Data Acquisition Basics

Data Acquistion Parameters

- Block Diagram
- Signal Input Range
- Terminal Configuration (Differential, RSE)
- Acquisition Mode (Continuous Samples)
- Samples to Read
- Sample Rate (Hz)

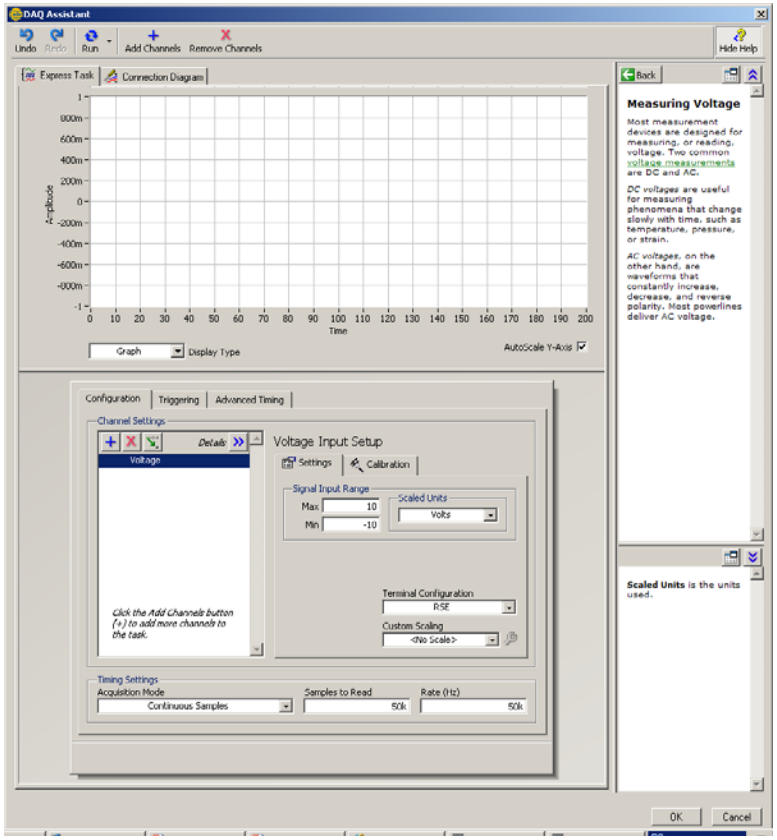
Graph Function Generator Output

- Create a Blank VI
- Make sure NI ELVIS || is turned on
- Instantiate Functions -> Measurement I/O -> DAQMx -> DAQ Assistant
  - Click on Acquire Signals -> Analog Input -> Voltage and select Dev1 (NI ELVIS II) -> ai0.
  - Signal Input Range = +/- 10 V
  - Terminal Configuration = RSE
  - Acquisition Mode = Continuous Samples

Graph Function Generator (cont.)

  - Acquisition Mode = Continuous Samples
  - Samples to Read = 50k
  - Sample Rate = 50k Samples per second
- How long does it take to collect 50k samples.

Graph Function Generator (cont.)



- Configure the Data Acquisition as shown above. Click **OK**
- You will be prompted to insert the DAQ Assistant in a loop – click **YES**

Graph Function Generator (cont.)

– Connect a BNC cable from the FGEN BNC on NI-ELVIS to Banana A and B as shown and add 2 wires from Banana A to AI0+ and Banana B to AIGND.

Graph Function Generator (cont.)

- Turn on the Function Generator. See steps 1-4 of this tutorial for details.
- Add a Waveform Graph to your block diagram to see the sine wave. Right click on the graph and click on Visible Items -> Scale Legend and -> Graph Palette

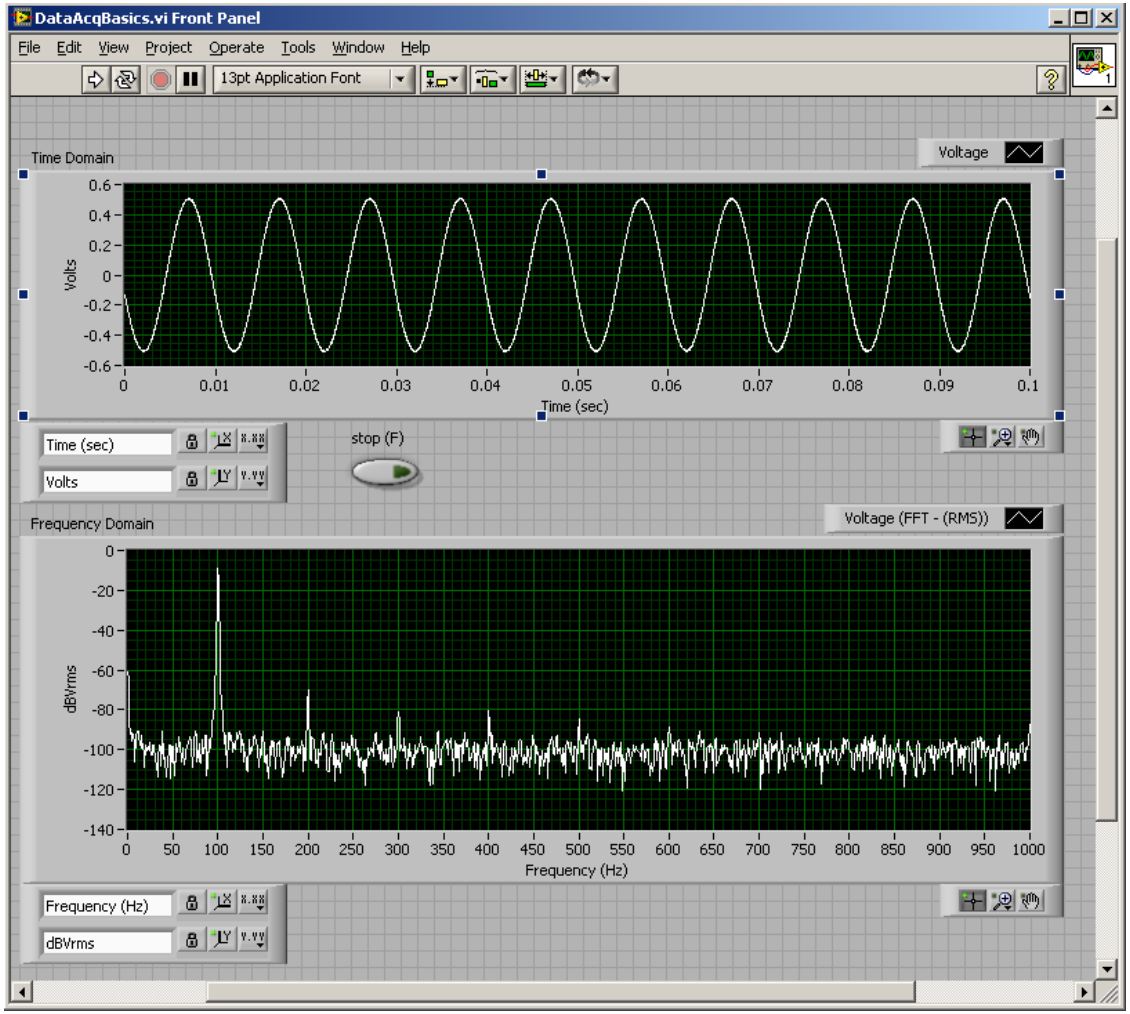
Graph Function Generator (cont.)

- Change the waveform to triangle and square. Click on the lock to turn off auto scaling and use the zoom tools to look at the waveforms in detail.
- Use the Sweep function. Since the

Fourier Transform

- All signal can be represented as a sum of sinusoid by using the Fourier Transform.
- If you plot the Magnitude of the Fourier Transform, the X-Axis represents frequency and the Y-Axis represents the amplitude of the frequency components of your signal.
- The term FFT (Fast Fourier Transform) is commonly used to refer to the Discrete Fourier Transform.

Fourier Transform (cont.)



- Verify the frequency of the signal shown above in both the time and frequency domain.
- Notice the harmonic distortion not visible in the time domain
- You can compute the Signal to Noise ratio easily in the frequency domain. Everything not at 100 Hz is noise.

Fourier Transform (cont.)

- Add a plot of the Frequency Components of the Function Generator output to your vi. Use Functions -> Express -> Signal Analysis -> Spectral to compute the Fourier Transform. The default values will work for us. Wire the graph to the FFT-(RMS) output.