EXCISED LARYNX BOOTH MANUAL

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Last Edited: July 2015
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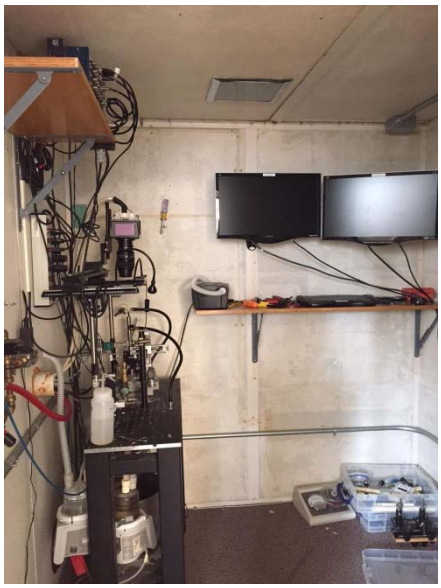
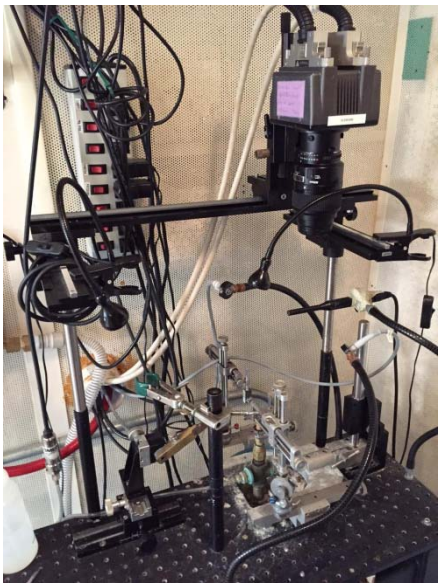
Contents

Introduction

Excised Booth Description

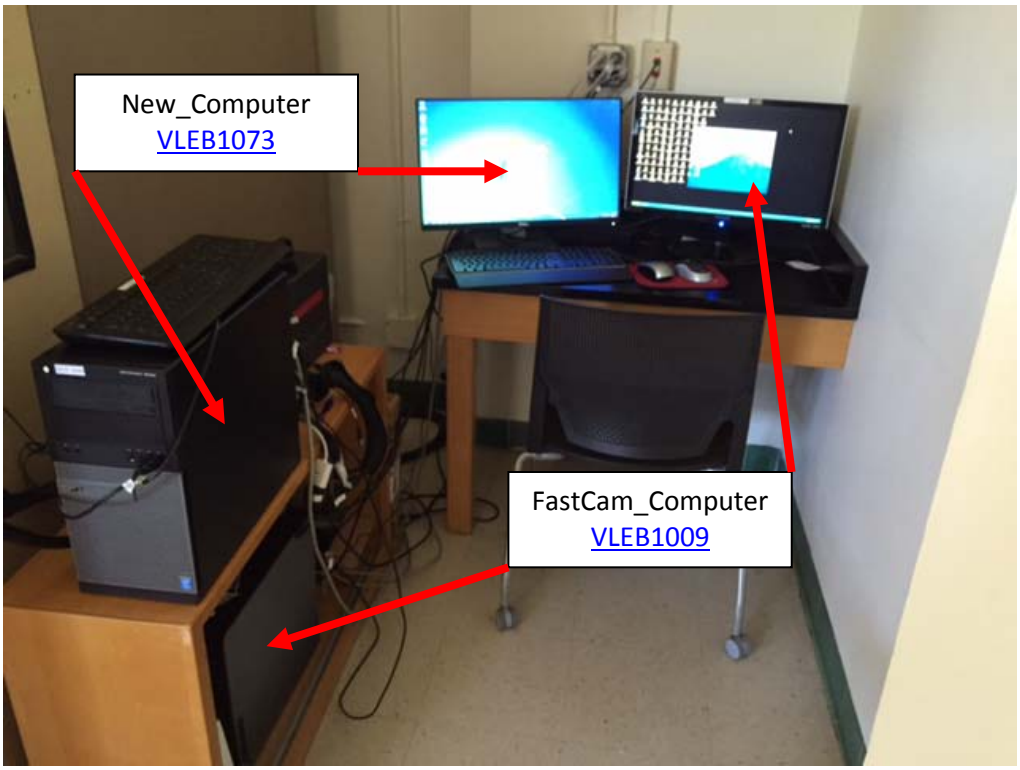
The Excised Larynx booth was developed by the Jiang Voice Lab at the University of Wisconsin-Madison in order to precisely and consistently phonate excised larynxes (typically canine larynxes) and take acoustic data as well as high speed imaging data. The booth is constructed to be sound proof to eliminate noise contamination during data acquisition. The entire booth can be operated from the inside so that a data session need not be interrupted by having to leave the booth.

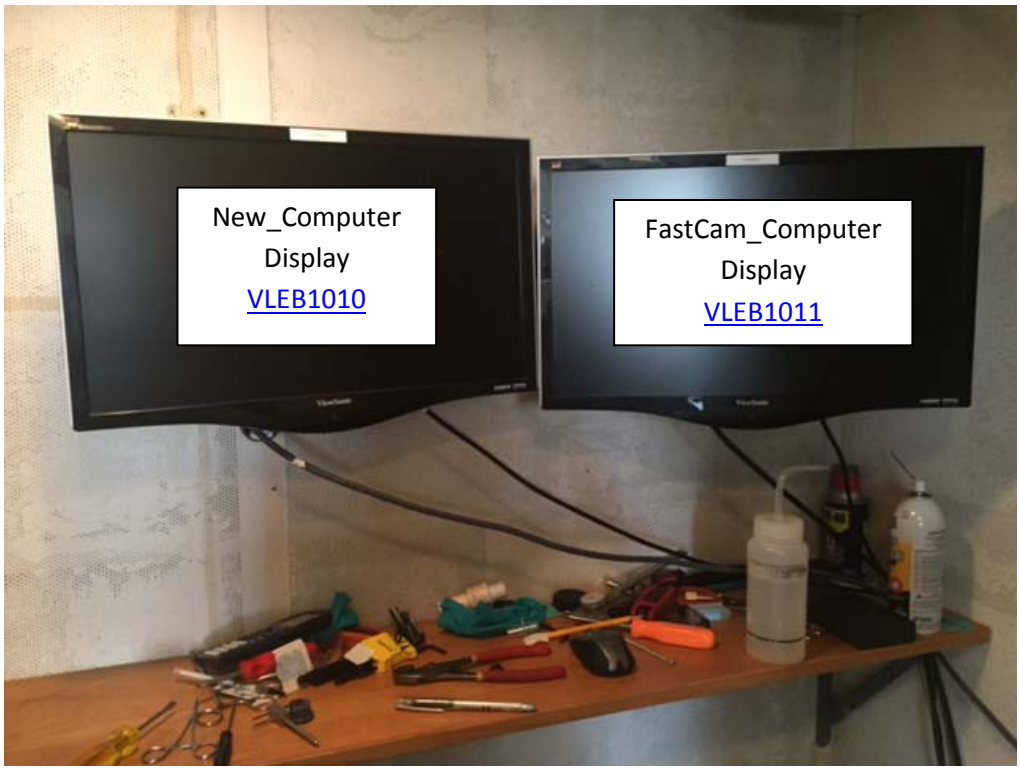
This manual first provides some pictures of the booth to introduce you to the different parts of the booth that interact. Then there is a comprehensive parts list. Use the hyperlinks to jump to a certain part number so that you can read about its function and connection to other parts. Next is how to dissect a larynx for use with the FastCam. Then how to set up a larynx in the booth and how to properly position the vocal folds. The remaining portions of this manual are dedicated to maintenance and cleaning of the

NOTE: Two computers are used to run the booth. The New_Computer(VLEB10073) is used to run the LabView software and the FastCam_Computer (VLEB1009) is used to run the FastCam (VLEB1026). This will be addressed further in other sections of the manual.

Pictures

Computer and Displays





FastCam

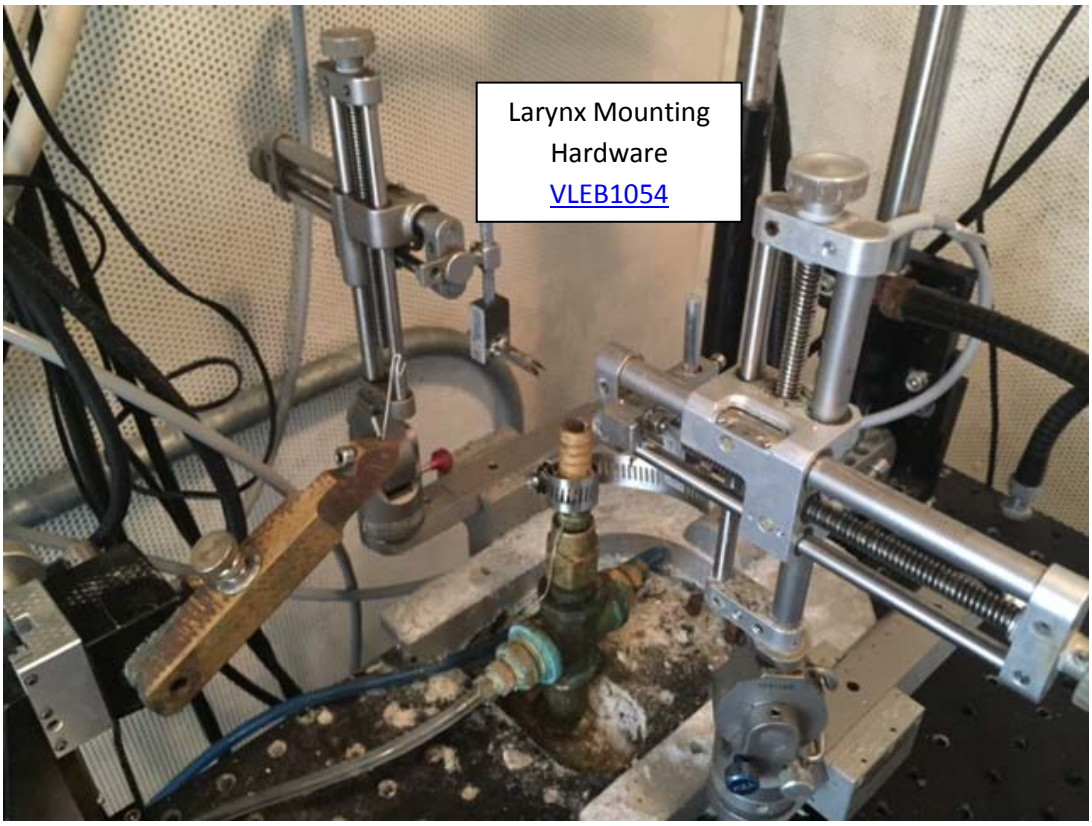
FastCam Processor

VLEB1026

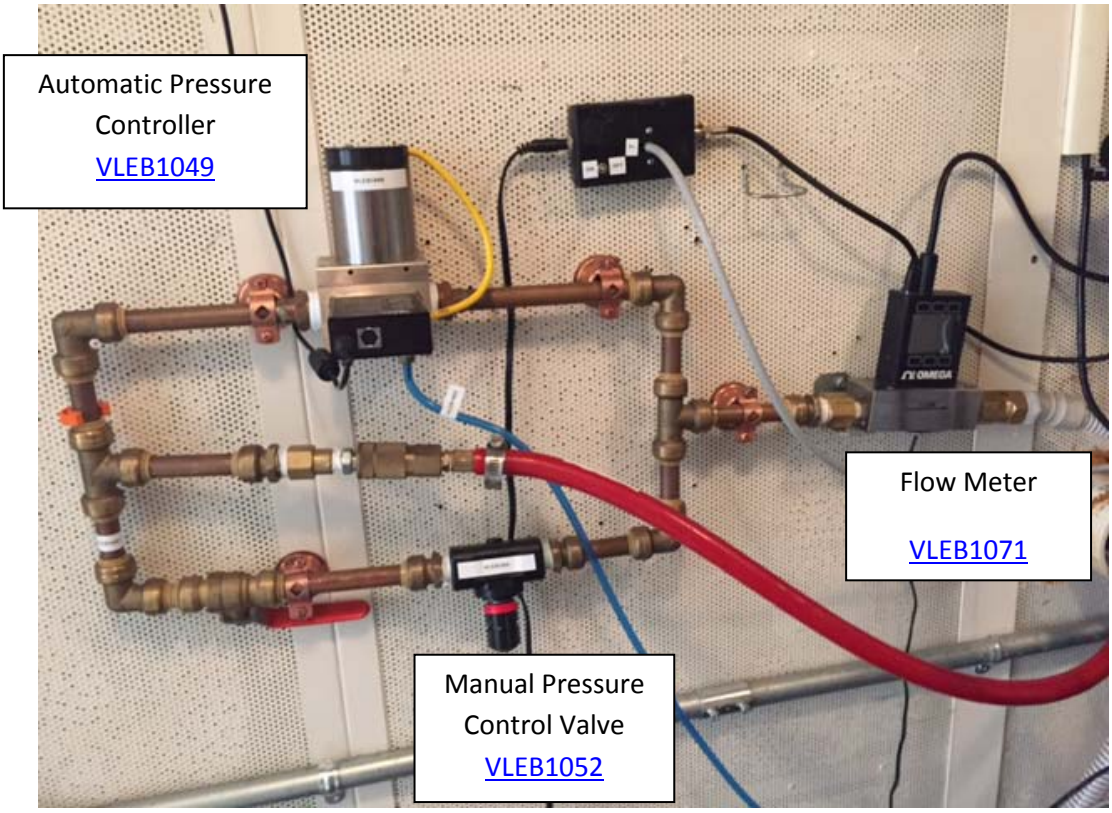
FastCam Imager

VLEB1030

Larynx Attachment Hardware



Compressed Air Manifold



Parts List

Nomenclature: VLEB####

VLEB: Voice Lab Excise Booth

VLEB1002: USB Mouse
Used with outside computer

VLEB1003 USB Wireless Keyboard Transmitter
Connected to New_Computer (VLEB1073)
Wireless keyboard (VLEB1004) is used inside booth

VLEB1004 USB Wireless Keyboard
Used to control New_Computer (VLEB1073)

VLEB1005 DVI-I (Dual Link) Cord
Connects New_Computer (VLEB1073) to left monitor (VLEB1010) inside booth.
Goes through booth port B (VLEB1013)

VLEB1006 DVI-I (Dual Link) Cord
Connects from booth port B (VLEB1013) to inside left monitor (VLEB1010) inside booth.

VLEB1007 DBI-D (Single-Link)
Connects outside monitor (VLEB1008) to FastCam_Computer (VLEB1009)

VLEB1008 Right Outside ViewSonic Monitor
Serial: R2S091521296
Connected to FastCam_Computer (VLEB1009)

VLEB1009 FastCam_Computer
Controls and monitors the FastCam (VLEB1026)
Service Tag: 5POSQH1
Windows XP 2002 Service Pack 3
3GB RAM
Intel core2 Quad Q8200 2.3GHz

VLEB1010 Inside Left Display
Serial: RS2091521238
ViewSonic 1080p
Connected to New_Computer (VLEB1073) via DVI-I (Dual Link) (VLEB1005/6)

VLEB1011 Inside Right Display - Mirror of outside right monitor (VLEB1008)
Serial: RS2091520670
ViewSonic 1080p
Connected to FastCam_Computer (VLEB1009) via HDMI cables (VLEB1015/6VLEB1016) that go through booth port B (VLEB1013)

VLEB1012 Booth Port A
4 USB (VLEB1032-VLEB1035) cords run through this hole into the booth. The USB cords are connected to the 4 inside-booth USB ports (VLEB1036-VLEB1039)

VLEB1013 Booth Port B
Display cords run through this hole into the booth. They are connected to display ports inside the booth.

VLEB1014 Keyboard
Connected to FastCam_Computer (VLEB1009) via USB (VLEB1017)

VLEB1015 HDMI Cable

Connect FastCam_Computer (VLEB1009) to booth port B (VLEB1013) to HDMI cable (VLEB1016) to inside-booth right monitor (VLEB1011)

VLEB1016 HDMI Cable

Connects from inside booth HDMI port to inside-booth right monitor (VLEB1011)

VLEB1017 Keyboard USB Cable

Connects outside keyboard (VLEB1014) to USB Hub (VLEB1021) to FastCam_Computer (VLEB1009)

VLEB1018 FastCam_Computer Power Cord

Connects FastCam_Computer (VLEB1009) to 120V wall outlet on circuit

VLEB1019 Ethernet Cord

Connects FastCam_Computer (VLEB1009) to network router

VLEB1020 Computer Mouse USB Cord

Connects to FastCam_Computer (VLEB1009)

VLEB1022 Wireless Keyboard Transmitter USB Cord

Connects wireless keyboard transmitter (VLEB1003) to New_Computer (VLEB1073)

VLEB1025 Monitor Power Cord

Connects outside monitor (VLEB1008) to power strip (VLEB1024)

VLEB1026 FastCam Processor

Serial: 118015136
UW ID:
Datasheet (See "Datasheets" folder if link is broken)

VLEB1027 FastCam Processor Power Cord

Connects FastCam processor (VLEB1026) to power strip (VLEB1024) to 120V wall outlet.

VLEB1028 FastCam IEEE 1394 Cord (i.e. Firewire 400)

Connects FastCam Processor (VLEB1026) FastCam_Computer (VLEB1009)

VLEB1029 FastCam Processor-Imager Cord 2

Connects FastCam Processor (VLEB1026) port 2 to FastCam Imager (VLEB1030)

VLEB1030 FastCam Imager

Serial: 118015136

VLEB1031 FastCam Processor-Imager Cord 1

Connects FastCam Processor (VLEB1026) port 1 to FastCam Imager (VLEB1030)

VLEB1032 Booth USB Cord

Connects New_Computer (VLEB1073) to the bottom interior-booth USB connection (VLEB10036) by going through booth port B (VLEB1012)

VLEB1033 Booth USB Cord

Connects New_Computer (VLEB1073) to the 2nd from the bottom interior-booth USB connection (VLEB10036) by going through booth port B (VLEB1012)

VLEB1034 Booth USB Cord

Connects New_Computer (VLEB1073) to the 2nd from the top interior-booth USB connection (VLEB10036) by going through booth port B (VLEB1012)

VLEB1035 Booth USB Cord

Connects New_Computer (VLEB1073) to the top interior-booth USB connection (VLEB10036) by going through booth port B (VLEB1012)

VLEB1036 Interior-Booth USB Port

Bottom Interior-booth USB port behind the door. Connected to New_Computer (VLEB1073) with USB Cord (VLEB1032)

VLEB1037 Interior-Booth USB Port

2nd from the bottom Interior-booth USB port behind the door. Connected to New_Computer (VLEB1073) with USB Cord (VLEB1033)

VLEB1038 Interior-Booth USB Port

2nd from the top Interior-booth USB port behind the door. Connected to New_Computer (VLEB1073) with USB Cord (VLEB1034)

VLEB1039 Interior-Booth USB Port

Top Interior-booth USB port behind the door. Connected to New_Computer (VLEB1073) with USB Cord (VLEB1035)

VLEB1046 Compressed Air Supply Hose

Connects the compressed air supply (VLEB1050) to the air control manifold (VLEB1047)

VLEB1047 Compressed Air Control Manifold

Routes the compressed air to either the automatic (VLEB1049) or manual (VLEB1052) branches.

VLEB1048 Interior-Booth Compressed air shutoff valve

Connected to the compressed air control manifold (VLEB1047). Turns compressed air supply to manual control branch (VLEB1052) on/off (On is parallel to piping).

VLEB1049 Automatic Pressure Controller

Uses negative feedback from the pressure measuring tube (VLEB1053) to control the pressure of the automatic control branch of the air supply manifold (VLEB1047)

Manufacturer: Alicat Scientific

Model: PCR3-5PSIG

Manual (Look at "PCR-Series" portions)

VLEB1050 Exterior-booth Compressed Air On/Off Valve

Turns the compressed air supply on/off on the exterior of the booth. Connect to compressed air supply hose (VLEB1046)

VLEB1051 Outside Booth Compressed Air Pressure Regulator

Use this to set the compressed air pressure supplied to the booth. Typically around 20psi.

VLEB1052 Interior-Booth Manual Pressure Control

Connects to the manual branch of the compressed air supply manifold (VLEB1047). Use this to manually control the pressure supplied to the larynx.

VLEB1053 Pressure Measuring Tube

Connects the larynx mounting hardware to the automatic pressure controller (VLEB1049) to measure the subglottal pressure.

VLEB1054 Larynx Mounting Hardware (NOT LABLED)

VLEB1055 Interior-Booth Power Strip

Power strip is turned on by exterior-booth switch (VLEB1056). Connects the following equipment with individual power switches for each:

VLEB1056 Exterior-Booth Power Switch (Bottom-Left)

Turns on/off the interior-booth power strip (VLEB1055)

VLEB1057 Exterior-Booth Power Switch (Bottom-Right)

Turn on/off the interior-booth power outlet (VLEB1044).

VLEB1058 Exterior-Booth Power Switch (Top)

Turns on/off the interior booth ceiling lights.

VLEB1059 Humidifier 1

Humidifiers are used to saturate the pseudolung (VLEB1061) with almost 100% humidified air.

Manufacturer: Concha Therm III, Fisher and Paykel Healthcare, Inc., Laguna Hills, CA

VLEB1060 Humidifier 2

Humidifiers are used to saturate the pseudolung (VLEB1061) with almost 100% humidified air.

Manufacturer: Concha Therm III, Fisher and Paykel Healthcare, Inc., Laguna Hills, CA

VLEB1061 Pseudolung

Mimics a lung about the size of a human or dog. It is simply a chamber that receives air from the humidifiers (VLEB1059/1060) and supplies it to the larynx attachment hardware.

VLEB1062 Mini Lamp 1

Used to provide light while manipulating larynx and equipment. Can be kept on while the FastCam is in use, but is not the main light source. The optical light sources (VLEB1064/65) should be used for the FastCam

VLEB1063 Mini Lamp 2

Used to provide light while manipulating larynx and equipment. Can be kept on while the FastCam is in use, but is not the main light source. The optical light outputs (VLEB1064/65) should be used for the FastCam

VLEB1064 Optical Light Output 1

Connected to the optical light source (VLEB1066) outside the booth. Light travels from the source, through optical tubing and splits into two outputs.

VLEB1065 Optical Light Output 2

Connected to the optical light source (VLEB1066) outside the booth. Light travels from the source, through optical tubing and splits into two outputs.

VLEB1066 Optical Light Source

Light Source for optical outputs (VLEB1064/65). Intensity is controlled with variac (VLEB1067)

VLEB1067 Variac for Optical Light Source

Controls the intensity of the light produced by the optical light source (VLEB1066) and fed to the optical light outputs (VLEB1064/65).

VLEB1068 Omega Pressure Transducer

Model Number: MMG005V10W2MA0T1A4
Output 0-10V DC
Serial Number: 447912
Pressure Range 0-140 cm H2O

VLEB1069 Calibration Device

Used to calibrate the pressure transducer (VLEB1068). Please see pressure sensor calibration section.

VLEB1070 Pressure Tubing

Connects the pressure transducer (VLEB1068) to the larynx mounting hardware (VLEB1054) in order to read sub-glottal pressure.

VLEB1071 Flow Meter

Measures the flow of compressed air going through the larynx.
Model: FMA-1610A

VLEB1072 Outside left monitor

This monitor is attached to the New_Computer (VLEB1072)

VLEB1073 New_Computer

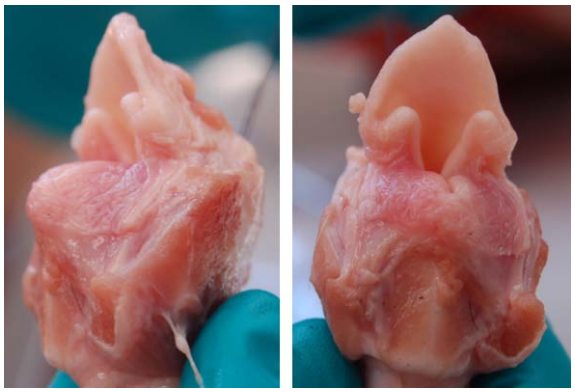
This is a new computer that was purchased and installed in order to be HIPAA compliant. It is responsible for running Labview during data collection. Any human subject data should be used with this computer and not the FastCam_Computer (VLEB1009)

How to Dissect Larynx (For use with FastCam)

a. All of the instruments and equipment needed for excised larynx prep and experimentation should be found in room 2785. Wear gloves when working with larynges.
b. Thaw larynges
    i. Bring the larynges to room temperature using the water bath set at 32.5 degrees. Occasionally, you may have to adjust the safety knob to allow the water to fully heat.
    ii. Once the larynges are fully thawed, transfer them to a sink, container, or metal excised tray and drain the water bath. An easy way to do this is to use a syringe and the extra tubing near the water bath to create a siphon that pulls the water out of the bath and into the sink. Another way to start the siphon is to first fill the tube with water from the tap and then quickly insert one end of the tube into the water bath.


Larynx with trachea trimmed to appropriate length

c. Larynx dissection
    i. It works best to prepare the larynges on one of the metal excised trays found on the shelves. These help contain all of the larynx juices.
    ii. Dissection equipment can be found in the drawers labeled dissection tools.
    iii. While working on one larynx, the remaining larynges should be submerged in room temperature saline. You should also keep the larynx you are working with hydrated by applying saline when necessary (saline squirt bottles are on shelves or in excised booth).
    iv. Trim the trachea using scissors to leave just enough trachea to allow mounting in the excised booth (usually a few trachea rings or about a ½ inch).
    v. Trim the hyoid bone, thyrohyoid membrane, and thyroid cartilage as much as you can without affecting the surrounding structures. This is to allow the micrometers in the excised booth direct access to the inner structures and muscles to simulate adduction.
        1. You can also trim other unnecessary structures if they are present, such as the tongue, esophagus, and membranes or muscles outside of the thyroid cartilage.


Larynx with trimmed bone and cartilage


Elongation suture

2. Depending on the study you may or may not remove the epiglottis and tissue down to the level of the vocal folds.

d. Place one suture, medially and anteriorly, low on the epiglottis or remaining tissue of epiglottis. This suture will simulate elongation in the excised booth, so it should be close to the level of the vocal folds, but it should not hit either fold

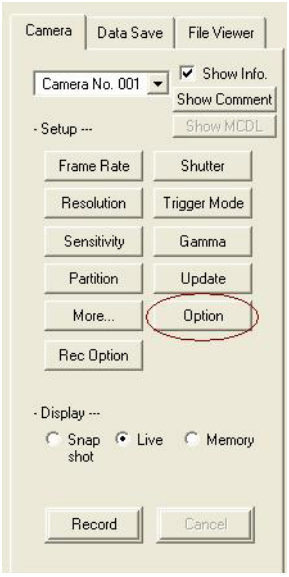
Booth Setup Steps (With FastCam Video Acquisition)

Note: if you do not wish to use the FastCam, then ignore the steps under the title "**FastCam Setup"** and any subsequent steps that talk about the FastCam processor or camera.

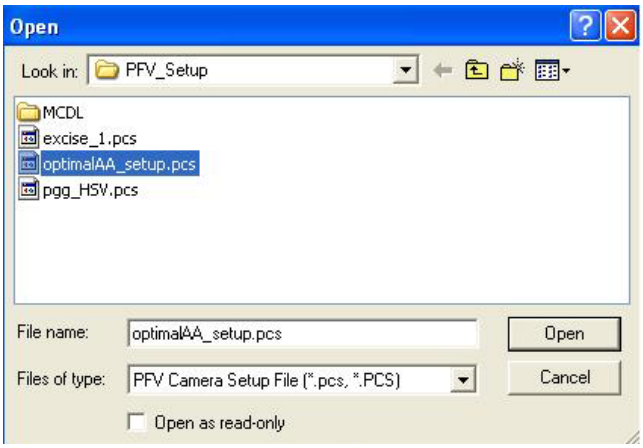
1) Turn on all 3 power switches on the outside of the booth to the left of the door.
2) Ensure that the FastCam_Computer (VLEB1009) is on.

FastCam Setup (Steps 3-12 are all done on the FastCam Computer VLEB1009)

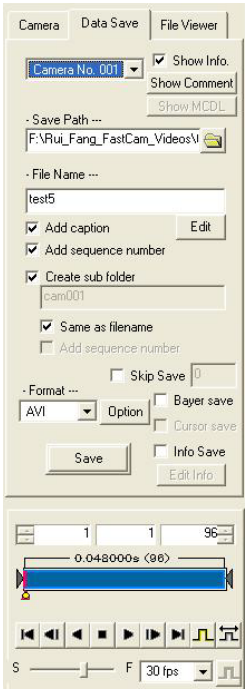
3) Turn on the FastCam Processor (VLEB1026). Switch is on the bottom under the processor-imager cord connections (VLEB1029/31)
4) Open Photron Fastcam Viewer (PFV) software. Shortcut  is located on the desktop.
5) Click the "Option" button.



6) Click "Load"
7) Select the file named "optimalAA_setup.pcs" located at Desktop/PFV_setup/optimalAA_setup.pcs



8) Click “open”. If you get an error that says the file can’t be loaded because the “camera” types differ”, close the software and re-open it because the FastCam Processor (VLEB1026) has not had time to initialize itself yet.
9) Now let’s set up the saving options. Under the “Data Save” tab select a folder to save all of the video files and give your files a name. The software will automatically add some labels to the end of your file name. Ensure all of the settings outlined in the picture below are used (use your own location and name of course).



10) Note: make sure that the location you selected actually has space available. Otherwise your files will reach 1% downloaded and then freeze until the PFV software crashes.
11) Return to the “Camera” tab. You should see an image from the camera on the center of the screen. Don’t panic if you don’t, the camera needs a TON of light to pick up an image. Do the following to verify that the camera is working:

- Take the lens cap off of the camera (VLEB1030)
- Turn on the mini lamps (VLEB1062/63) and direct some light under the camera.
- Adjust the f-stop of the camera to allow more light in (lower numbers).
- Adjust the focus to get an image.
- Your goal here is to simply obtain an image on the screen so that you know the camera is functioning. You can adjust the camera more when the larynx is attached to the booth.

12) Press the "Record" button to ready the camera for triggering. The camera will not actually record anything until you trigger the camera.

LabView Setup (Steps 13-26 are all done on the New_Computer VLEB1073)

13) Open LabView and then open the file "Aquire for Long Recordings 2.5_j&s.vi" that is located on the external hard drive attached to the New_computer **VLEB1073**.
14) Calibrate the pressure sensor (VLEB1068) as described in the calibration section
15) The file saving functionality is a little tricky so pay attention to the following instructions. With the LabView program STOPPED (stop-sign logo is on the top toolbar. It will be stopped when you first open LabView), change the file save location by pressing the folder icon. Name your file and click ok.

16) You can now run the program by clicking the “right” arrow on the top toolbar. You should see the sensors start to display data, but you are NOT yet recording any of this data to an output file.
17) Here is the tricky part – you are now running a LabView data collecting session. Any time you press the big green start button you will record data to the output file. When you press the big red stop button you will stop recording data. You can press the big green start button again to continue recording data to the output file (and big red stop button to stop recording data). You can repeat this process as many times as you want (e.g. for multiple trials with the same conditions). Your data will be recorded to ONE output file until you press the stop-sign logo in the toolbar. After you press the stop-sign logo the file name you chose will be iterated (i.e. a number will be added/increased at the end of your file name). The next time you start the program by pressing the “right’ arrow in the toolbar, a new session will begin and data will be saved to a NEW output file. If you don’t want LabView to iterate your file names you must change the file name by pressing the folder icon BEFORE you press the “right” arrow to start the program again. If you try to change the file name while the program is running, LabView will simply ignore this and keep recording data into the file that you had selected when you hit the “right” arrow. It is recommended that you rename your output file for every different scenario you are testing (e.g. cartilage modification style 1, style 2… etc). You can then conduct as many trials as you desire in one session by pressing the big start and stop buttons. Run some dummy sessions to get used to this behavior. Here is a mock session:

    1. Folder icon clicked and save location changed. File name given.
    2. Program started with “right” arrow.

    Trial 1

    3. Phonation achieved
    4. Big green start button pressed.
    5. Camera triggered (we will talk about this soon)
    6. Big red stop button pressed
    7. Phonation stopped.

    Trial 2

    8. Phonation achieved
    9. Big green start button pressed.
    10. Camera triggered (we will talk about this soon)
    11. Big red stop button pressed
    12. Phonation stopped.

    Trial 3

    13. Phonation achieved
    14. Big green start button pressed.
    15. Camera triggered (we will talk about this soon)
    16. Big red stop button pressed
    17. Phonation stopped.

18. Stop-sign button pressed. This session of trials is over. The larynx position/angle/whatever is changed and readied for the next set of trials (remember to spray with 0.9% saline solution).
19. Folder icon is pressed to give a different name to the next set of trials.
20. Program is started with "right" arrow and the next set of trials is recorded identically to step 3-18.

    This sequence of events will create an output file with a different name for each set of trials.

18) Now let's look at what LabView is providing us as an output file. There are actually three files that LabView will output when you press the stop-sign logo after a session. One is a .wav file that records all of the audio from the microphone, the other two are text files. The file with "flex" in the name can be ignored. The other file is all of the pressure, flow and acoustic data. When you open this file in a text editor you may notice that the formatting is lopsided/shifted. Let's import this data into Excel to make it look cleaner.
19) Open excel and go to the "Data" tab on the top. Click the button labeled "From Text" (Note: this process may be different for different versions of excel, google the terms "Excel Import Data from Text File").
20) Locate your file and press "import".
21) Make sure that the option "Delimited" is selected.
22) In the field labeled "Start import at row:" type in 23 (Note: if you are not using the exact LabView file specified, it is best to leave this field at 1). This simply gets rid of the header information provided in the LabView output file. This information may be of use to you and you should reference it by opening the original file directly.
23) Click finish and select the place where you want Excel to put your data. It is recommended that you place each import into a new Excel sheet. For multiple trials it is nice to organize each trial into a new sheet by using the bottom sheet tabs.
24) You should now see a filled in sheet with row one displaying "X_value; Flow; X_value; Pressure… etc"
25) If you pressed the big green start button and big red stop button in LabView more than once, you will notice a jump in the X_Value column (look very far down the column because the X_Value increment is very small). This jump is what happens when you press the big red stop button to stop recording data and then press the big green start button to start recording data again. The jump can be used to separate your trials very easily.

Attaching Larynx

26) After you have prepped your larynx for the booth, it is time to attach it. Throughout this process be sure to spray you vocal folds with a 0.9% saline solution every few minutes (and throughout data collection). You should have about 1-2 inches of trachea attached to the larynx. Be sure that the hose clamp is already over the barb (larynx attachment hardware) before you thread the trachea. Thread the trachea over the hose barb.

27) Adjust the larynx so that the thyroid cartilage is pointing towards the direction of the door and the vocal folds are aligned with the suture holder track (i.e the vocal folds will appear perfectly horizontal in the FastCam viewer software when you have properly adjusted the camera in the steps below).
28) Tighten the clamp until snug. Do not over tighten. If you see trachea flesh bulging out of the slits in the hose clamp, you have tightened too much.
29) Attach the suture to the middle of the suture holder.
30) From here refer to the Positioning the Vocal Folds section to get a detailed description of how to manipulate the arytenoids to achieve phonation.
31) When you are satisfied with the position of the vocal folds it is time to try and achieve phonation (self-oscillation of the vocal folds that causes an audible sound).
32) Be sure that the LabView software is running ("right" arrow clicked on the top toolbar). You should see pressure, flow, jitter, shimmer…etc values being displayed.
33) Start to turn the manual pressure regulator (VLEB1052) and watch the pressure increase. Around 4-12 cm H_2O (it can vary widely), you should start to hear phonation. Don't be dismayed if you don't.
34) If no phonation occurs, consult the "Positioning the Vocal Folds" section and make sure that the folds are level and even. Also remember to keep spraying the larynx with 0.9% saline solution every few trials.

Recording FastCam Videos While Acquiring LabView Data
(Steps 36-41 are done on the FastCam_Computer VLEB1009)

35) If you follow the "Mock Session" steps you will trigger the camera to record videos (be sure that the PFV software "Record" button has been pressed so that the camera is ready for triggering). During the "mock session" steps, the "Trigger" button in the PFV software is used to trigger the FastCam to take a video. IMPORTANT: you should see the partition number in the top left of the PFV software increment each time you press the "Trigger" button.
    - Note: each video that is recorded is called a "partition". The current partition is displayed in the upper-left of the PFV software when in the "Camera" tab
    - If you trigger a video that you do not want to save, you can go back into the PFV software and click "Cancel" to un-ready the camera. You can then click the "partition" button and change the current partition to the last video you took. This will overwrite the partition you selected. Be careful to not overwrite any other partitions further down the list if you want to save them.
    - It is not recommended that you alter the partition sequencing too much because odd, short videos get created randomly (I have no idea why) when you start and stop a recording session. Instead just make a note in your notebook which partitions belong to which trials so that you can download them properly at the end of the day.
    - Note: you only have 64 partitions/videos to work with before you have to download them (very time consuming) so plan accordingly.

36) When you are done taking data you must now download the files off of the FastCam Processor (VLEB1026). **IMPORTANT: If you do not download the files from the FastCam Processor, they will be lost when you close the software or turn the processor off.**

37) If you did not set the save location in steps 9 & 10, do so now.

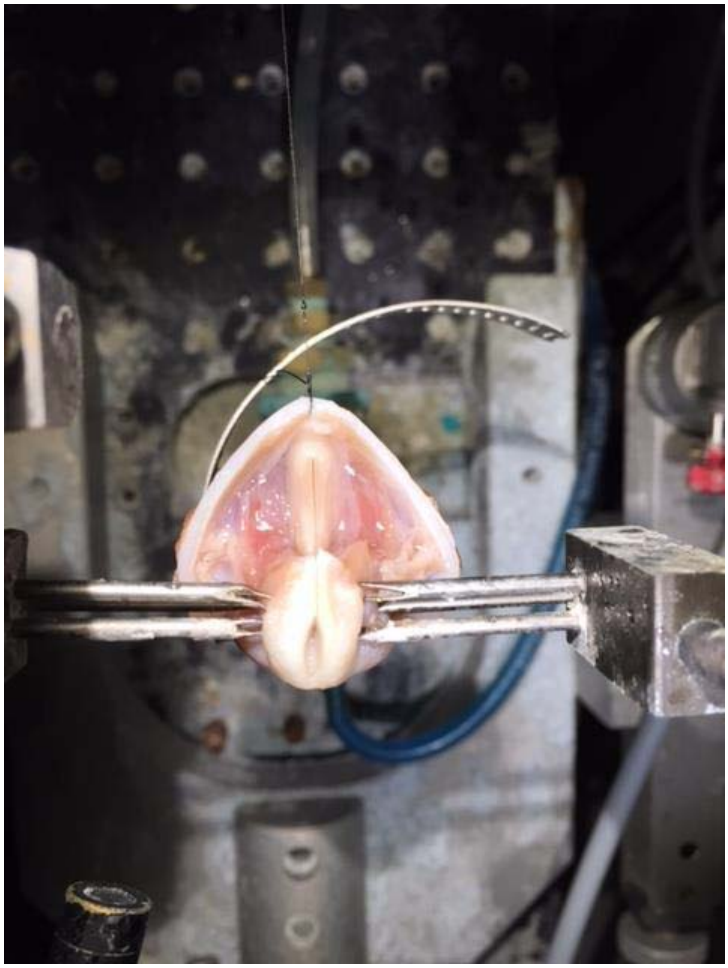
38) From the "Data Save" panel, click the "Save" button.

39) A dialog box below will open up. The partitions/videos on the right hand side are the ones that will be downloaded from the FastCam processor (VLEB1026) into your file save location. Use the arrow keys to move partitions to the right hand side to save them.

40) Click the "Save" button to begin the download. Wait for all of the files to download before attempting to use the software again. **BE SURE TO NOT TUN OFF THE FASTCAM PROCESSOR** (VLEB1026) **BEFORE ALL THE FILES ARE DOWNLOADED.** When all of the files are downloaded you can organize and rename them as you like.

Positioning the Vocal Folds

Positioning the vocal folds is a tricky process. Your goal is to manipulate the arytenoids with the pincers (three pronged pointy things in the image below) so that the vocal folds are adducted and level. You do not want the arytenoids to be offset/sliding over each other. The picture below offers a sample of what the folds should look like when you are done. Use the anterior commissure suture that you placed during dissection to manipulate the vocal fold length. You should just barely begin to pull the larynx with the suture. If you pull to far, the larynx will not phonate or it will have an artificially high phonation threshold pressure (PTP).



Top view of larynx mounted in excised booth with proper vocal fold adduction.

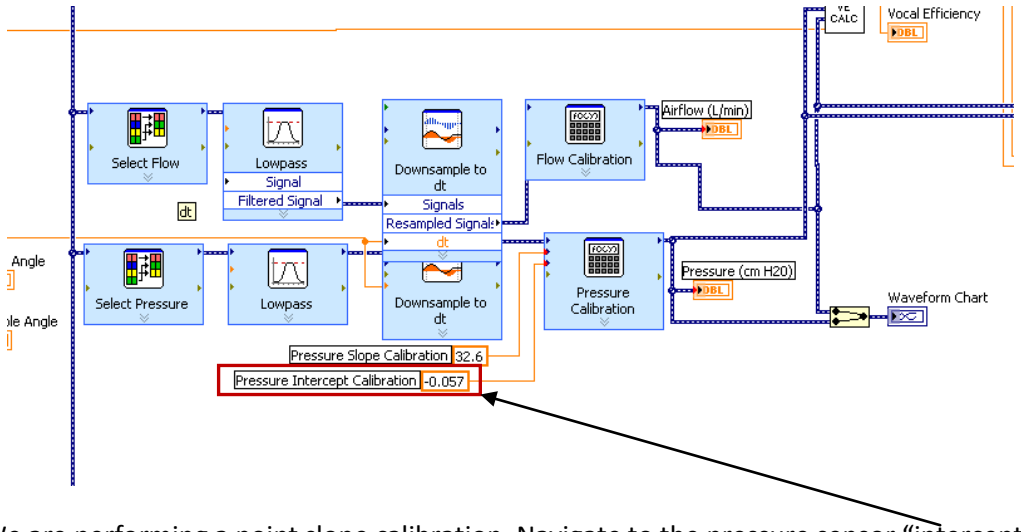
Test your positioning by slightly increasing the flow to the larynx (adjust manual flow knob VLEB1052). Phonation should occur within 3-12 cm H2O of pressure (generally) for a normal larynx setup. Note: true phonation is a consistent, audible, sinusoid-like sound that is emitted from the vibration of the vocal folds. If the sound is overly breathy (air rushing past folds) or very irregular, adjust your setup. If no phonation occurs, stop the air flow and make adjustments to your pincers and suture. If phonation occurs, but PTP is too high, lower the pressure a bit until you don't hear any phonation and then make minor adjustments to the pincers and suture until you hear phonation. Be sure to frequently (every 3-9 trials) spray your vocal folds with 0.9% saline solution.

Calibration

Pressure Sensor

The pressure transducer (VLEB1068) needs to be calibrated each day before data is taken.

1) We will perform an "intercept slope" calibration. We will determine the zero point of intercept by simply disconnecting the pressure sensor form all tubing and taking a reading. We will determine the slope value by using the calibration device mentioned below.
2) Make sure that there is nothing blocking the hose barb of the larynx setup (i.e. there is not larynx attached to the setup). And that the flow is shutoff (VLEB1052).
3) We are going to set the zero pressure. Start the LabView session and **write down the pressure** displayed in LabView (be sure the program session is running/click the "right arrow" mentioned in Booth Setup Steps). This pressure we will call the **"Current LabView Pressure"**
4) In LabView, select Window > Show Block Diagram
5) You should see a page like the image below. Scroll down until you see the fields boxed below.



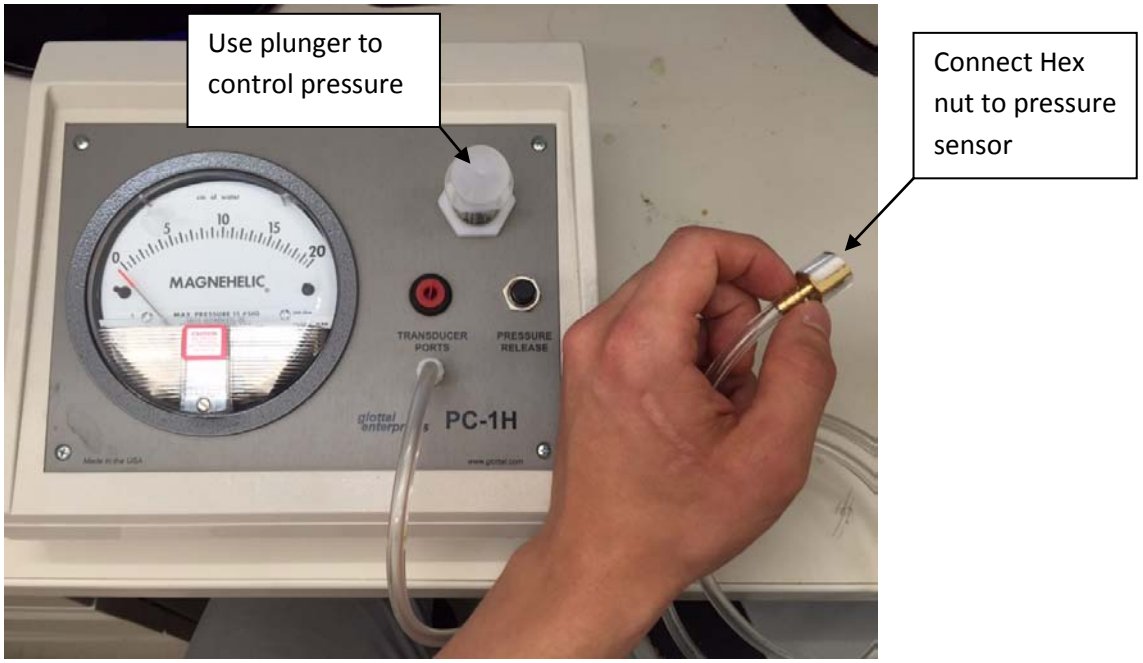
6) We are performing a point slope calibration. Navigate to the pressure sensor "intercept" field as indicated in the above picture. The current value of the intercept we will call **"Current Intercept",** e.g. -0.057 in the above picture.
7) Perform the calculation:

Current LabView Pressure + Current Intercept = (value entered in "intercept" field)

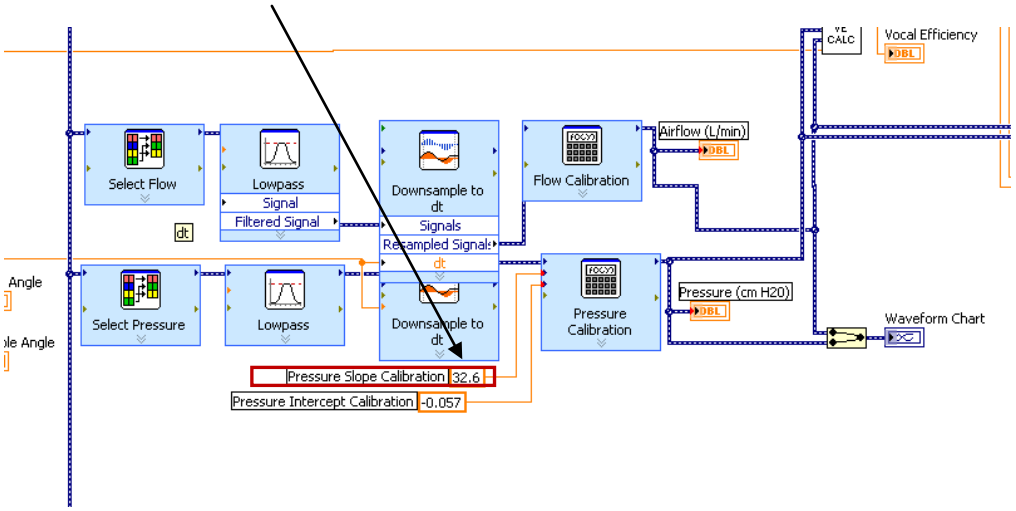
e.g. If LabView was reading 0.35 for the "Current LabView Pressure":
0.35 + (-0.057) = 0.293

8) Enter the value obtained from the above calculation in the "intercept" field.
9) Switch back to Window > Show Front Panel
10) Unhook the hex nut from the bottom of the pressure sensor (VLEB1068) to disconnect the tubing (VLEB1069)

11) Locate the pressure calibration device (VLEB1069) and use the hex nut pictured below to hook up the calibration device to the pressure sensor (VLEB1068)



12) The plunger can now be used to control the pressure delivered to the pressure sensor. The pressure release button is used to reset the pressure gauge to zero regardless of plunger position. **Note: there is some leakage to the plunger so you must slowly depress the plunger to keep a value steady.** This is best done with two people: one person holds a value and the other person reads off what LabView is displaying.
13) Now set the pressure to 10 with the calibration device and **write down the pressure** that LabView is displaying. We will call this the **"Current LabView Pressure ~10"**
14) Switch back to the block diagram view as in step 5.
15) Navigate to the "slope" field as picture below and record the value. We will call this the **"Current Slope"**



16) Now perform the calculation:

(Current Slope) – 3.2 *[(Current LabView Pressure ~10) – 10] = (Value entered in “slope” field)

e.g. If LabView was reading 10.6 when the pressure calibration device was set to 10:
32.6 – 3.2*(10.6-10) = **30.68**

17) Enter the value obtained above into the “slope” field.
18) Perform some test pressures with the calibration device to ensure that the calibration was successful. Feel free to tweak the slope or intercept if the above calculations did not give you a proper calibration.
19) Disconnect the calibration device and hook up the sub glottal pressure hose (VLEB1070) to return the setup to its original condition.

Maintenance and Cleaning

Humidifier

Check to make sure that the humidifiers (VLEB1059/1060) still have water in them. If they become low you will need to refill them using the following steps:

1. Turn off the humidifier you wish to refill by switching the power switch near the bottom of the base.
2. (Optional) remove the entire humidifier from the mounting bracket by sliding the unit up and out of its socket.
3. Detach the tubing attached to the top of the humidifier and note their respective positions.
4. Take off the water tank by pressing the big button indicated in the picture below and sliding the entire tank out. Be sure that the button is fully pressed down because salt buildup may limit its mobility.

5. Fill the tank with DISTILLED water from the break room up to the “fill line”. Distillation machine pictured below. Arrow points to nozzle. That’s just some fine looking bloke in the reflection.

6. Replace the tank and tubing by reversing the steps above.
7. Switch on the humidifier and feel good about yourself.

The humidifiers can also become coated with salt (especially humidifier 1, VLEB1059). So be sure to clean off the salt regularly to avoid corrosion. Once upon a time, the bottom of the water tank in humidifier 1 formed a hole due to corrosion exacerbated by salt.

Note: if the tank becomes damaged they can be replaced with spare tanks located in room 2766 on the shelving rack to the left as you walk in (please don't blame me if they have moved).

Pseudolung

The pseudolung will eventually become filled with some water. You can drain this water into the bucket below by pushing the rusty nail from side to side (yes, I'm serious).

Obtaining Excised Larynges

How to get more larynges (Jack/China or rabbits and dogs from Covance or other labs on campus)

a. China suppliers
    i. Talk to Jack to see if he can bring back larynges next time he returns from China.
b. Covance
    i. Contact Meechelle, who works at Covance, at meechelle.bordeaux@covance.com. Explain who you are, where you work, how many rabbit or canine larynges you would like, and when you would like them. She may or may not be able to accommodate your request.
    ii. If larynges are available, Meechelle will give you a time and day to pick them up.
    iii. The pick location is Covance Laboratories on Kinsman Blvd in Madison. You will have to park and load your vehicle at a loading dock at the back of the building. Once parked, you can use the phone at the loading dock to let someone know who you are and why you are there.

Disposing of Animal Tissue

1. Bag and box animal tissue. As you box up the bags, weigh each bag using the luggage scale and then label each box with its weight in pounds. No box should exceed 40 pounds. Use the biohazard bags and the luggage scale that are in the cabinet labeled "Biohazard Bags" in room 2785.

2. Freeze boxes. Freezers are located in rooms 2785 and 2750.

3. Attach an animal tissue pickup form to one of the boxes. You can find this form at http://www.ehs.wisc.edu/animaltissuepickup.htm.

4. On a pickup day, leave the boxes on the loading dock between MSC and SMI (across from Sterling Hall). Boxes should be on the loading dock by 9am. Scheduled pickup occurs every other Friday. If you need the tissue picked up earlier, you can submit an animal tissue pickup request online for a Wednesday or Friday morning (http://www.ehs.wisc.edu/animaltissuepickup.htm).

For more information and the pick-up schedule and locations, you can contact Timothy Lanzhammer (tlanzhammer@fpm.wisc.edu, 220-4273) or check the EHS website (http://www.ehs.wisc.edu/animaltissuepickup.htm).

Scripts to Speed up Analysis

Inside the electronic folder that contains this manual, there should be another folder called "Graham's_SpeedyFiles". If there isn't a folder by this name, go complain to the lab manager and track down this folder because it will save you from dozens of hours doing mundane tasks.

Kymograph Excel Spreadsheet Compiler

The first script, named "MucosalWaveDataCompiler", deals with excels files that have been output from the MatLab program mucosal.m. This script takes the excel spreadsheets that you saved while using the mucosal.m program and compiles them into a single excel file.

NOTE: this program only takes the following values from the spreadsheets:

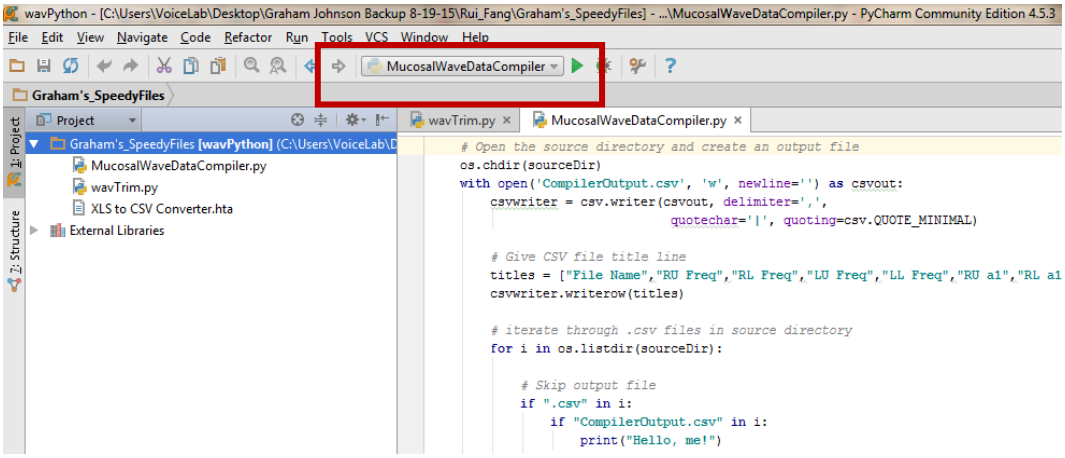
RU freq,	RL freq,	LU freq,	LL freq,	RU a1,	RL a1,	LU a1,	LL a1,	RU p1,	RL p1,	LU p1,	LL p1,

Here are the steps to use the python script.

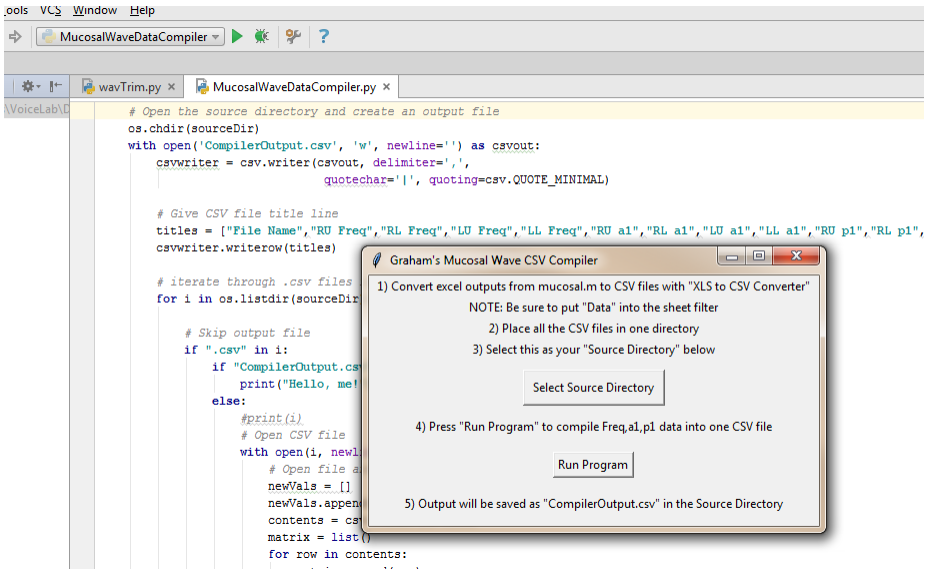
1) Open PyCharm. Here is a link to download the program if your computer does not have it (https://www.jetbrains.com/pycharm/download/).

2) Open the file “MucosalWaveDataCompiler” in PyCharm.

3) Run the program by pressing the green arrow at the top with MucosalWaveDataCompiler selected as shown in the red box below.



4) You will see the window below pop up. Follow the instructions in the window. **Note**: you must convert all of the excel files into CSV files. A program is included in “Graham’s_SpeedyFiles” folder that can do this for you. Place all of your excel files in one folder and run the XLS to CSV converter program (Step 1 below). You can then sort by document type to separate all of the CSV files from the excel files. Place all of the CSV files in a new folder (this will be your “source directory” that you select in step 3 below).



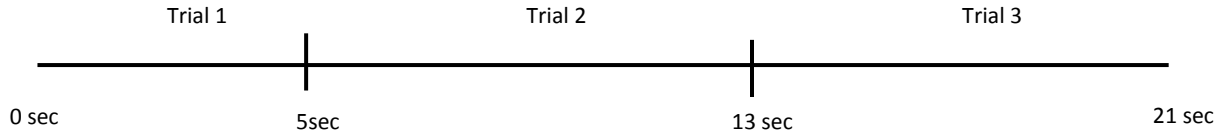
5) When you are finished with the instructions, there will be an output file **in the source directory** called “CompilerOutput.csv”. Quit the program by pressing the “X” in the corner.

Script to Splice Audio Files

This script can take your .wav files and chop them into one second pieces that can be used for TF32 and D2 analysis, but please be aware to the following caveat:

This script can be used ONLY if your .wav files are structured in a certain way. I will go into a detailed description of how this script works so that you can determine if your audio files are set up properly for this script.

Imagine that the line below represents the duration of your audio file, let's say that it is 21 seconds long. This script assumes that you have taken **three** trials and saved them into one .wav file (if you take five trials, I am sorry that I didn't include you in my python festivities. Please find someone who is familiar with python, and they will be able to tweak the code for you.)



Notice that for this example, I did not make the length of each trial the same (i.e. trial 1 = 5s, trial 2 = 8 sec, trial 3 = 8 sec)

This program does the following steps to chop up your .wav recording into 9 one-second clips (3 clips for each trial):

1) (Trial Length) = (Total length) / (# of trials) = 21/3 = 7s

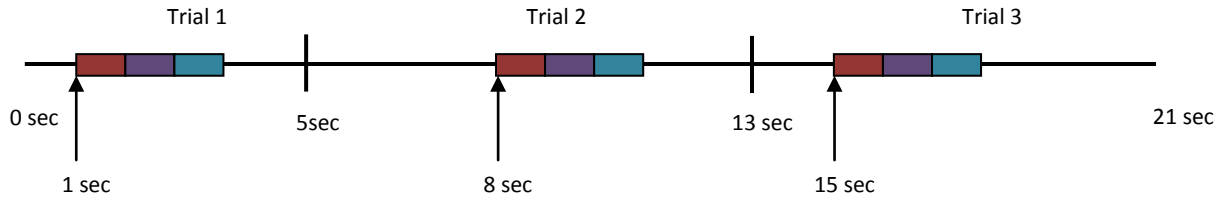
2) Calculate breakpoints:

First Breakpoint = 1s

Second Breakpoint = (Trial Length) + 1s = 7s + 1s = 8s

Third Breakpoint = 2*(Trial Length) + 1s = 2*7s + 1s = 15s

3) Then use each breakpoint as the beginning of a 3 second section that will be chopped up into 3 one-second clips as diagramed below. The blocks represent where the 1 second clips are taken from.



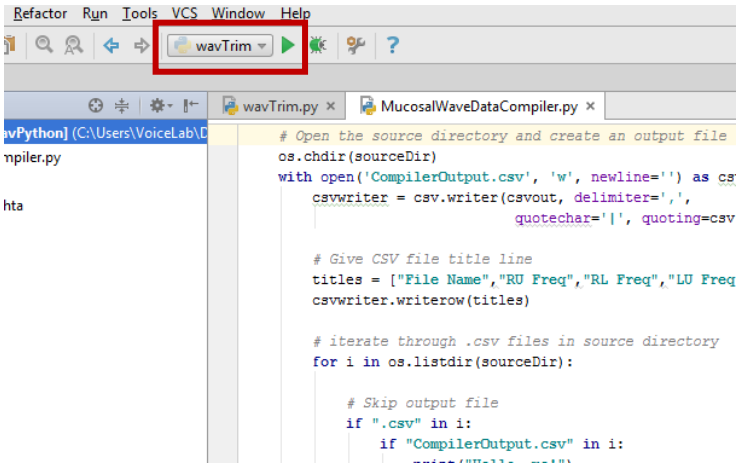
4) As you can see, this script works if your .wav file is structured so that you were recording a **single trial** within the window of a set of the blocks above.

If you have determined that your audio files are formatted correctly, then proceed to use this script as follows:

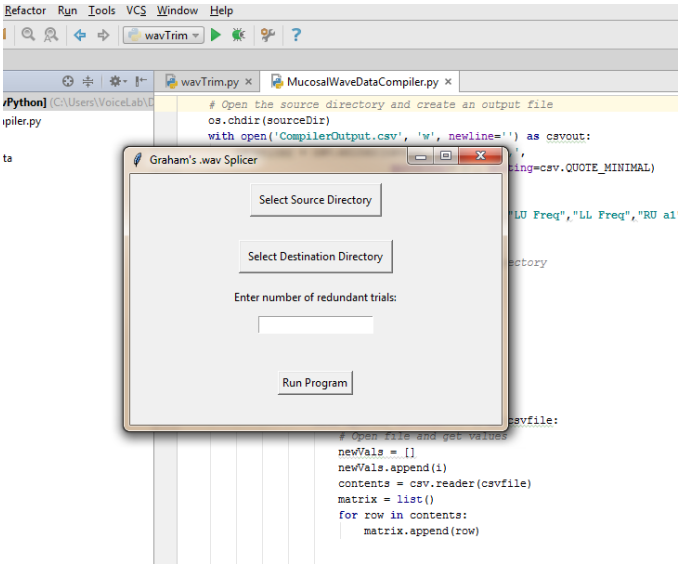
1) Open PyCharm. Here is a link to download the program if your computer does not have it (https://www.jetbrains.com/pycharm/download/).

2) Open the file “wavTrim” in PyCharm.

3) Run the program by pressing the green arrow at the top with wavTrim selected as shown in the red box below.



4) You will see the window below pop up.



5) Move all of your audio files into one folder and select this as your source directory.

6) Select the destination directory as where you would like your one-second files to be located when the program is finished running.

7) Enter the number of redundant trials as 3 (just between you and me: I hardcoded the program to be set on 3 trials because I didn't have time to debug this input field… so find someone better than myself if you wish to alter this script to run a different number of trials.)

8) Run the program. It may take a minute or more.

9) Now all of your one-second clips will be in your destination folder. Groovy!

10) Quit the program by pressing the "X" in the corner of the window.