted steady offset voltage
- After signal conditioning, the analog voltage is sampled at regular intervals
- The signal or sampled voltage is then converted from analog to a digital representation
- The computer software displays the data directly

## General Setup

- Connect the USB cable from the PowerLab amplifier to the GCRC laptop (image 13&14)



**Image 13 :** The USB cable from PowerLab



**Image 14:** The USB cable plugged into the laptop

- Turn the laptop on and start Chart

- Make sure that all desired peripheral equipment (ECG, EtCO<sub>2</sub>, GSR, etc) is attached (see below)
- When ready for data acquisition, press the “Start” button to begin

## ECG (Electrocardiogram)

### Reference Range

- 50 – 100 beats per minute. This varies from one person to the next based on cardiac conditioning, exercise, medications, and anxiety.

### Default Settings

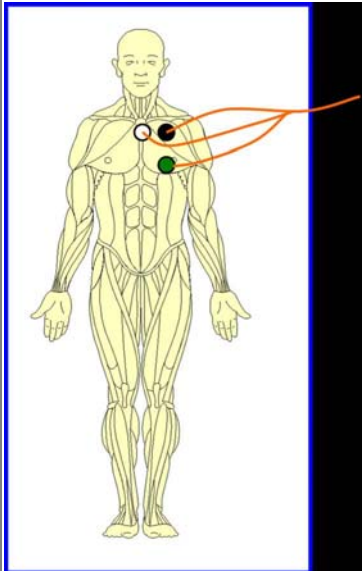
- Check the PowerLab ECG bioamp ([image bioamp](#)). Make sure the cable is attached to the PowerLab amplifier BNC channel output [[image 16](#)].
- Confirm that the BNC input channel matches the channel set for ECG “channel settings” [[image 17a](#)] in chart (\*note: the designated channel for ECG may vary depending on how it was setup)



Image 16: Powerlab power cable



Image 17a : PowerLab amplifier

<p>Attach ECG electrodes to the subject in preferred configuration and snap-connect the <b>plastic coated insulated</b> ECG leads to the electrodes on the subject</p> <p>The standard configuration is as follows: (facing the subject) upper left=white, upper right=black, lower right=green [see image on right]</p> <p>On women, place the lower right electrode directly below the left breast</p>	
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## EtCO<sub>2</sub> (End-tidal Carbon Dioxide)

- Attach the nasal cannula (CO<sub>2</sub> respiratory tube) [[image 19](#)] to the port on the Capstar CO<sub>2</sub> sensor pod [[image sensor pod](#)]. There should be a male to male tube adaptor attached to the sensor pod to allow the cannula to attach.



Image 19: Nasal cannula



Image sensor pod : Capstar sensor pod

- Make sure the red “fast” button [image fast button 1&2] is pushed in on the blue Capstar-100 CO<sub>2</sub> Analyzer [image capstar analyzer 1]



- Make sure the cable connected to “EtCO<sub>2</sub>” on the Capstar sensor pod is connected to the correct channel on the PowerLab amplifier. This channel should match the channel set for EtCO<sub>2</sub> in “channel settings” [image 17b]

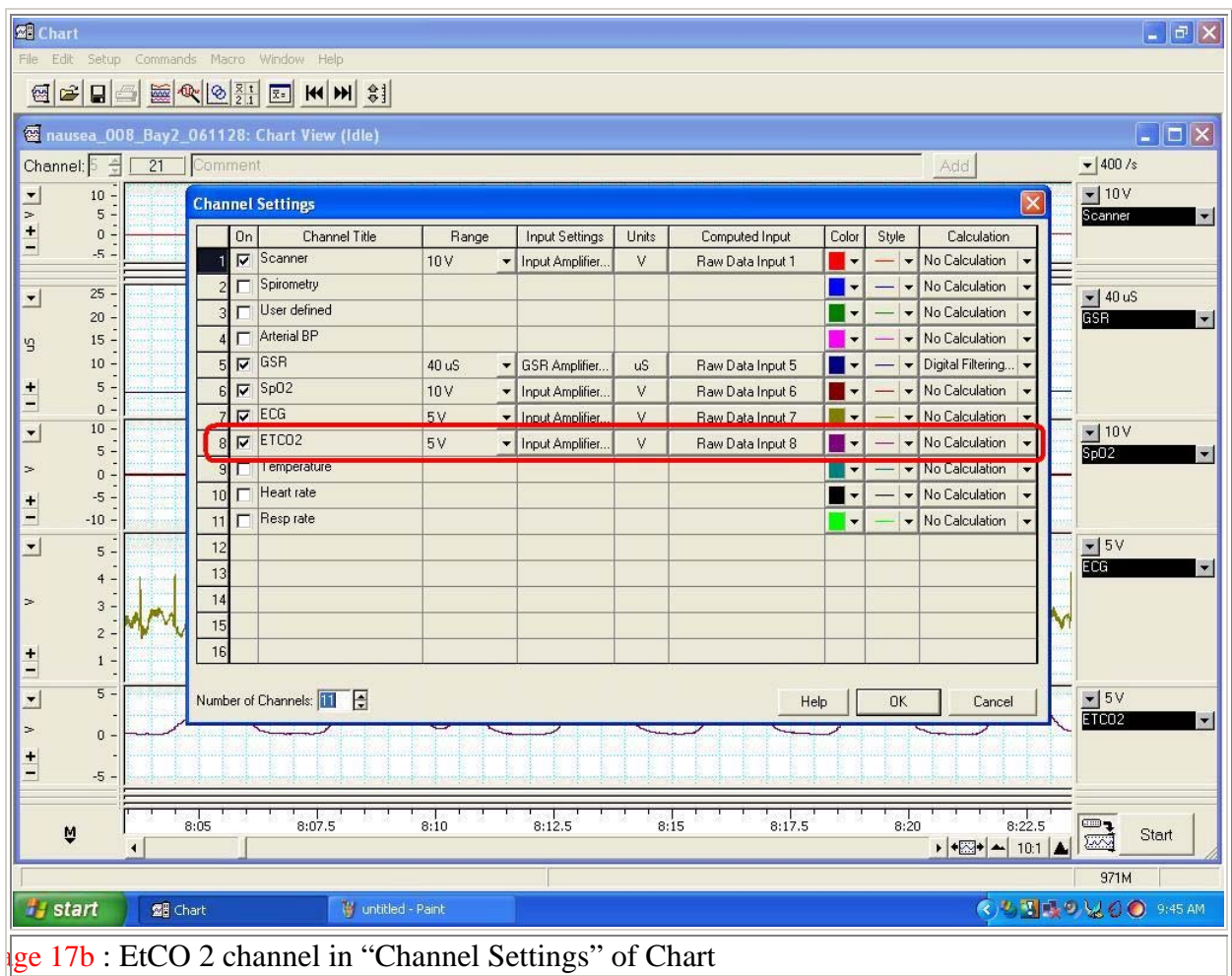


Figure 17b : EtCO 2 channel in “Channel Settings” of Chart

## ETCO2 calibration and use for GCRC/Mock Physio Equipment-CapStar-100 ETCO2 analyzer

- Turn Unit on for at least 5 minutes before sampling
- When the instrument is warmed and the **SAMPLE INLET** port is open to room air, adjust the Zero knob on the front panel to get a reading of 0%
- Once a stable zero is established, a known calibration gas is introduced to the **SAMPLE INLET**.
- Adjust the **SPAN** knob until the display indicates the concentration of the calibration gas
- The digital display can report CO2 concentration in either % or mmHg (see DISPLAY MODE on front of Unit)
- The display can report either a FAST response to changing concentration or an End Tidal (ET) reading. **The FAST response display is updated about 3 times per second and is the preferred mode**
- Once calibration is complete, attach nasal cannula to subject
- To display data on the Powerlab monitor, follow above steps to convert voltage to mmHg for your display

**No condensed water or fluids should enter the sample cell, this will shift the zero or make zeroing impossible. A moisture trap should be used between the sample site and the SENSORPOD sample inlet**

## GSR (Galvanic Skin Response)

### Reference Range

Baseline levels usually 10 – 50 uS

## Default Settings

## Hardware Setup

Attach the GSR banana cables directly into the GSR amp (image on the right).



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- Check the BNC channel output for GSR and make sure this channel matches the channel set in the “channel settings” [image 17c] of Chart.

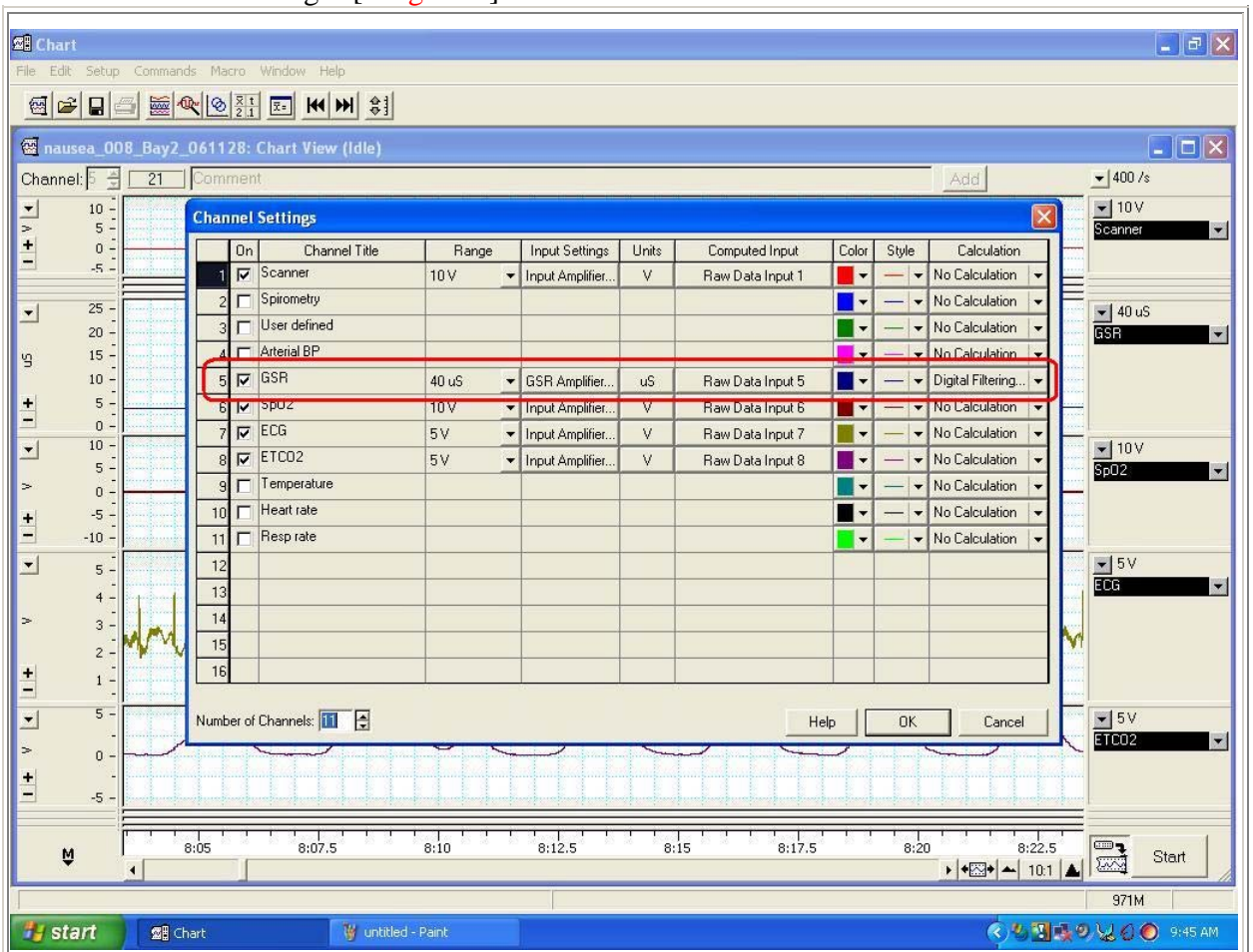


Image 17c GSR channel in “Channel Settings” of Chart

## GSR Electrodes

- Have subject wash their hands in soapy water followed by rinsing and thorough drying.
- When ready to place the electrodes on the subject, place a little isotonic Biopac 101 gel inside the well on the electrode (fill to top of well) to enhance conductance [image 24].
- Use a paper towel to skim off the top – level the gel to fill the well and only the well [image 25].



Image 24

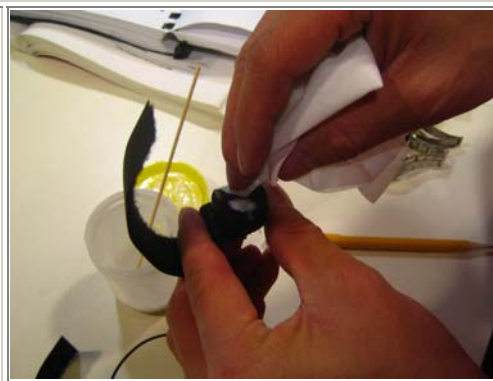


Image 25

- Go to PowerLab and click on the output for GSR, and select “GSR amplifier”[image 26].



Image 26: getting to “GSR Amplifier” in chart

- Click “Open Circuit Zero” (do this before connecting the electrodes to the subject) [image 27]

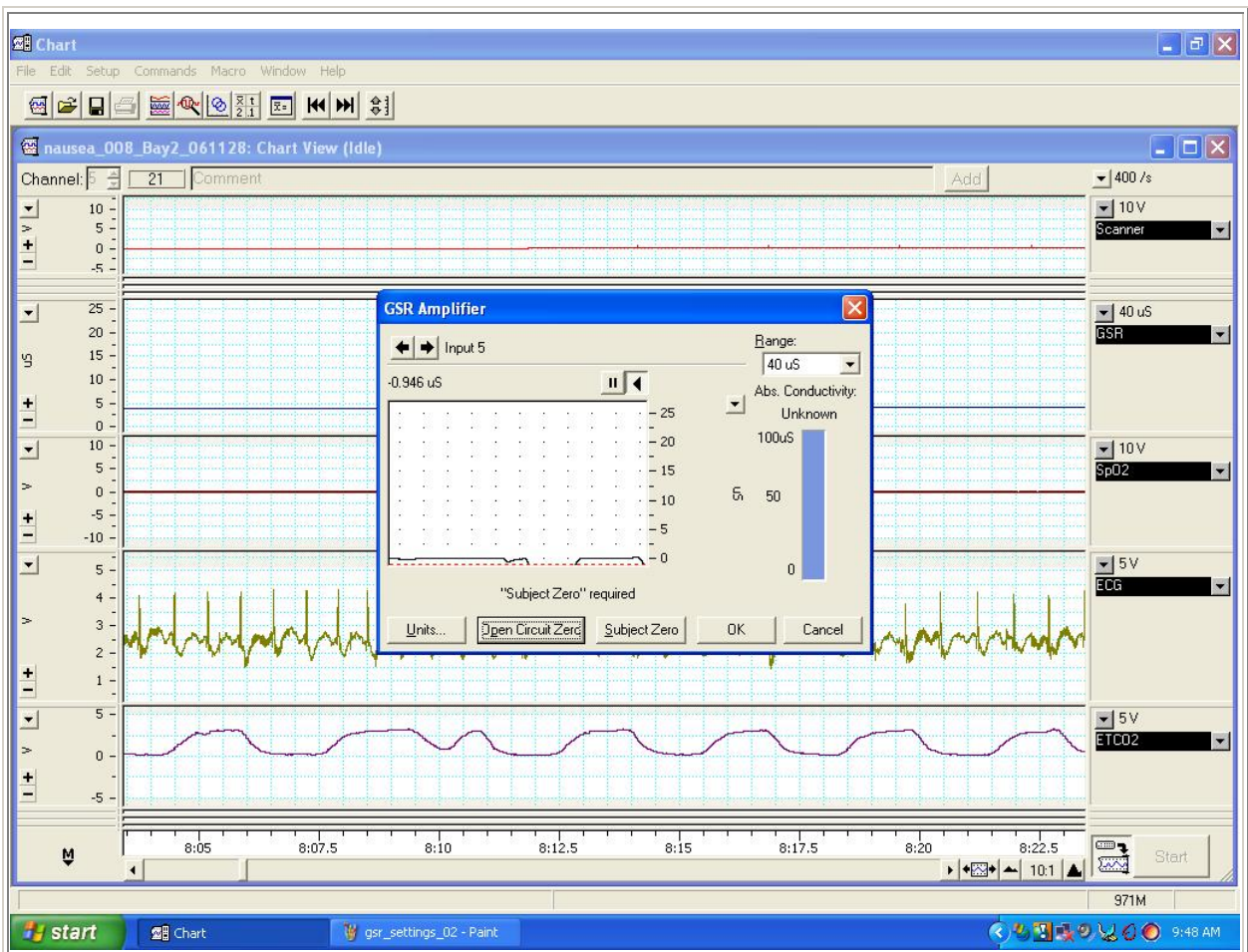
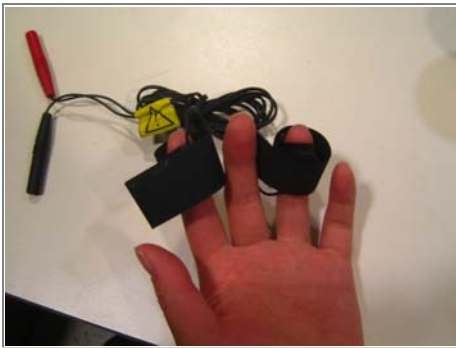


Image 27: Screen grab of “Open Circuit Zero”

Connect the electrodes to the tips of the index and ring fingers (or toes) of the subject [ image right]

Note the subject's GSR level (this may differ for different subjects).



- Note the subject's GSR level (this may differ for different subjects).
- Go to Power Lab's “GSR amplifier” [image 26] and click “subject zero”

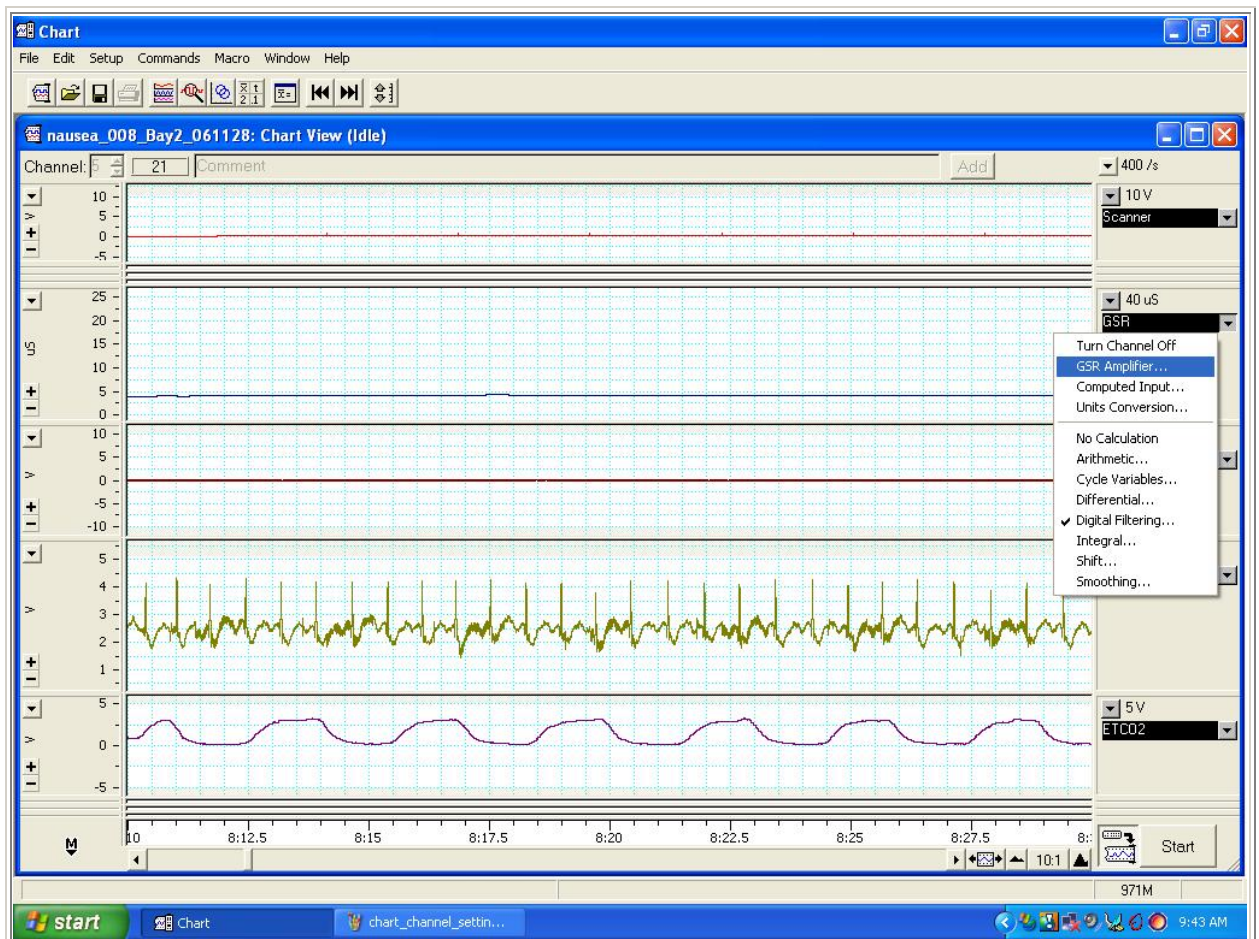


Image 29: Screen grab of “Open Circuit Zero”

- Access the GSR menu by placing the cursor on the down arrow to the right of the channel title [image 29]



Image 29: Screen grab of subject zero