BT Quick Start Guide
Step 1: Check that the items shown below are included in your Kit

CHEETAH

USB CABLE
TO CHEETAH

BioTac with Mechanical Adapter

Multi BioTac
Board

Connector/Cable
12" or 18"

Auxillary 5Volt POWER

Step 2

Connect Multi BioTac Board to Cheetah.
Insert BioTac into Mechanical Adapter
Tighten set screw and plug Flex Circuit
into connector on Standard Electrical
Adapter

QUICK START GUIDE
BioTac Connections to PC
STEP 3

CHEETAH Data and Power connections to Computer Via USB

Power supply for BioTac 5V from Wall Mount Transformer

Multi BioTac Board Connected Directly to Cheetah
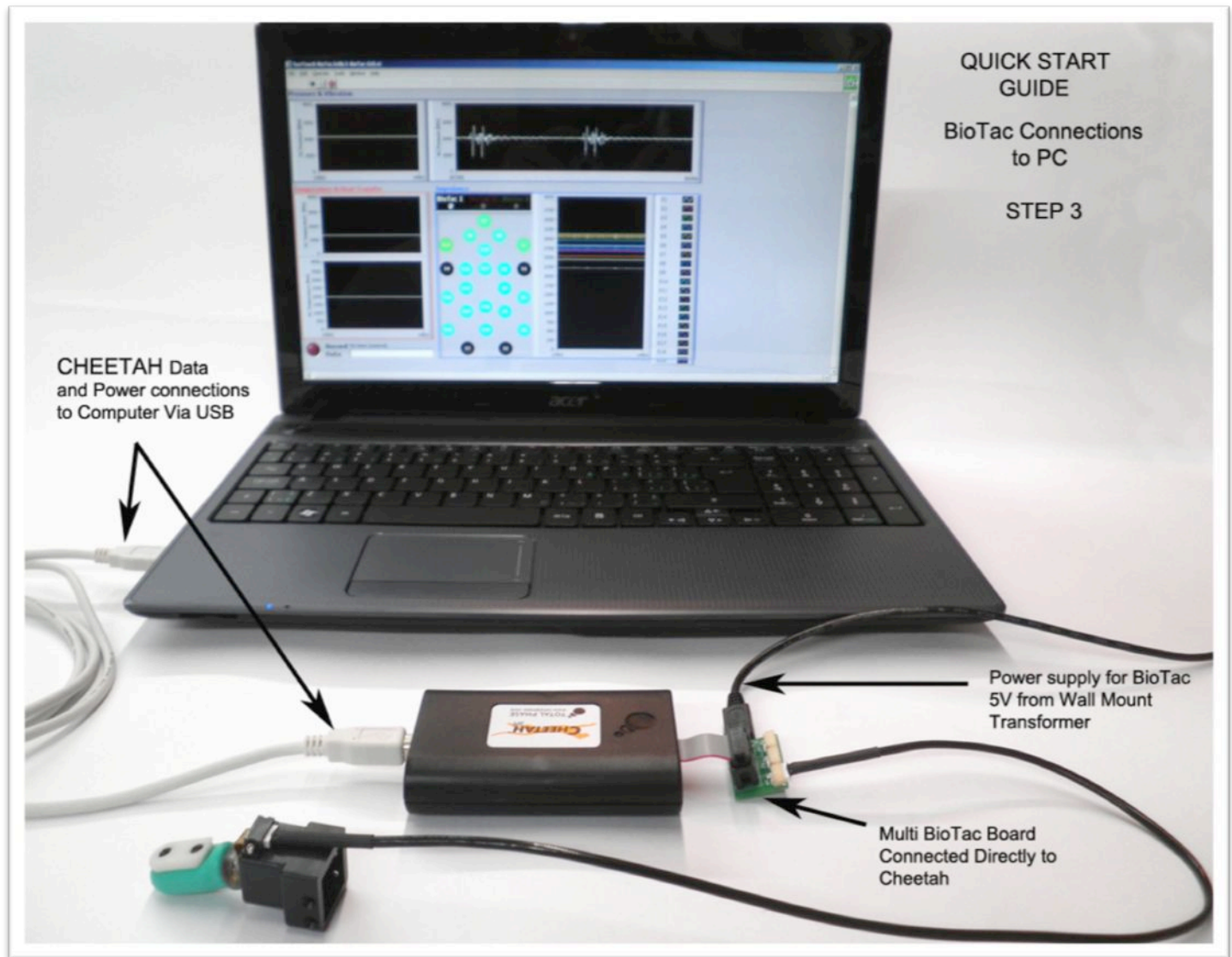
STEP 4

To use the BioTac, three software programs must be downloaded. They are the

1. " 3 BioTac GUI and Software 9ZIP file containing EXE files"

2. "LabVIEW Run-Time Engine 2010 – (32-bit) – Windows"

3. "USB Drivers (Windows)"

1) The "3 BioTac GUI and Software 9ZIP file containing EXE files" can be downloaded by going to www.syntouchllc.com and clicking on BioTac from the "Products" drop-down menu. Under "Downloads" click on "Software." Click on " 3 BioTac GUI and Software 9ZIP file containing EXE files" and a ZIP file will begin downloading. Unzip the file and the GUI will be under file named "3 BioTac GUI.exe"

2) If you will be running the GUI on a computer that does not have LabVIEW installed, you will need to download and install the "LabVIEW Run-Time Engine 2010 – (32-bit)."

   Windows 7 and earlier: http://www.ni.com/download/labview-run-time-engine-2010/2087/en/

   The website will redirect to a "Make a NI User Account" page. This account is necessary to download the software and the account is free. Once an account has been created, the page will redirect to the original download site. Once again click on the download link and your download will begin.

3) The USB Drivers software can be downloaded by going to the following link http://www.totalphase.com/products/cheetah_spi/ Click on the Downloads tab located under the picture. Download USB Driver for your machine. The download link will redirect to a sign in page. After registering a new account, download the software.
   For Linux specifically refer to
   http://www.totalphase.com/support/articles/200472636#s3.3
   For Mac, no driver is needed. Also refer to
   http://www.totalphase.com/support/articles/200472636#s3.4

4) Download the Appropriate API for your machine from
   http://www.totalphase.com/products/cheetah-api/

   Copy the library file (cheetah.dll or cheetah.so) from the downloaded zip. Paste the file into the Syntouch application folder (the bt_cheetah folder with biotac.h, biotac.c, etc. files).
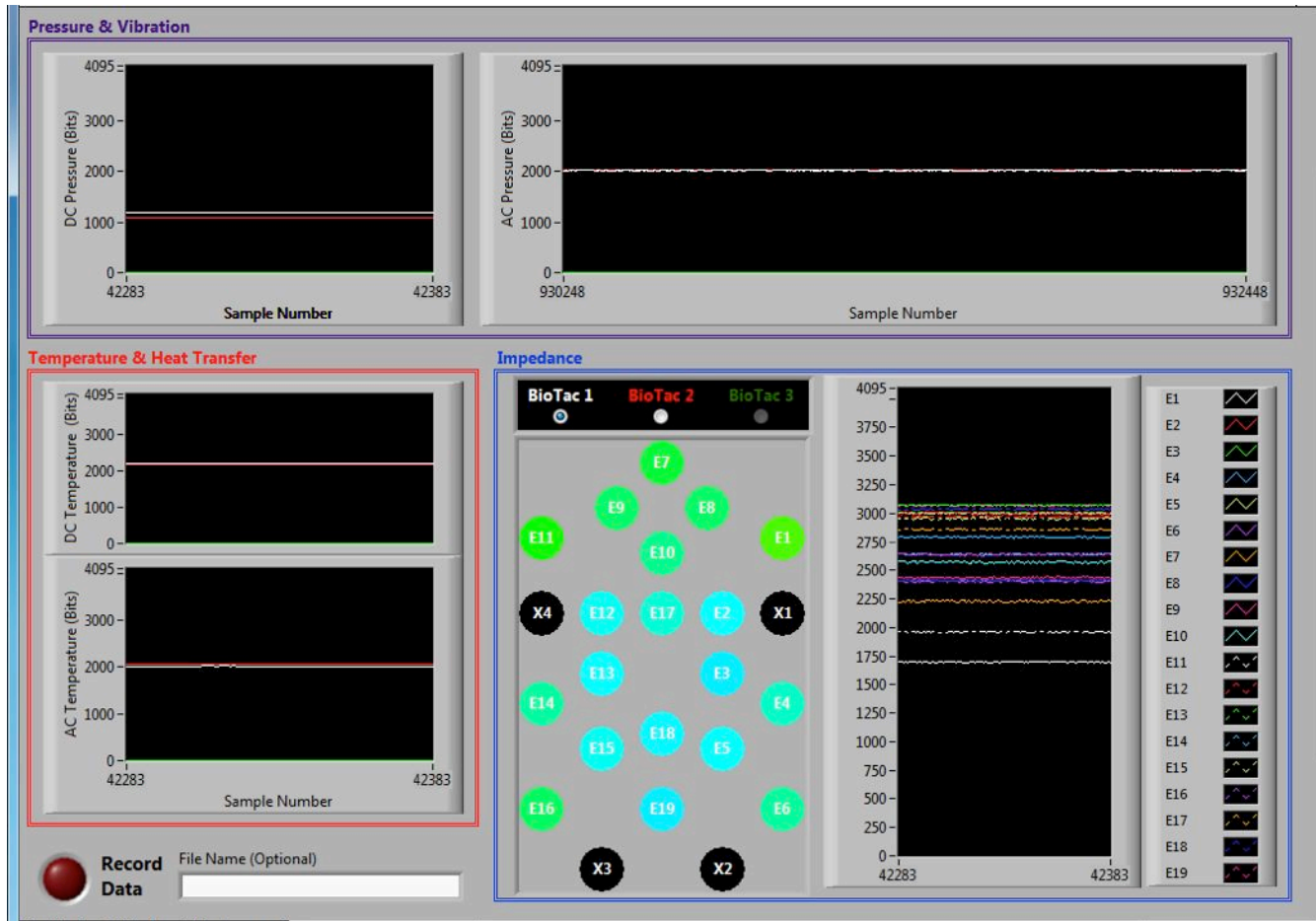   For Windows: Copy cheetah.dll under the "c" subfolder
   For Mac/Linux: Copy cheetah.so under the "c" subfolder

5) You can now launch "3 BioTac GUI.exe"

Users Guide for 3 BioTac GUI
For use with Windows PC only

Selects, displays and records data from one to three BioTacs connected via multiBioTac board and Cheetah USB interface

Available BioTacs are indicated by trace color keys in black box in the center, which are greyed out when the corresponding port on the MultiBioTac board has no BioTac connected. The electrode impedances will be displayed for the selected BioTac as a color-coded map (blue = low impedance = low force; red = high impedance = high force or no liquid) and individual traces at right. The pressure modalities (top) and thermal modalities (left) have multiple, color-coded traces for all available BioTacs.

The Record button at lower left will stream data to file from all three channels in ASCII, space-delimited format with header (see example below). If a File Name is specified, data will stream directly to that file (located in My Documents folder) until Record is turned off by hitting button again. Hitting Record again without changing File Name will over-write existing file. If no File Name has been specified, you will be asked to provide a name or discard by selecting cancel when Record is turned off.

Other LabView GUIs provided with the BioTac include:
- **BioTac Demo** GUI with enhanced sampling, processing and display of vibration signals. The code provides a useful example of a different frame structure.
- **BioTac Info** GUI that provides serial number and other header info.

Interpretation of BioTac Data values (all 12-bit numbers ranging from 0-4095):
- Impedance Modality: An AC voltage is applied to the four reference electrodes (X1-4). Each sensing electrode (E1-19) is connected in turn to a load resistor whose voltage is sampled and digitized. Thus the data correspond to conductance, with higher values for the thickest liquid layer and lower values as the liquid is displaced by increasing force on the skin over each electrode. The map of electrode positions uses a reverse color-code (red corresponds to low conductance = high impedance).
- Pressure Modalities: DC Pressure represents the low-pass filtered output of the liquid pressure sensor (0-15psi vs. atmospheric). AC Pressure is the high-pass filtered and amplified output of the pressure sensor that corresponds to vibration (20-1000Hz band).
- Thermal Modalities: DC Temperature represents the resting temperature of the thermistor behind electrode E10. AC Temperature corresponds to thermal flux, essentially the first derivative of DC Temperature.

DataStructure: 2.0
Operator: Jeremy
Date: 4/5/2012 < Date and Time are Generated Automatically
Time: 1:13 PM
Flex Version: B.D,B.D, < comma delimited for BioTacs #1,#2,#3 - blank indicates no BioTac connected
Firmware Version: 2.38 ,3.01,
Serial Number: BT-2P-02.2.0-B-11-E-00-04, BT-2P-02.1.2-A-11-D-29-01,
SampStructure:Pac,E1,Pac,E2,Pac,E3,Pac,E4,Pac,E5,Pac,E6,Pac,E7,< Sampling Pattern (line truncated)
SampRate: 4400
FramesInBatch: 7
OtherData:

Begin File < a blank line followed by text "Begin File" indicates that the following line will be data
0.000000 63 308 0 2021 0 2033 0 0 1
0.000227 63 308 17 1739 0 16 0 0 1
0.000455 63 308 0 2021 0 2032 0 0 1
0.000682 63 308 18 3039 0 645 0 0 1
0.000909 63 308 0 2021 0 2030 0 0 1
0.001136 63 308 19 3106 0 877 0 0 1
0.001364 63 308 0 2020 0 2035 0 0 1
…

Key to data structure (one line per sampled channel for all three BioTacs, two connected in example above):

Time stamp (s) batch index frame index channel ID BioTac1 value BioTac1 parity BioTac2 value

BioTac2 parity BioTac3 value BioTac3 parity

Columns are delimited by a space character

Troubleshooting

- **GUI Will Not Launch**: Verify that *all* files from the GUI download are copied to the computer from the ZIP file (including the folder "data" which contains necessary .dll files). Also ensure the drivers for the Cheetah SPI Host Adapter and LabVIEW runtime engine are installed (as explained in step 4).
- **GUI Returns Error "No Cheetah Found":** Ensure the USB connection to the Cheetah SPI Host Adapter is connected to a working USB port. The GUI should run even if no BioTacs are connected as long as the Cheetah is plugged in and the Cheetah is available. Occasionally, when running LabVIEW programs or other executable files that also use the Cheetah SPI there can be a resource locking problem. Verify that all other programs that have used this device are completely closed and exited to free up the Cheetah resource for the GUI. A less elegant, yet simple method to do this is to simply disconnect and reconnect the USB cable if this problem is encountered.
- **GUI Returns Error "Cheetah Target Power":** Desktop computers and laptops designed to meet USB 2.0 specification should be capable to power the Cheetah SPI Host Adapter and up to three BioTacs. In some circumstances (typically low quality hardware, or other competing high-power USB devices on the same line) the available power to drive the BioTacs and Cheetah device could be insufficient. If this is observed, you can use the supplied auxiliary power cable to connect to the Multi-BioTac board to supply power to the BioTacs.

- **Electrode Color Plots**

  - **All Electrodes are Black:** While the four reference electrodes X1-X4 are always shown in black, connected BioTacs should produce colored values for the electrodes. If all of the electrodes are black, when launching the GUI verify the BioTac is connected to port 1. If you can either connect the BioTac to port 1, or select the port it is connected to in the BioTac selector.
  - **One or Two Electrodes are Red:** This observation when the BioTac is not contacting an object is typically symptomatic of an air-bubble in the device. If this is observed, please see the BioTac skin filling and replacement insert for how to purge air-bubbles from the BioTac.
  - **All Electrodes are Green or Yellow:** This observation is typical of an under-inflated BioTac. A properly inflated BioTac will appear Blue or Cyan. Please see the BioTac skin filling and replacement insert for notes on filling the BioTac to proper inflation volume.

BioTac Split-Ring Integration

The split ring included with the BioTac system is not a necessary component of the BioTac except when the BioTac is used in situations requiring extreme tangential forces where BioTac fluid leakage may occur.


1. Identify the threaded and non-threaded halves of the split ring. In the following picture the piece on the right is threaded.

2. Hold the threaded half of the split ring on the underside of the BioTac skin so that the split ring rests on the skin while also touching the plastic as per the picture. Be sure to keep the threads parallel to the nail.

3. Place the non threaded half of the split ring on the top of the BioTac skin taking care to align the holes
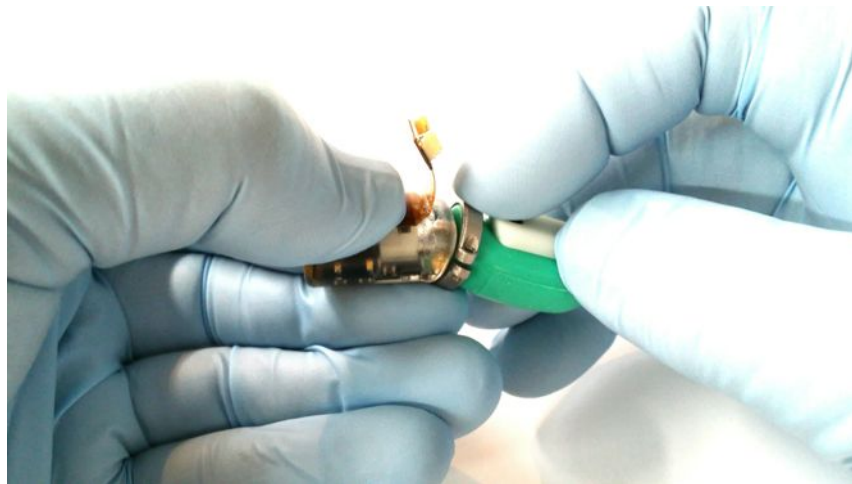
4. Insert 1 screw (0-80) through one of the holes of the top split ring and screw only a couple of threads into the bottom split ring. Alternate between either side, progressively tightening equally

5. Tighten each screw until the split rings are flush with each other, readjusting if there is nail silicon pinched in between the plastic and the ring.

6. The following are INCORRECT ways to position or attach the split ring

In this photo, the split ring is incorrectly aligned with the nail and is not flush with the plastic of the body of the BioTac. The screws also need to be tightened so that the two pieces meet.

In this photo the split ring is correctly aligned along the top piece of the ring but the bottom ring piece is incorrectly placed too far away from the body of the BioTac. The screws have been correctly tightened to allow the two ring pieces to touch.