The Vernier Power Amplifier Program

Last Revision 5/8/12

In addition to its capabilities as an amplifier, the Vernier Power Amplifier is designed for use as a versatile function generator when used with the Vernier LabQuest. The LabQuest audio output controls the Power Amplifier, and can produce a DC output as well as a variety of AC signals. The LabQuest Mini, however, does not output an audio signal, and thus cannot be used with the Power Amplifier.

We have created a stand-alone program to allow a computer to control the Power Amplifier as a function generator. This program generates a formatted signal from the computer's sound card to drive the Power Amplifier.

The program has the same functionality as the Power Amplifier used with the LabQuest, with two additional features. The Power Amplifier will now produce an AC waveform with a DC offset, and is able to change the output frequency up and down by a factor of two(an octave).

The program was developed in LabVIEW 2011 and then converted to a stand-alone application. If LabVIEW 2011 is not installed on the host computer, the LabVIEW 2011 Run-Time Engine must be installed.. See the Installation section for more details.

INSTALLATION

Windows

Run the Power Amplifier Installer.exe and install. The installer will automatically install the LabVIEW 2011 Run-Time Engine, if needed, and thePower Amplifier program.

Mac

You must manually install the LabVIEW 2011Run-Time Engine. This is a free download from the National Instruments web site at: http://joule.ni.com/nidu/cds/view/p/id/2537/lang/en

After installing the Run-Time Engine move the application "Power Amplifier Mac" to the applications folder on the host computer.

SET UP

The Power Amplifier must be attached to a computer's audio jack using the 3.5 mm audio cable that comes with the Power Amplifier. Disconnect all other audio devices attached to the computer as the program seeks audio device ID 0. If the headphone jack is not set to ID 0, you will need to reconfigure the computer.

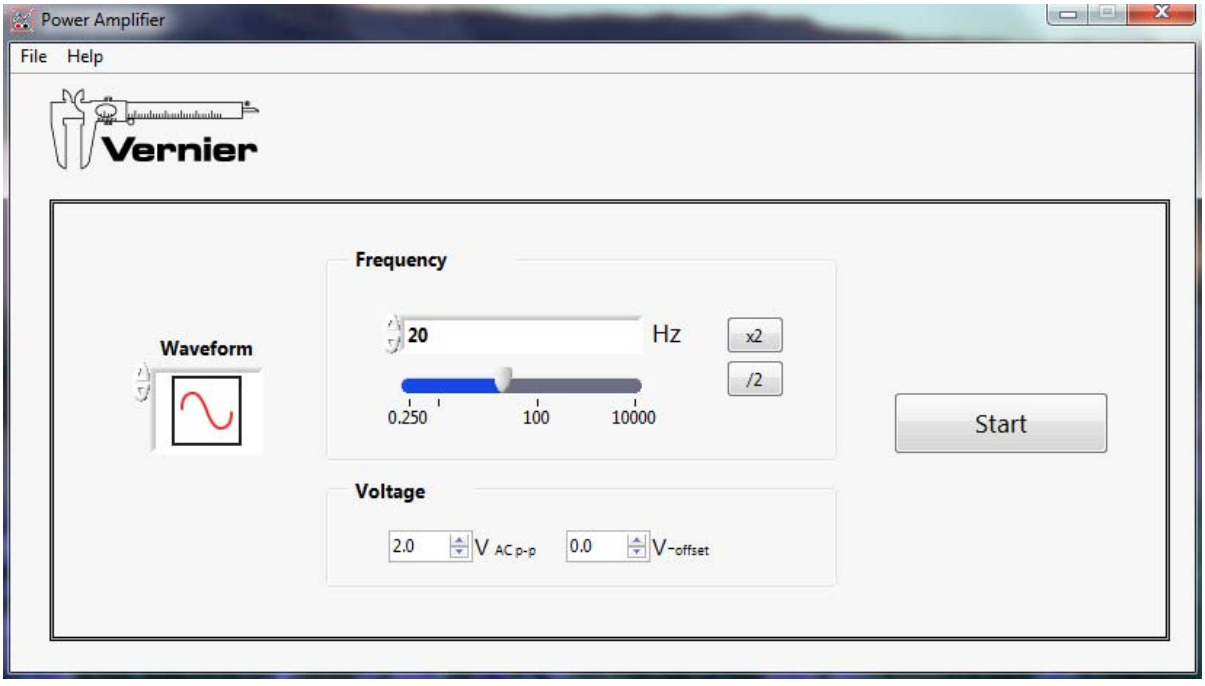
The computer's sound card should be capable of outputting stereo as the program makes use of both channels. The left channel outputs AC signals. The right channel produces a PWM signal to control the DC offset. The balance between the two channels should be at 50%. If your sound card allows you to adjust the separation between the right and left channels, set it for maximum separation.

Set the computer's volume to maximum and unmute the audio output.

These programs will not run on a Mac with a PowerPC processor. LabVIEW does not support those computers.

FEATURES AND OPERATION –Power Amplifier Program

When the program opens, the control panel of the function generator appears with the output off as shown below. The start button starts the signal output. Click the same button again to turn the output off.



Voltage: The program allows an output voltage range of -10 volts to 10 volts, the range the Power Amplifier covers. Adjust the voltage by typing in the number into the V AC or V –offset window, depending on the output mode. The AC output is measured in peak to peak units. The

program will produce an AC signal on top off a DC offset by setting the appropriate values into their respective values. If only a DC signal is desired select the DC Output from the Signals selector control as shown below.

Sine Square Triangle Ramp up Ramp down DC offset

Signals: The program is can create the following AC signals: sine, triangle, square, and saw. The program can also create a DC output. Change between these output signals using the selector control “Waveform,” located on the left of the front panel.

Frequency: The program is capable of outputting frequencies ranging from .25 Hz to 10000 Hz. The particular sound card in your computer may not produce signals at the ends of this range. Select the output frequency by either typing it into the Frequency box or using the blue slider. One Hertz adjustments to the frequency can be achieved by using the up and down arrows next to the Frequency box. The program is also capable of doubling or halving the current frequency. Use the “x2” and “/2” buttons to achieve the corresponding effect.

Note on Amplitudes

The program is calibrated for one of the common sound cards. This calibration is only approximate. The sound card in your computer may not produce the same signal level when set at maximum volume. So you may see different output levels and those levels may vary with frequency. For many applications this is not an issue. If your application is sensitive to the exact amplitude of the signal then you will need to calibrate it using LoggerPro with one of the Vernier interfaces, or using an oscilloscope.