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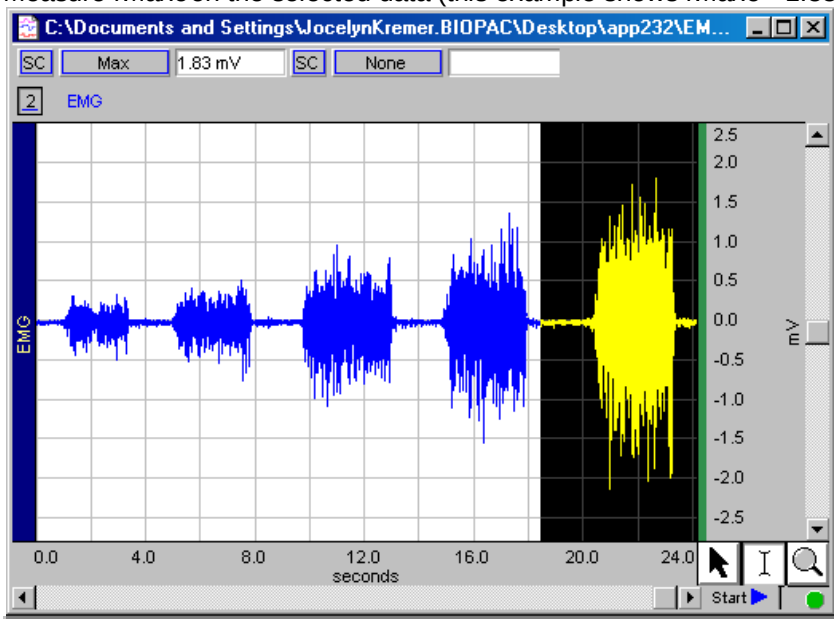
Application Note 232 EMG: Normalizing to Maximal Voluntary Contraction (MVC)

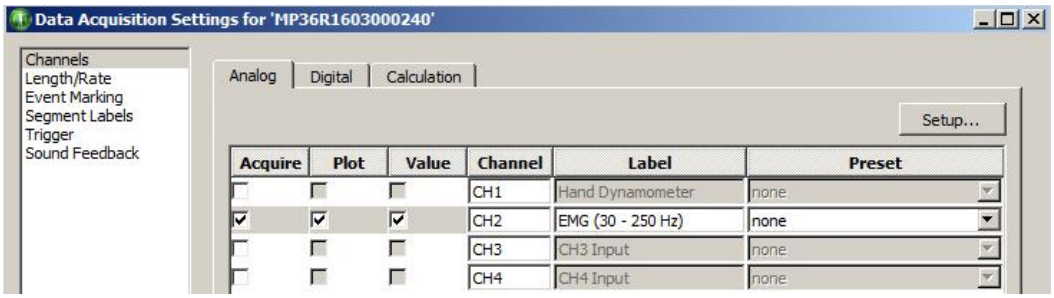
This Application Note will explain how to normalize EMG data to maximal voluntary contraction (MVC) and how to measure the area under the curve.

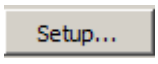
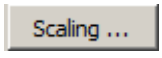
- This procedure works in Acq*Knowledge* (Research systems) and BSL *PRO* (Education systems).

1. Acquire data of subject performing MVC.
2. Measure ñMaxòon the selected data (this example shows ñMaxò= 1.83 mV) and save the result to use in Step 6.



3. Open a new file (File > New).
4. Choose MP menu > Set Up Data Acquisition > Channels.

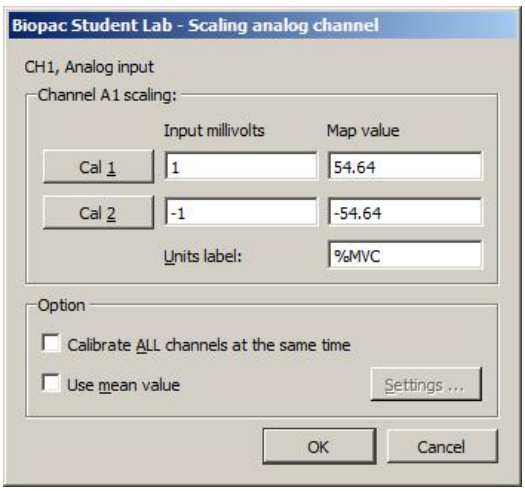


5. Choose a  Preset to establish the appropriate EMG bandwidth (this example uses EMG (30 - 250 Hz).
6. Normalize EMG to MVC.
   a. Click  to open Input Channel Parameters for the corresponding EMG channel
   b. Click  to access the scaling parameters.
   c. Compute the scaling factor as follows, using the MVC max measured in Step 2:
      i. Max EMG in mV (1.83) = MVC (100%)
      ii. 100/1.83 = 54.64
      iii. 54.64 is the scaling factor for this level of MVC.

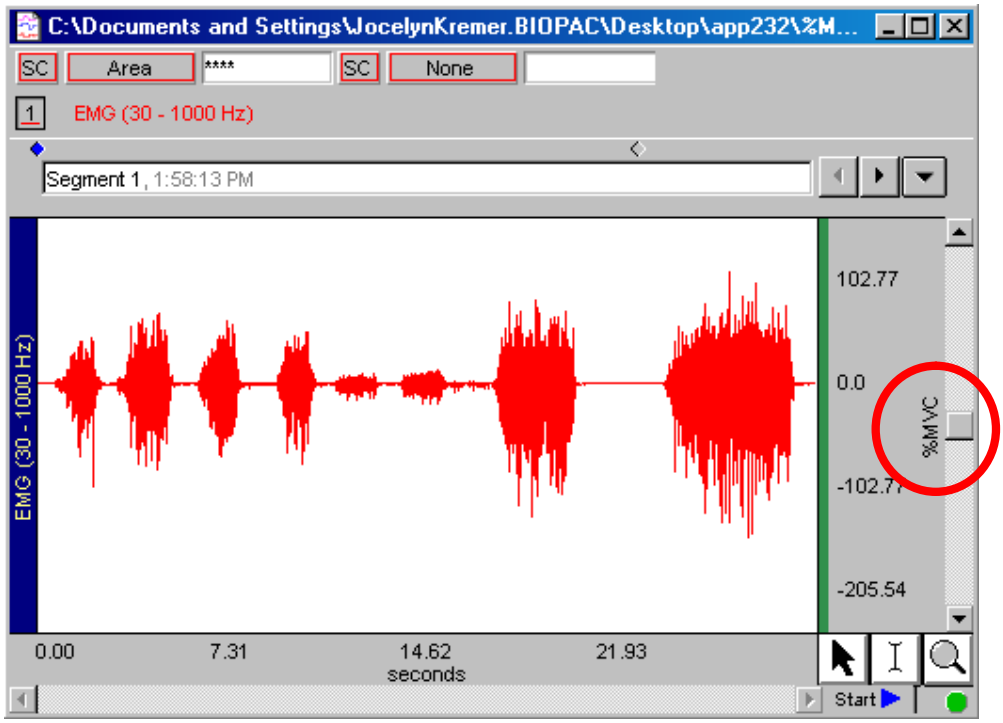
d. Enter into Scaling as follows:

	Input Value	Scale Value
Cal1 =	-1	-54.64
Cal2 =	1	54.64

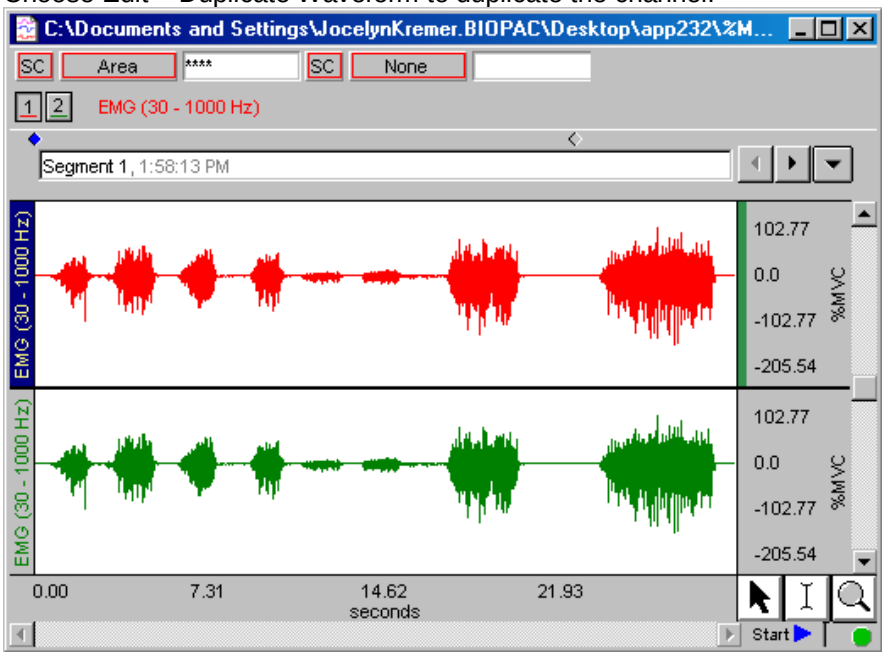
Units Label: %MVC



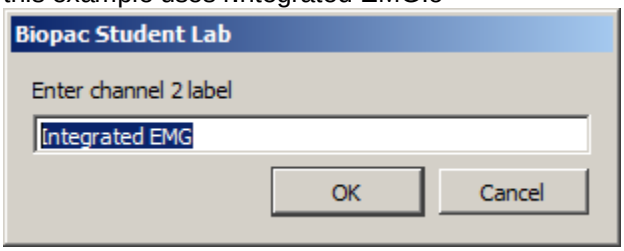
7. Acquire new data of subject performing MVC.
   - As subject performs the protocol, values will now be shown as %MVC.



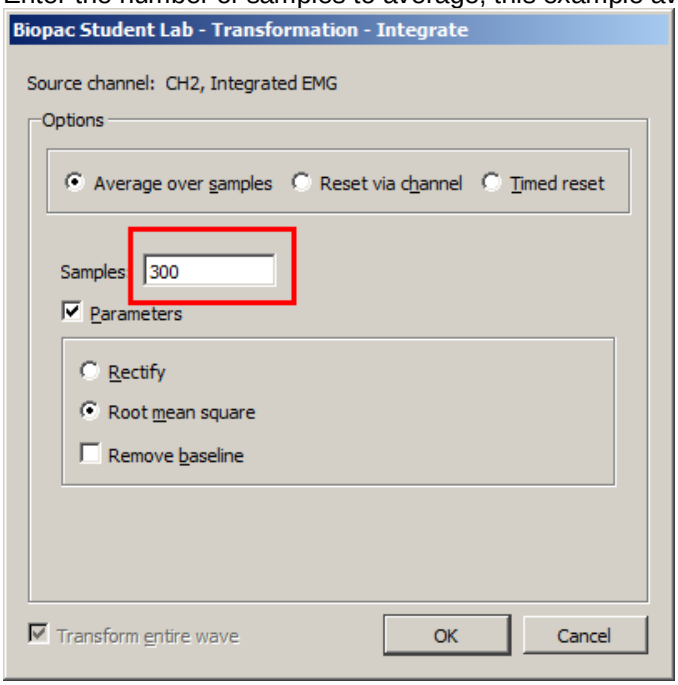
8. Choose Edit > Duplicate Waveform to duplicate the channel.



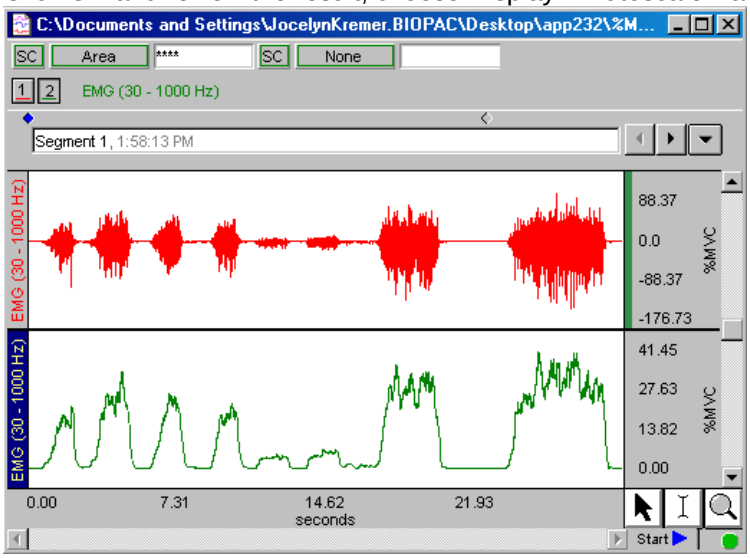
9. Select and relabel the duplicated channel (double-click on the left-edge channel label of the duplicated channel); this example uses ñIntegrated EMG.ò



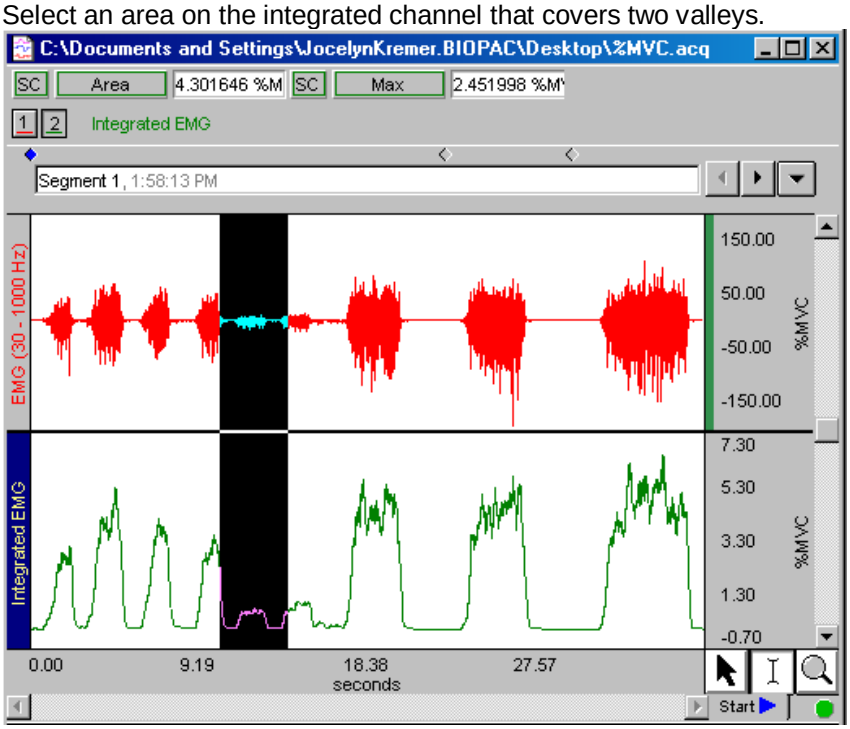
10. Click Transform > Integrate to perform an integration on the entire waveform.
    a) Enter the number of samples to average; this example averages over 300 samples.



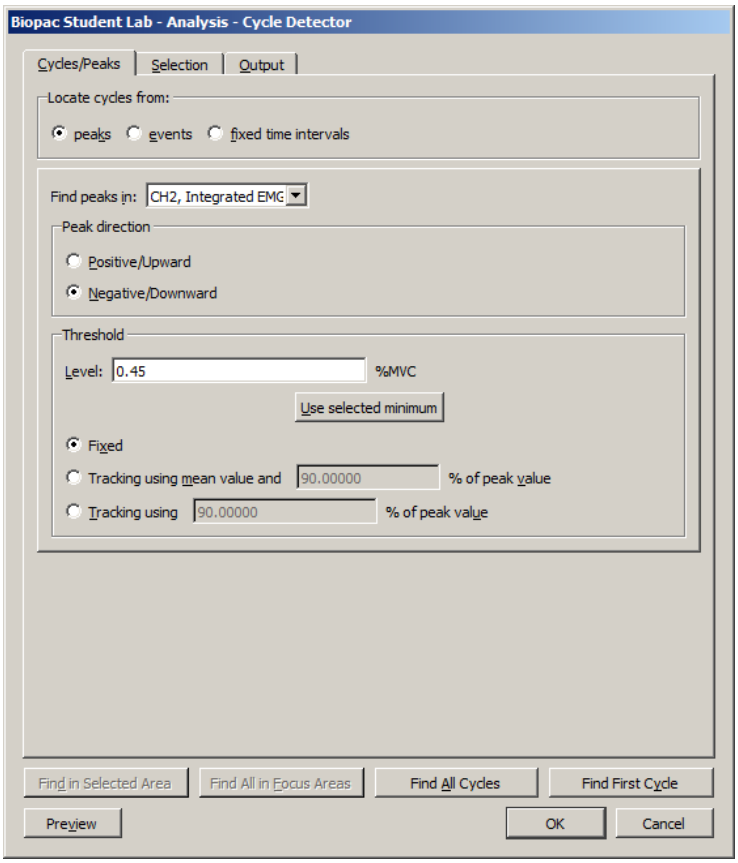
b) Click OK and review the result; choose Display > Autoscale waveforms if necessary.



11. Select an area on the integrated channel that covers two valleys.

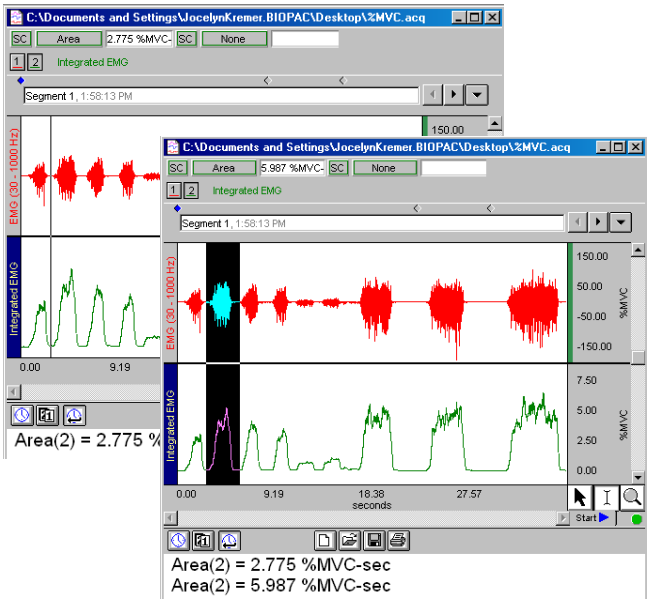


a) Select Analysis > Find Cycle.
b) Select Negative peak
c) Set Threshold to .45 (you will need to adjust this based on the data).
d) Under the ñ**Selection**ò tab, Set first cursor to: **Previous Peak** (leave the ñsecòvalue as is)
e) Under the ñ**Output**ò tab, Select ñPaste measurements into journal.ò
f) Click OK.



12. Click the cursor at the start of the data file.
13. Find cycles via Analysis > Findé options.
    a) Use ñFind Cycleòand then ñFind Next Cycleòto measure individually.
    b) Use ñFind All Cyclesòto measure all at once.
    c) The last peak may not be found if there is not enough data after the peak.
    d) Use File > Preferences > Journal to set the measurement details to include (name, channel, etc.)
    e) Use Display > Preferences > General to set the result precision.

Find Peak and Find Peak



Find All Peaks