A Research & Development Co.

SCICON R&D INC.

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Developers of the next generation of affordable signal analysis software
And portable multi-channel data acquisition systems for
MAC & PC.

CALX
Portable Calibration System
For Air Flow & Pressure

The new system is light and field portable with one side for air flow and the other side for air pressure using standard UTube style mechanism.
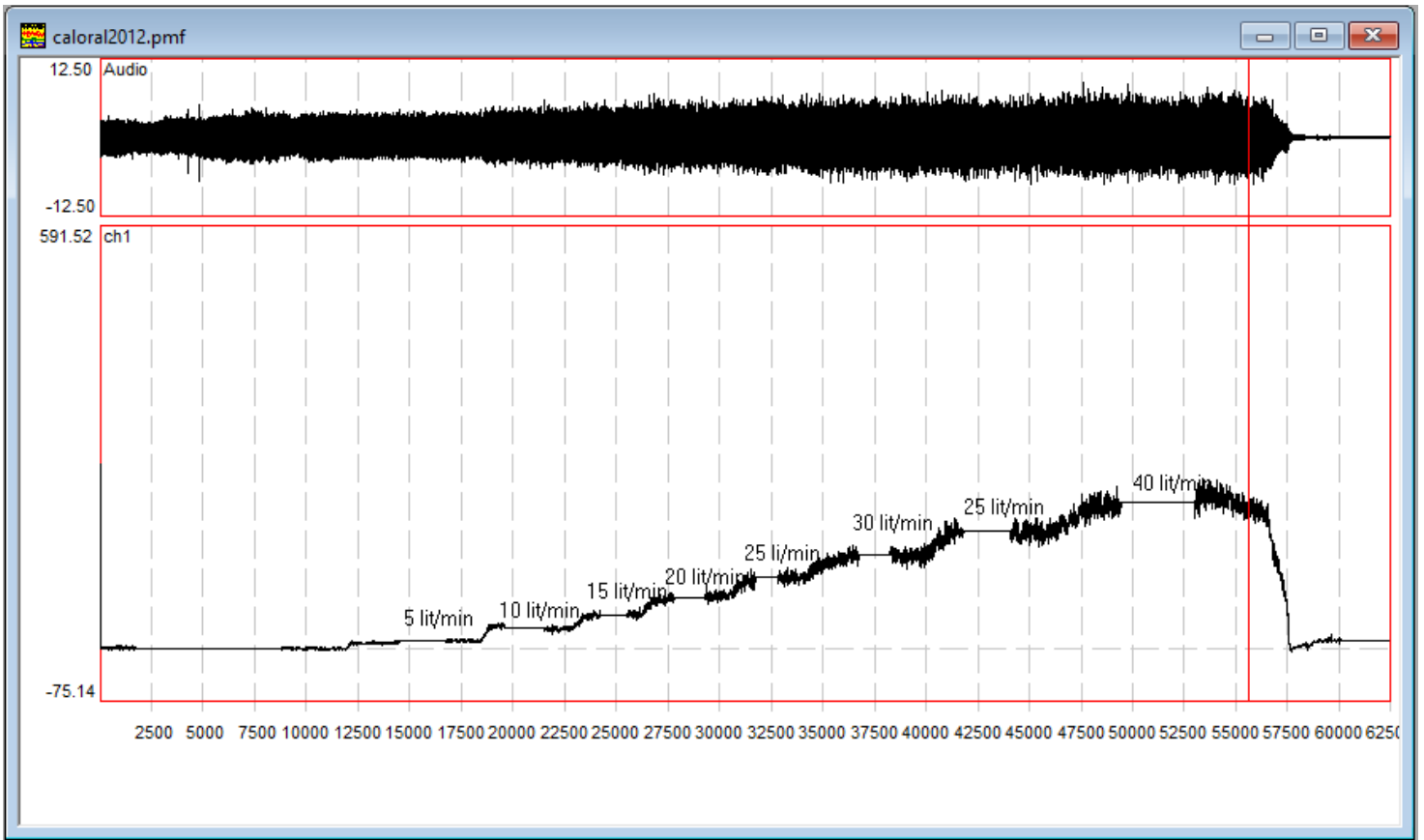
Flow Calibration Procedure

The flow side is composed of a rechargeable air pump with power indicator. To recharge, use the provided cable, connect to any USB power adapter for a few hours. To start press the ON/OFF button for a few seconds. The air pump starts slowly and gain power a few seconds later.

The flow tube is a NON-DIRECT read, depending on the type of float, the ranges are different. We have two different systems with a glass and stainless-steel float with different reading charts.

The system comes with the corresponding chart displayed behind the flow tube.

1. The air control knob is provided for controlling the airflow rate. Always start with the lower flow. Turning the knob **clockwise will DECREASE** and **counterclockwise will INCREASE** air flow.
2. The flow meter shows airflow rate in generic scale from 10 to 150. Please review the conversion table behind the flow tube. The chart unit is in ml/min and to convert to ml/sec, simply divide by 60.
3. Have a sheet of paper and a pen handy to record some values during the recording.
4. Start PCquirerX/MacquirerX with a blank file. Press the record button to open the recording scope window. Deselect all the unnecessary channels. You should end up with only two channels showing, one audio and the other the desired DC channel.
5. Adjust the gain on the DC channel to ensure to cover the entire range of air flow.
6. It may be a good idea to lower the filter rate to about 10 Hz to minimize the more noise.
7. Place the oral or nasal mask on the adapter (large white semi rod) and hold it securely in place to ensure airtight fitment.
8. If the fitment is an issue, remove the masks and place the oral or nasal bases directly on top of a black rubber insert on top of the large white rod.
9. **Press RECORD in the scope window to start the actual recording operation. A running seconds will show the recording time. <u>This step is very important to get a reference base line for the DC channel without air flow.</u>**
10. Press On/Off switch to start the motor and let it run for a few seconds.
11. Adjust air flow to about 10 (middle of the ball). Run it for 3 seconds and mark 10 on the paper with a pen number 10
12. Repeat as above 20, marking number 20
13. Continue the above steps all the way up to 150, marking each step. You may want to increase to bigger steps, say to 30 instead of 10.
14. Turn off the motor and stop recording. You should end up with a "stairs like" recording as shown below. You may need to practice a few times to get the best "stairs like" recording as you can.
15. If the data looks turbulent, click on the channel display in interest, (say ch#1 for oral flow), make a small selection, use the **Analysis->Average Ch:1 (or whichever you have clicked on)** menu to average out the data. This function will average out the selection.
16. Start a blank log file. Place the marker at the location when the motor was off (**reference level**), then use **Analysis->Set DC Channels Reference**. This will use this point as the **zero level**. Then place the marker at the middle of the portion when the motor was on, use **Log->Enter at marker** menu to enter the value at the marker in the log file. This number corresponds to the **5 l/m** of flow rate (or whatever number from corresponding chart). (see figure 1)
17. Repeat this process the rest of the steps.
18. Save and close the log file.
19. Plot the data by hand or import the log file into any standard statistical program.
20. Depending on how linear the data looks, select either a straight line going through the data points and **the origin**, or a quadratic function.
21. Choose a **straight line**, then calculate the **slope of this line** (see figure 2). This slope is the **"B"** value in the calibration equation Physiological unit = Bx + C (where C is the intercept and should be set to 0) in the **Options->Channels Selection/Calibration** dialog box.
22. In the unit entry slot, type in **l/sec**.
23. Close the **Options->Channels Selection/Calibration** dialog box by clicking **OK**. Now all the data in that channel are converted into the **milliliters per second**.

The pictures are given as a guide, your result will vary.

Pressure Calibration Procedure
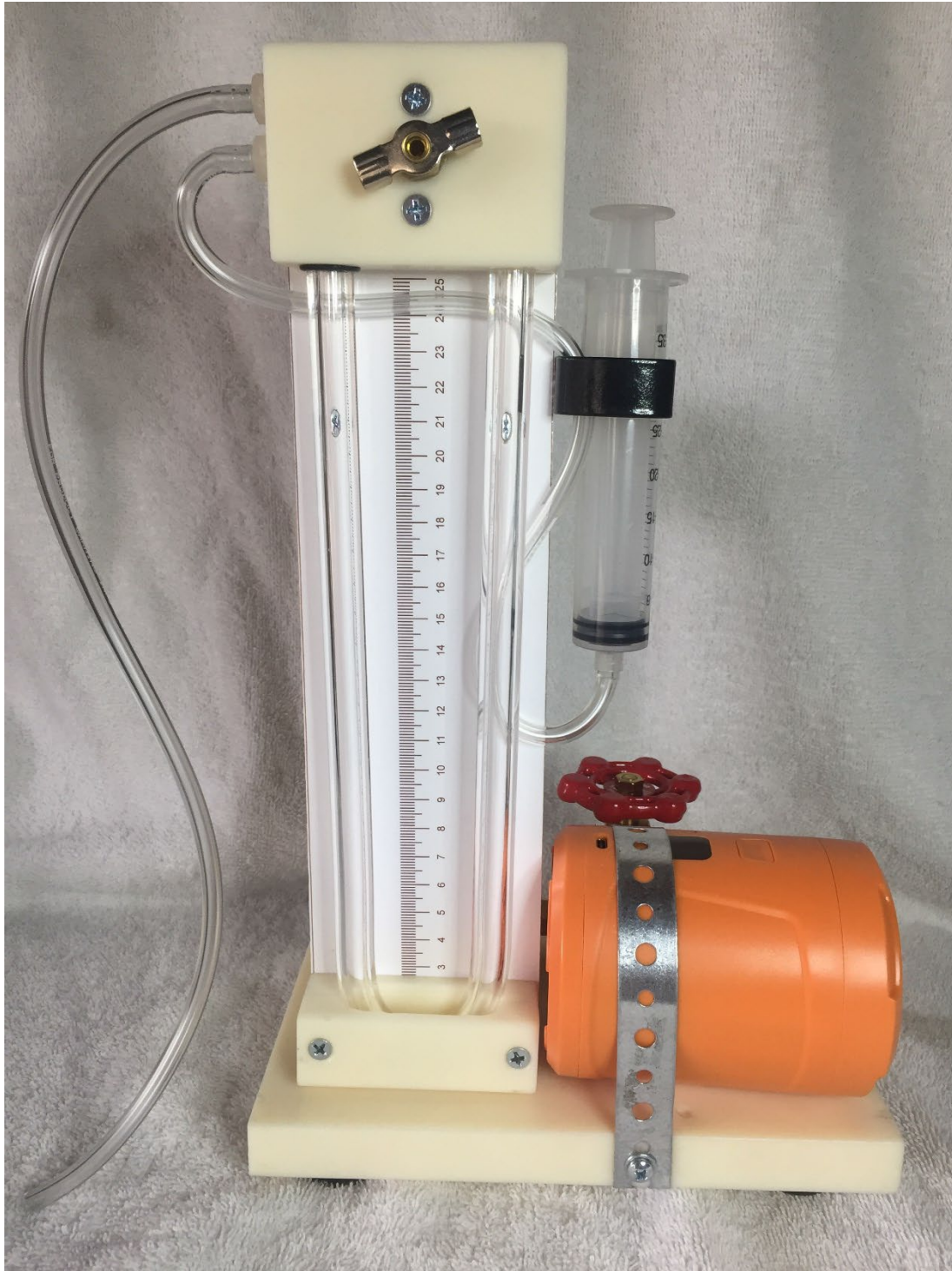
1. *Fill* half the **U-tube** with water. Make sure there are no bubbles in the water and the water levels are the same on both sides.
2. Connect the long tubing at the end of **U-tube** assembly to a pressure transducer.
3. Open the brass air valve to the external air pressure by turning it **counterclockwise** a few turns.
4. Pull the syringe to half way up, making sure the water levels are still the same.
5. Close the brass air valve to the external air pressure by turning it **clockwise** until it completely closes.
6. Gently press the syringe in, moving the water column, and read the water displacement in the tube. (**THE ACTUAL DISPLACEMENT IS 2 TIMES YOUR READING AS THE DIFFERENCE IN THE WATER LEVELS IS THE ACTUAL PRESSURE**). Due to some possible air leakage, you may need to apply a small pressure on the syringe to keep the water levels steady.
7. Start a blank file and set the record time to **10 seconds**. Set the water level displacement to **5 cm**. Start recording. Wait for about **5 seconds**, while recording still in progress, open the **brass air valve** to the external air pressure by turning it **counterclockwise** a few turns, which causes the water levels to be the

same on both sides. The recorded file should now look like a step with a high value at the beginning and a low value at the end. (see figure below)

8. Start a blank log file. Place the marker at the location when the motor was off (**reference level**), then use **Analysis->Set DC Channels Reference**. This will use this point as the **zero level**. Then place the marker at the middle of the portion when the motor was on, use **Log->Enter At Maker** menu to enter the value at the marker in the log file. This number corresponds to the **5 cm** of water pressure. (very similar to figure 1)
9. Repeat this process for at least 4 to 5 values (say 5, 10, 15, and 20 cm).
10. Save and close the log file
11. Add another data point **zero for zero cm** to the data file just created. **This is very important**, because there should not be any pressure without any displacement.
12. Plot the data by hand or import the log file into any standard statistical program.
13. Select a **straight line** going through the data points.
14. Calculate the **slope of this line** (see figure below). This slope is the **"B"** value in the calibration equation Physiological unit = Bx + C (where C must be 0) in the **Options->Channels Selection/Calibration** dialog box
15. In the unit entry slot, type in **cm/H2O**.
16. Close the **Options->Channels Selection/Calibration** dialog box by clicking **OK**. Now all the data in that channel are converted into the **cm of water**.
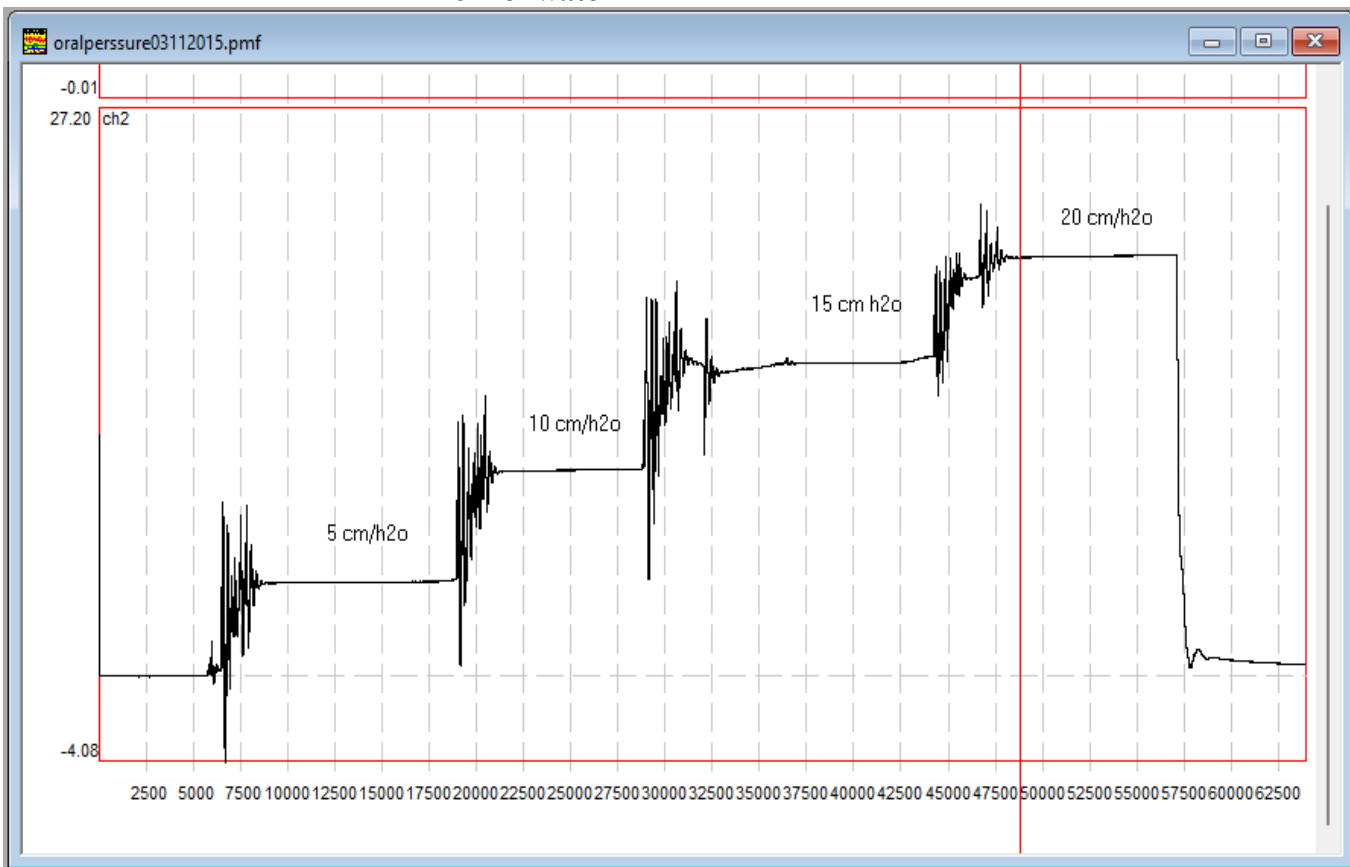
	File Name	Entry definition and order	Entry 1	Entry 2	Entry 3	Comments
1	oralperssure0...	Marker Entry: time Audio ,ch2	11430.410	0.000	4.477	5 cm/H2O
2	oralperssure0...	Marker Entry: time Audio ,ch2	23826.769	0.000	9.824	10 cm/H2O
3	oralperssure0...	Marker Entry: time Audio ,ch2	39040.484	0.000	15.040	15 cm/H2O
4	oralperssure0...	Marker Entry: time Audio ,ch2	51597.835	0.000	20.124	20 cm/H2O

Ch2 Corresponding
Data CM/H2O
values