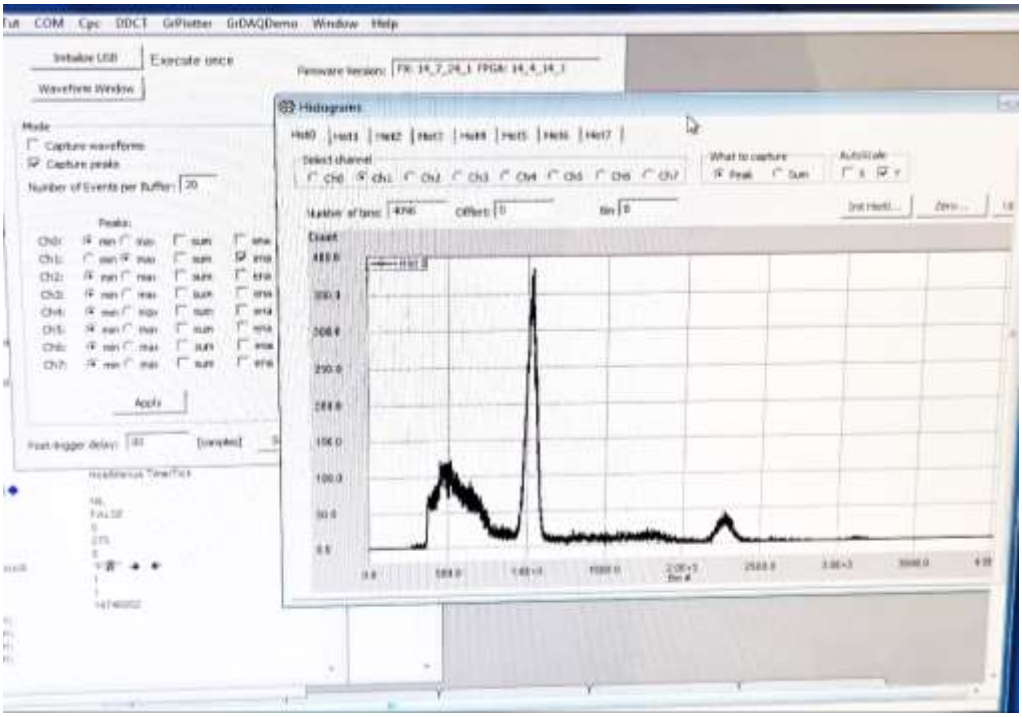
DDC-8/BlackBox QuickStart User's Guide

1) Turn on the DDC-8 rack module. (You might hear **3 ding sounds** from the computer speakers)
2) Click on the **BlackBox ANSEL** icon to open the DAQ software.
   Then choose **DDCT>Main** from the top menu bar.
3) Begin the initialization procedure and
   a. click on Initialize USB (But **only once**!). The **Log** window should display "….**Interface: 0**"
      i. If you see something else (possibly -5 or -22), close Blackbox, push the button labeled "**Reset USB**" on the front panel of the DDC-8 module (or power-cycle the device)
   b. Then choose **DDCT>SDAC** from the top menu and set signal amplitude offsets for each channel in the boxes on the right-hand side. Click on button "**Set SDAC**" to apply the settings.
      i. In most spectroscopy measurements, the number "**32**" should be entered for each of the analog inputs to be used. This enables full scale digitization of ~2V pulses.
      ii. In principle, other offsets can be used if specifically required (e.g. if negative [use "**225**"] or bipolar [use "**128**"] pulses are expected.).
4) Recheck on the scope. the **form** of the positive **analog signal** (→**Ch 1,..**) and its timing rel. the negative digital trigger pulse (→**NIM_IN_0** BNC, no 50-Ω terminator)
5) Go back to the **DDCT>Main** window and set following values in the dialog boxes:
   a. Check the box for "**capture peaks**", to measure amplitudes.
      i. For initial setup test, choose a **value between 2-5** for the **Number of Events per Buffer.** (This determines how often the GUI display will update information. It can be increased in actual data taking runs.)
   b. Set each of the desired Ch#s to **max** and **ena.**
   c. Press **Apply** to save all of the settings adjusted so far.
   d. Adjust the **Post-trigger delay** to **80 for initial setup**.
      i. This instructs the DDC-8 about the number of signal samples (40ns ea.) to inspect. A good start value is **80**, but typical larger values are used, like **512**.
   e. Press the button "**Send delay to board**" to save the delay.
6) Answer the "**Get N events**" question box, choose "**0**" (zero) for indefinite run time.
7) Press the "**Start**" button to initiate the DDC-8. The counters "**Run time**" and "**Events captured**" should start incrementing, indicating proper functioning of the DAQ.

8) The DDC-8 DAQ provides an option to **monitor the event-by-event data stream**, without disturbance, by displaying a corresponding frequency (pulse-height) spectrum as a histogram on an extra window with manipulation options. Proceed as follows:
   a. From the top menu, select **DDCT>Histograms** to display the window **histograms**, which provides access and manipulation to up to 8 histograms (Hist0,…,Hist7).
   b. Configure the histogram parameters **Number of Bins** to display**,** number of **Offset** ADC-channels, **Bin** size in ADC channels, which define the appearance of the histogram in the display
      i. Default settings are **4096** Bins, **2048** channels offset & **16** channels per bin. The screenshot below has 4096, 0, and 8 instead for displaying data entering DDC8-Ch1.
      ii. Comparisons are possible by displaying the same data on different histograms, e.g., on Hist0 and on Hist3.
   c. Initialize the histogram by pressing the button **Init Hist0,..**
   d. Histogram display is useful for monitoring data taking runs. Event data remain intact.
   e. Useful hint: Identify zero pulse-height by briefly disconnecting the analog signal cable from the corresponding DDC8 input connector, e.g., Ch1,..

9) Once the above data monitoring suggests proper DAQ settings, event data can be written to file by checking the "**Write Peaks to File**" box on the **Main** window (below Start and Stop buttons).



Tips/Troubleshooting:

1) After changing any setting, you need to press "**Apply**", then "**Send delay to board**" before starting data collection. This finalizes the changes in the software, then sends them to the FPGA.

2) Be sure to write down in your logbook the Runtime & # of events collected after each run.
    a. Don't worry if you forget, however, as this information is accessible from the output file.

3) Be sure to save all of your data on the EXPERIMENTAL_DATA partitions on the hard drives (Disk ***E***). Most of the C: drives will fill up quickly.
    a. This was a common problem in previous years. If your data is not saved correctly, be sure to check and make sure the HDD isn't full.

4) Keep an eye on the Log Window. If the machine suddenly starts to display "**-5**"'s, there is likely a problem with the connection and it is better to power cycle the instrument and reinitialize.

5) Sometimes, you will hear the "ding" of the USB disconnect. This happens occasionally via static discharge or jostling of cables. Power cycle the box & reinitialize to continue

6) If you want to quickly export the histogram from Blackbox, double click on the legend entry for "**Hist_0**" and a window will appear with the bin values in a list. This makes for easy importation into IGOR, but you should practice making the histograms manually on your own.

7) If you want to adjust the scaling on the histogram to zoom to a particular region, double click on either axis to bring up the menu.
    a. Be sure to uncheck the "**autoscale**" box in order to change the scale of a particular axis.