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V. DATA ANALYSIS

FAST TRACK Data Analysis

1. Enter the **Review Saved Data** mode.

   - Note channel number (CH) designations:

Channel	*Displays*
CH 2	**Volume**

   - Note measurement box settings:

Channel	*Measurement*
CH 2	**Delta T**
CH 2	**P-P**

2. Use the **I-beam** cursor to select the area from time zero to the end of the recording. Record the Vital Capacity (VC).

   A

Data Analysis continues…

Detailed Explanation of Data Analysis Steps

If entering **Review Saved Data** mode from the Startup dialog or Lessons menu, be sure to choose the file with ñ**FEV – L13"** file name extension.

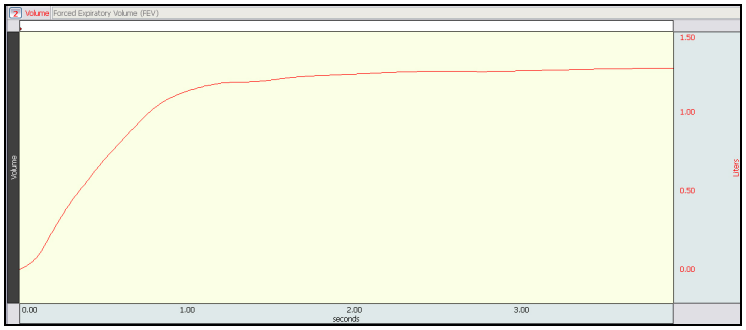

Fig. 13.22 Example FEV data

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. The following is a brief description of these specific measurements.

Brief definition of measurements:

Delta T: Displays the amount of time in the selected area (the difference in time between the endpoints of the selected area).

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

The ñselected areaò is the area selected by the I-Beam tool (including endpoints).

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: Show Grid, Hide Grid, -, +

The **P-P** measurement for the selected area represents the Vital Capacity (VC).

Note: In the example, the Grids have been enabled to assist in data selection.

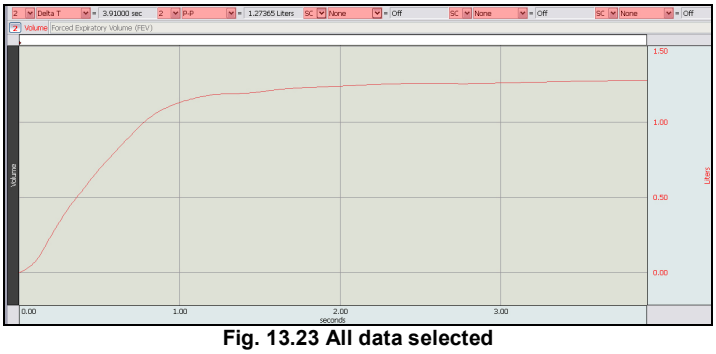

Fig. 13.23 All data selected

3. Use the **I-beam** cursor to select the first one-second interval (Fig. 13.24). Record the volume expired and calculate $FEV_{1.0}$.

   B

4. Use the **I-beam** cursor to select the first two-second interval (Fig. 13.25). Record the volume expired and calculate $FEV_{2.0}$.

   B

5. Use the **I-beam** cursor to select the first three-second interval (Fig. 13.26). Record the volume expired and calculate $FEV_{3.0}$.

   B

6. Answer the **FEV**-related questions in the Data Report before continuing to the **MVV** section.
7. Select File > **Save Changes**.
8. Pull down the **Lessons** menu, select **Review Saved Data**, and choose the correct **MVV – L13** file.
9. Use the **zoom** tool to set up your display window for optimal viewing of the deep, fast breathing portion of the recording (Fig. 13.27).

10. Use the **I-beam** cursor to select a twelve-second area that is convenient to count the number of cycles in the interval (Fig. 13.28).

    C

Data Analysis continues…

The selected area should be from Time 0 to the one-second reading, as displayed in the Delta T measurement. The grid can be used as a reference. The volume expired is indicated by the **P-P** measurement.

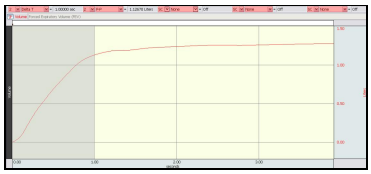

Fig. 13.24 $FEV_{1.0}$

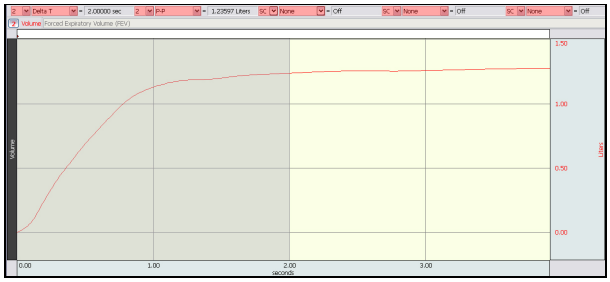

Fig. 13.25 $FEV_{2.0}$

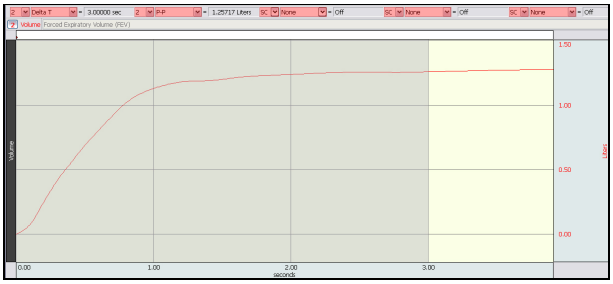

Fig. 13.26 $FEV_{3.0}$

Choose the data file that was saved with ñ**MVV – L13"** extension.

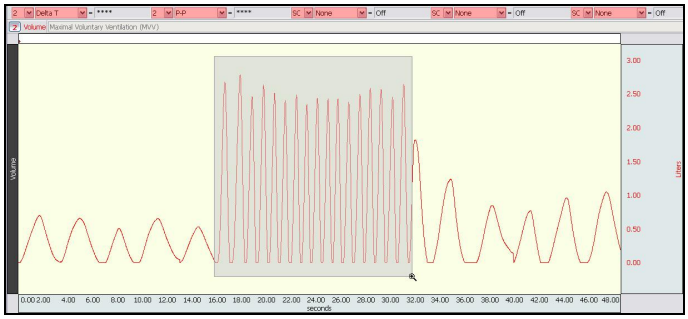

Fig. 13.27 Zoom in on rapid/deep breathing data

Use the Delta T measurement to determine the time interval. In the example below, 13 cycles are in the 12 second interval.

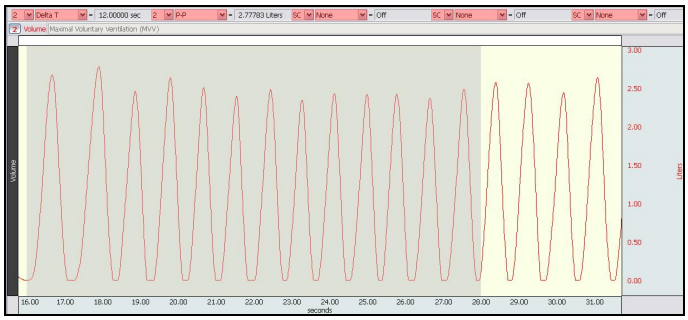

Fig. 13.28 Example of 12 second data selection

11. Place an event marker at the end of the 12 second selected area (Fig. 13.29).

Itôs helpful to clearly mark the end of the individual cycle measurement area by placing an **event marker** at the end of the selected 12 second interval. To place an event marker, right-click in the marker region just above the data display and select ñInsert New Event.ò If the event marker is not placed correctly, it can be moved by holding down the Alt key and dragging with the mouse.

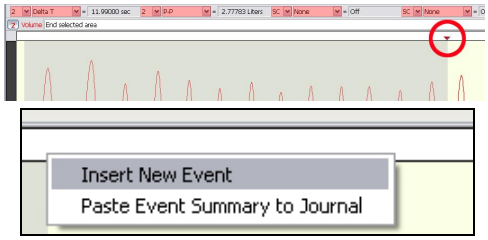

Fig. 13.29 Event Marker insertion

You may also enter event text in the field above the marker.

12. Use the **I-beam** cursor to select <u>each complete individual cycle</u> in the 12-second interval defined in Step 9. Record the volume of each cycle.

C

13. Calculate the average volume per cycle (AVPC) and then the Maximal Voluntary Ventilation (MVV).

C

The Volume is measured by the P -P (Peak-to-Peak) measurement.

Fig.13.30 shows the first cycle of the 12-second interval defined in Fig. 13.28 selected:

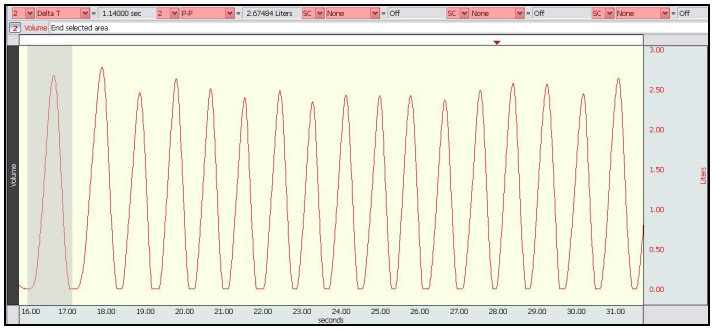

Fig. 13.30 Example of first cycle selection

14. Answer the MVV-related questions at in the Data Report.
15. **Save** or **Print** the data file.
16. **Quit** the program.

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 13

Complete the Lesson 13 Data Report that follows.

PULMONARY FUNCTION II

- *Pulmonary Flow Rates*
- *Forced Expiratory Volume (FEV)*
- *Maximal Voluntary Ventilation (MVV)*

DATA REPORT

Studentôs Name: _____

Lab Section: _____

Date: _____

Subject Profile

Name:_____ Height:_____

Age:_____ Gender: Male /Female Weight:_____

I. Data and Calculations

A. Vital Capacity (VC)

2 P-P = _____

B. Forced Expiratory Volumes: $FEV_{1.0}$, $FEV_{2.0}$, $FEV_{3.0}$

Table 13.2

Time Interval (sec)	Forced Expiratory Volume 2 P-P	Vital Capacity (VC) *from A*	FEV/VC *calculate*	(FEV/VC) x 100 = % *calculate*	= FEV_x	*Normal Adult Range*
0-1				%	$FEV_{1.0}$	66% - 83%
0-2				%	$FEV_{2.0}$	75% - 94%
0-3				%	$FEV_{3.0}$	78% - 97%

C. MVV Measurements (Note, all volume measurements are in liters)

1) Number of cycles in 12-second interval: _____

2) Calculate the number of respiratory cycles per minute (RR):

RR = Cycles/min = Number of cycles in 12-second interval x *5*

Number of cycles in 12-second interval (from above): _____ x 5 = _____cycles/min

3) Measure each cycle

Complete Table 13.3 with a measurement for each individual cycle. If Subject had only 5 complete cycles/12-sec period, then only fill in the volumes for 5 cycles. If there is an incomplete cycle, do not record it. (The Table may have more cycles than you need.)

Table 13.3

Cycle Number	Volume Measurement 2 P-P		Cycle Number	Volume Measurement 2 P-P
Cycle 1			Cycle 9	
Cycle 2			Cycle 10	
Cycle 3			Cycle 11	
Cycle 4			Cycle 12	
Cycle 5			Cycle 13	
Cycle 6			Cycle 14	
Cycle 7			Cycle 15	
Cycle 8			Cycle 16	

4) Calculate the average volume per cycle (AVPC):

Add the volumes of all counted cycles from Table 13.3.

Sum = _____ liters

Divide the above sum by the number of counted cycles. The answer is the average volume per cycle (AVPC)

AVPC = _____ / _____ = _____liters
Sum # of counted cycles

5) Calculate the MVV_{est}

Multiply the AVPC by the number of respiratory cycles per minute (RR) as calculated earlier.

MVV = AVPC x RR = _____ x _____ = _____liters/min
AVPC RR

II. Questions

D. Define **Forced Expiratory Volume** (FEV).

E. How do Subjectôs FEV values compare to the average per Table 13.2?

$FEV_{1.0}$	*less than*	*same as*	*greater than*
$FEV_{2.0}$	*less than*	*same as*	*greater than*
$FEV_{3.0}$	*less than*	*same as*	*greater than*

F. Is it possible for a Subject to have a vital capacity (single stage) within normal range but a value for $FEV_{1.0}$ below normal range? Explain your answer.

G. Define **Maximal Voluntary Ventilation** (MVV.)

H. How does Subjectôs MVV compare to others in the class? *less than* *same as* *greater than*

I. Maximal voluntary ventilation decreases with age. Why?

J. Asthmatics tend to have smaller airways narrowed by smooth muscle constriction, thickening of the walls, and mucous secretion. How would this affect vital capacity, $FEV_{1.0}$, and MVV?

K. Bronchodilator drugs open up airways and clear mucous. How would this affect the FEV and MVV measurements?

L. Would a smaller person tend to have less or more vital capacity than a larger person? Less More

M. How would an asthmatic personôs measurement of $FEV_{1.0}$ and MVV compare to an athlete?

Explain your answer.

End of Lesson 13 Data Report