

## V. DATA ANALYSIS

### FAST TRACK Data Analysis

1. Enter the **Review Saved Data** mode and choose the correct file.

- Note Channel Number (CH) designations:

Channel	Displays
CH 1	Stethoscope
CH 2	ECG

- Note measurement box settings:

Channel	Measurement
CH 1	P-P
CH 1	Delta T
CH 1	BPM

2. Set up the display window for optimal viewing of the first recording.

3. **Zoom** in on an area of two complete cardiac cycles, prior to the start of deep inhalation.
4. Use the **I-Beam** cursor to select the area from one R-wave to the next R-wave.

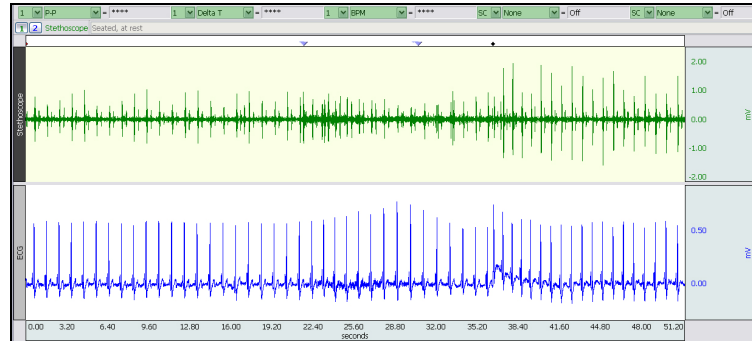
Note the **BPM** measurement.



**Data Analysis continues...**

### Detailed Explanation of Data Analysis Steps

If entering **Review Saved Data** mode from the Startup dialog or Lessons menu, make sure to choose the correct file.



**Fig. 17.16 Example data**

The measurement boxes are above the marker region in the data window. Each measurement has three sections: channel number, measurement type, and result. The first two sections are pull-down menus that are activated when you click them.


#### Brief definition of measurements:

**P-P (Peak-to-Peak):** Subtracts the minimum value from the maximum value found in the selected area.

**Delta T:** Measures the difference in time between the end and beginning of the selected area.

**BPM:** Calculates the difference in time between the first and last selected points and then divides this value into 60 seconds/minute.

The *selected area* is the area selected by the I-Beam tool (including endpoints)

**Note:** The append event markers  mark the beginning of each recording. Click on (activate) the event marker to display its label.

#### Useful tools for changing view:

**Display menu:** Autoscale Horizontal, Autoscale Waveforms, Zoom Back, Zoom Forward

**Scroll Bars:** Time (Horizontal); Amplitude (Vertical)

**Cursor Tools:** Zoom Tool

**Buttons:** Overlap, Split, Show Grid, Hide Grid, -, +

**Hide/Show Channel:** *Alt* + click (Windows) or *Option* + click (Mac) the channel number box to toggle channel display.

**Note:** Try and choose two cardiac cycles that have clearly defined ECG components and whose corresponding hear sounds have minimal noise artifact. Scroll to other cardiac cycles if necessary.

5. Use the **I-Beam** cursor to select an area from the start of the 2nd heart sound to the start of the 1st heart sound of the next cardiac cycle. (Refer to Stethoscope data only (CH1); do not use the ECG channel for this portion of the experiment.)

Note the **Delta T** measurement.



A

6. Zoom in on an area of one complete cardiac cycle.
7. Use the **I-Beam** cursor to select an area from the R-wave peak to the start of the 1st heart sound.

Note the **Delta T** measurement.



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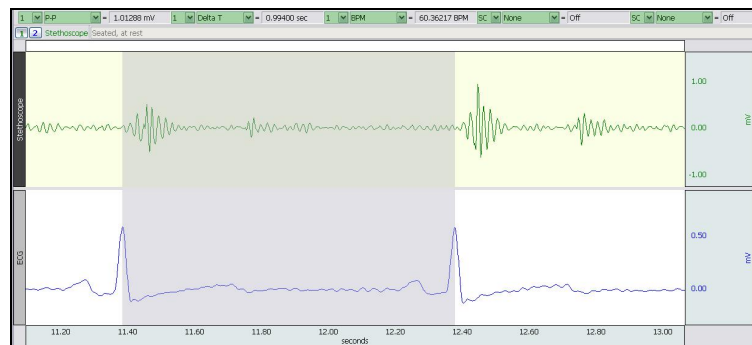
8. Use the **I-Beam** cursor to select an area from the R-wave peak to the start of the 2nd heart sound.

Note the **Delta T** measurement.



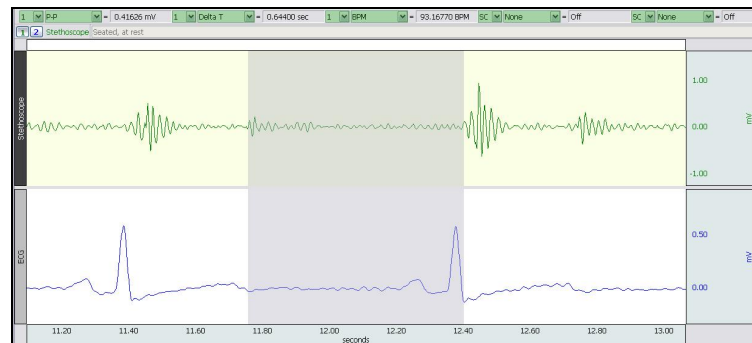
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**Data Analysis continues...**

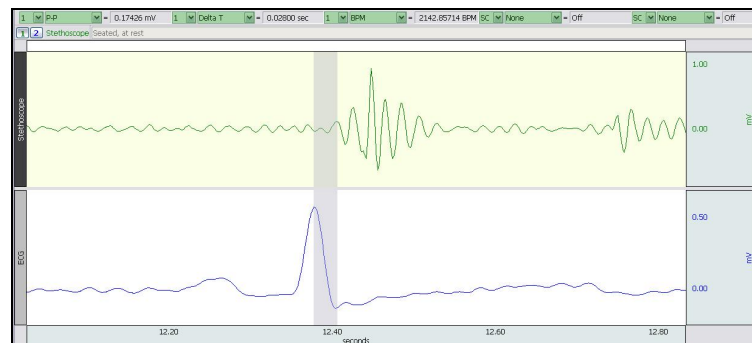


**Fig. 17.17 R-R interval**

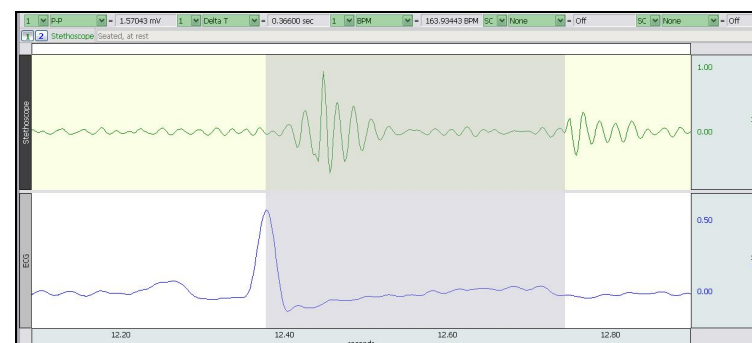
Heart Sounds in Stethoscope channel (CH1) will lag slightly behind the R-wave (ECG CH2).



**Fig. 17.18 2nd heart sound to 1st heart sound of next cardiac cycle**



**Fig. 17.19 R-wave to 1st heart sound**



**Fig. 17.20 R-wave to 2nd heart sound**

9. Use the **I-Beam** cursor to select an area that encompasses the 1st heart sound.

Note the **P-P** measurement.



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10. Use the **I-Beam** cursor to select an area that encompasses the 2nd heart sound.

Note the **P-P** measurement.



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11. Scroll to the Inhale interval of the “Seated, at rest” recording and take the measurements described above (in Steps 3 & 10) as required to complete Table 17.1.



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12. Scroll to the **Exhale** interval of the first recording and take the measurements described above (in Steps 3 & 10) as required to complete Table 17.1.



A

13. Scroll to the “**After exercise**” recording and take the measurements described above (in Steps 3 & 10) as required to complete Table 17.1.



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14. Answer the questions at the end of the Data Report.

15. **Save** or **Print** the data file.

16. **Quit** the program

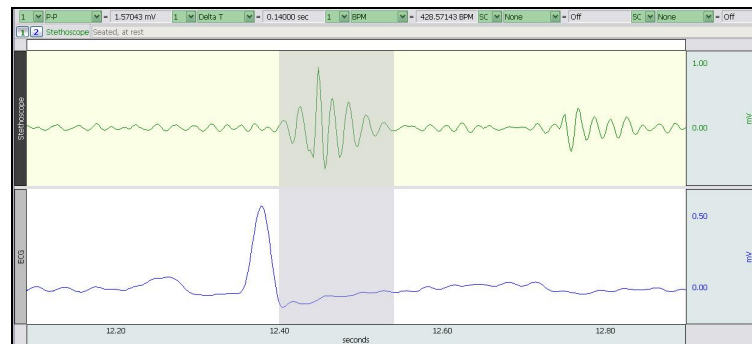


Fig. 17.21 1st heart sound interval

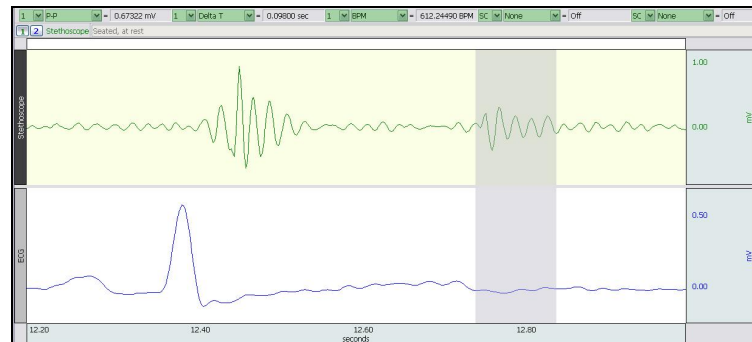


Fig. 17.22 2nd heart sound interval

This interval begins with the event marker labeled “Inhale.” Choose cardiac cycles that are a few cycles after the event marker.

This interval begins with the event marker labeled “Exhale.” Choose cardiac cycles that are a few cycles after the event marker.

This recording begins with the append event marker labeled “After exercise.”

Note: The ECG data may contain more baseline drift and/or EMG artifact than the first recording and the stethoscope data may contain more noise artifact. It may be necessary to scroll through the data until acceptable cardiac cycles and corresponding heart sounds are found.

An electronically editable **Data Report** is located in the journal (following the lesson summary,) or immediately following this Data Analysis section. Your instructor will recommend the preferred format for your lab.

**END OF DATA ANALYSIS**

### END OF LESSON 17

Complete the Lesson 17 Data Report that follows.

# HEART SOUNDS

- Cardiac valve functions
- Relationship between electrical and mechanical events of the cardiac cycle

## DATA REPORT

Student's Name: \_\_\_\_\_

Lab Section: \_\_\_\_\_

Date: \_\_\_\_\_

### Subject Profile

Name: \_\_\_\_\_ Height: \_\_\_\_\_ Gender: Male / Female

Age: \_\_\_\_\_ Weight: \_\_\_\_\_

**Note:** This Data Report assumes that all lesson recordings were performed, which may not be the case for your lab. Please disregard any references to excluded recordings.

## I. Data and Calculations

### A. Heart Sound Measurements

Complete Table 17.1 with “Seated, at rest” and “After exercise” data and complete the required calculations.

Table 17.1

Selected area	Measurement	Seated, at rest			After exercise
		At Rest	Inhalation	Exhalation	
R-wave to next R-wave	1 BPM				
R-wave to 1st heart sound	1 Delta T				
R-wave to 2nd heart sound	1 Delta T				
1st to 2nd heart sound	1 Delta T				
2nd sound to next 1st sound	1 Delta T				
1st heart sound interval	1 P-P				
2nd heart sound interval	1 P-P				

### B. Description of Heart Sounds

**Note:** You may copy and paste descriptions from the Lesson 17 journal below.

Describe the sounds of each of the following heart valves in terms of intensity (loudness,) pitch (frequency) and duration (length). Begin with the aortic valve and compare others to it. This is a subjective description.

**Aortic** \_\_\_\_\_

**Pulmonic** \_\_\_\_\_

**Tricuspid** \_\_\_\_\_

**Mitral** \_\_\_\_\_



6. Does ventricular ejection occur during ventricular depolarization or during ventricular repolarization? Refer to your experimental record before you answer, and explain your answer.

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7. Which cardiac valves close during ventricular systole? Which cardiac valves close during ventricular diastole?

Systole: \_\_\_\_\_

Diastole: \_\_\_\_\_

8. Define **systolic murmur** and give one example of a cause.

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9. Define **diastolic murmur** and give one example of a cause.

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10. Define **cardiac cycle**.

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11. Briefly characterize the relationship between the electrical events and the mechanical events of the cardiac cycle.

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**III. OPTIONAL Active Learning Portion**

A. *Hypothesis*

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B. *Materials*

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C. *Method*

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D. *Set Up*

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E. *Experimental Results*

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