

AOE 3054

Program Options

Other Options

1. Send a pulse from the Analog Output and record the response of the beam.
2. Send pseudo-random signal (white noise) out the Analog Output and record the response of the beam.
3. Use function generator and trigger the DAQ. Observe with scope and trigger the scope also.
4. Explore Pulse time vs. Beam response using function generator.
5. Control Function Generator Frequency.

Analog Output

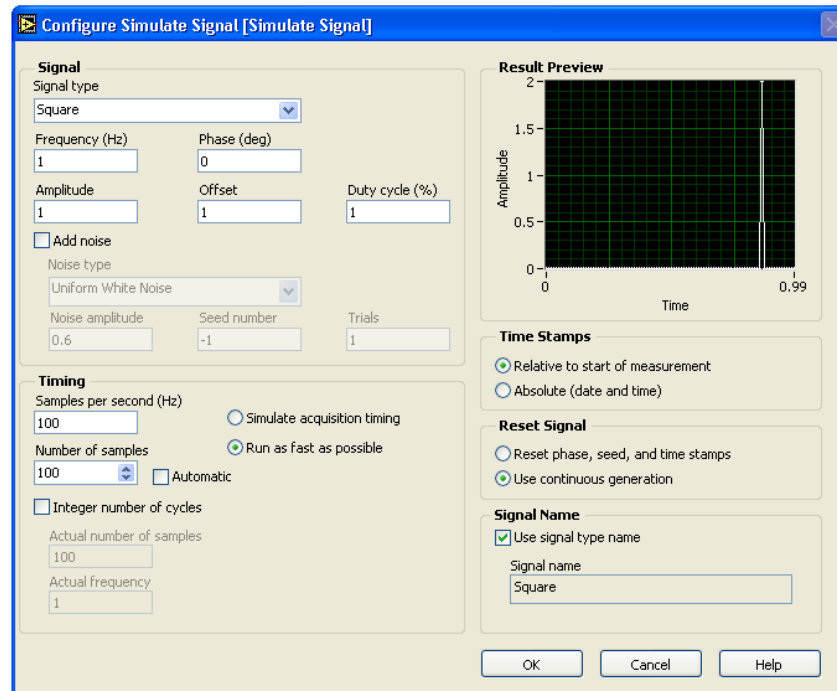
- The beam can be excited with a signal from the Analog output of the USB DAQ.
- The USB 6009 must be sent a software timed signal to the analog output port.
- The program could send a pulse once per second with a variable duty cycle.
- Duty cycle of 1 to 5% at 1 volt amplitude is adequate to tap the beam.
- The simulate signal VI will produce the data array and a *For Loop* that will index the array and send the data out to the DAQ AO.
- More elaborate hardware can handle the timing with its hardware and the program will not need to index the data.
- The simulate signal VI can add white noise to a signal. Turning off the amplitude would generate solely (pseudo) white noise.

Using the Analog Out

- Cautions when sending pulses to the beam amp!
 - Do not send a steady non-zero voltage to the amplifier.
 - Adjust the DC Offset to keep most of the signal at zero volts.
 - Start with the amplitudes low.
 - Make adjustments slowly as vigorous deflections can occur around the natural frequency of the beam.
 - Do not allow the beam to hit the probe.
 - Monitor the coil often for any warming and discontinue use until the reason for generating heat is corrected. (Usually too much DC offset.)

Simulate Signal (Square Pulse)

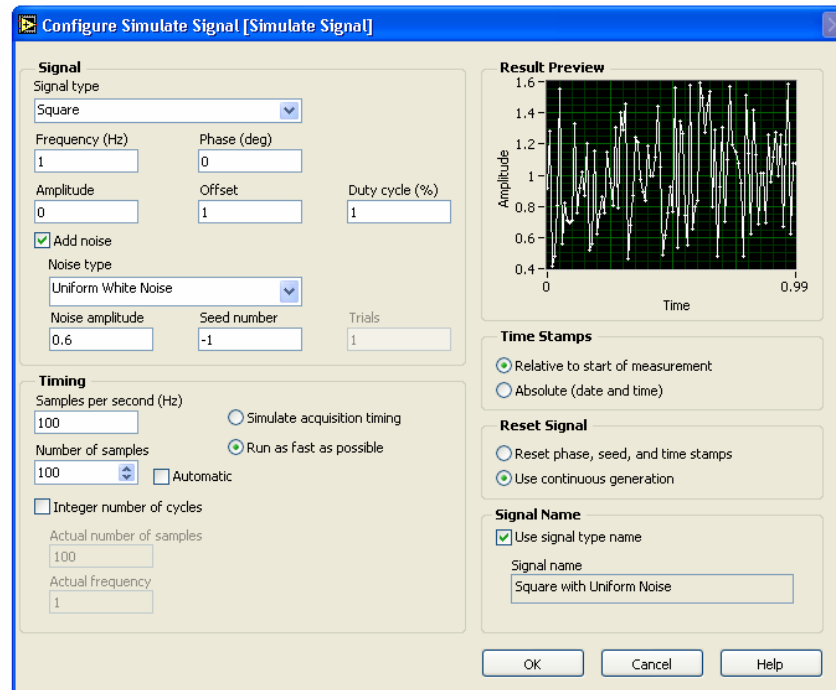
Simulate Signal VI is located on the Input Express Pallet.



Place the Simulate Signals VI on a New Block Diagram and set it up as above.

Simulate Signal (White Noise)

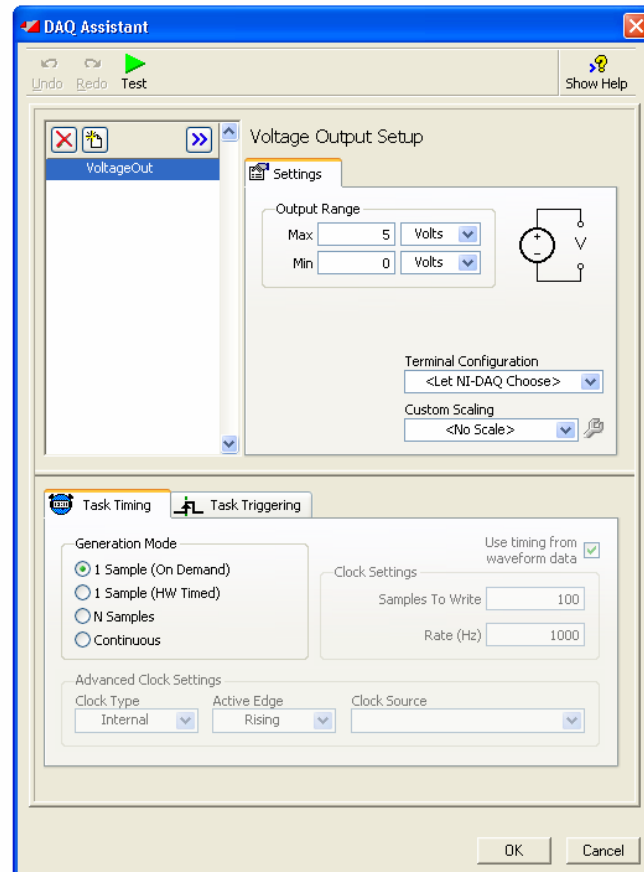
Simulate Signal VI is located on the Input Express Pallet.



Place the Simulate Signals VI on a New Block Diagram and set it up as above.

Analog Output Setup

Use the **DAQ Assistant** from the express *output pallet* and drop it to the right of the simulate signal VI

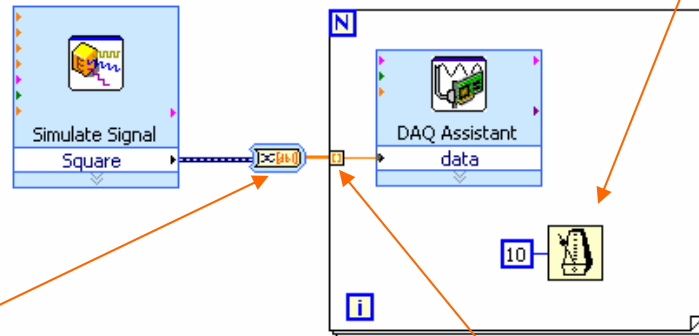


Select *Analog Output, Voltage, ao0* with default settings.

Beam Excitation

For Loop is located under *All Functions, Structures*. Place it like a while loop by enclosing the items to loop around.

Wait until Next Millisecond Multiple is located under *All Functions, Time and Dialog*. Create a constant of 10 for the input (for 10 mSec).



Convert **From Dynamic Data Type** is located on the *Sig Manip Express Pallet*.

Use the setting:

1D Array of Scalars,
Automatic.

Attach the wire from the output of the Convert from Dynamic Data Type through the For loop creating an *indexing tunnel*.

Using the Generate signal VI

- Save this VI and name it Generate signal for Beam.
- Drop this VI in the main VI to run in sync with it or create another VI and put this one in a while loop to run independent of the timing of the main VI.

Function Generator Pulse

- The beam can be excited with a pulse signal from the Function Generator using a square wave and varying the duty cycle.
- Connect the Main output to the amplifier. (Turn amp off until function generator is set up properly.)
- Connect the trigger out to the external trigger connection (PFIO on DAQ, and External Trigger on Scope).
- Adjust the function generator to produce a positive going pulse that is 10% or less of the total time between pulses (duty cycle).
- Be certain the other 90% is adjusted to zero volts using the DC offset.
- Adjustments to the amplitude will require adjustments to the DC offset. (A 5 volt pulse is adequate.)

Using the Function Generator

- Cautions when sending pulses to the beam amp!
 - Do not send a steady non-zero voltage to the amplifier.
 - Adjust the *DC Offset* to keep most of the signal at **zero** volts.
 - Start with the amplitudes low.
 - Make adjustments slowly as vigorous deflections can occur around the natural frequency of the beam.
 - Do not allow the beam to hit the **probe**.
 - Monitor the coil often for any warming and discontinue use until the reason for generating heat is corrected. (Usually too much DC offset.)

Varying Function Generator Frequency

- The function generator frequency can be varied by sending an analog output to the BNC connector on the back of the function generator.
- Setting the function generator on $2.0 \times 10\text{Hz}$ and varying the 0-5 volt analog out signal will vary the frequency over a useable range. Refer to the function generator manual for more information.