Simulated Signal from a Frequency Generator

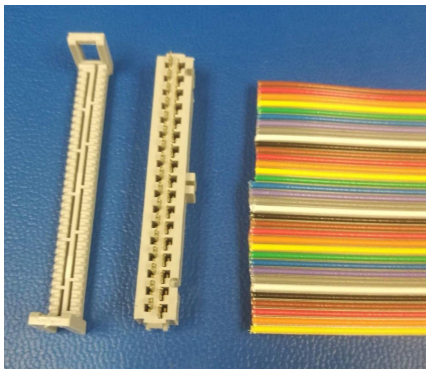
Hardware used:

- NI USB-6009 OEM
- Any computer running LabVIEW
- Agilent 33600A Waveform Generator
- Circuit Board
- Ribbon Cable
- USB to Serial Adaptor
- USB A to B Printer Cable
- Loose Wire
- Coaxial Cable to Alligator Clips
- Wire Strippers
- Knife/boxcutter

Setup

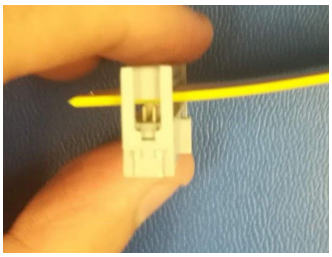
USB-6009 OEM Hardware

Start by obtaining the USB-6009 OEM IDC Socket with 34 contacts, and at least 5 inches (12 cm) of ribbon cable, cut to 34 individual wires.

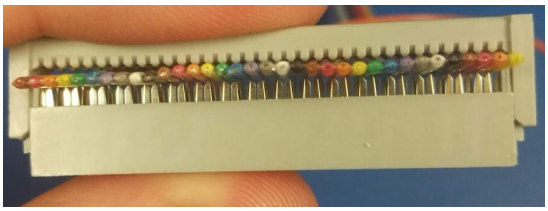


To connect the ribbon cable and the IDC Socket, you will need something similar to the vice grip shown to the right.

Take the ribbon cable and sandwich it between the socket and the stress relief.

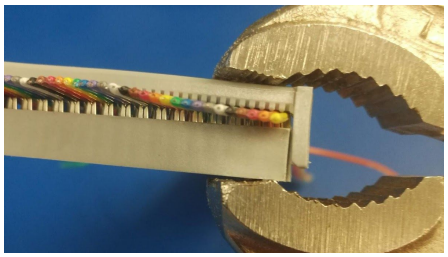


ATTENTION: Wear some sort of eye protection when connecting the the ribbon cable to the IDC socket, as the stress relief may break.

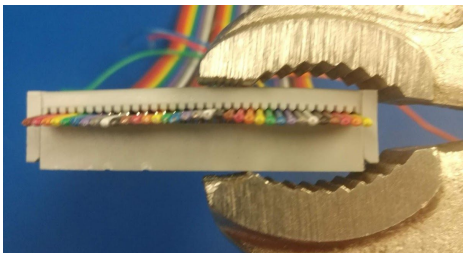


ATTENTION: Make sure that each wire has a corresponding connection before starting the next process.

ATTENTION: Ensure that the notch is pointing in the same direction as your ribbon cables. If it is not, you will have to start over. The notch is circled in the image below.



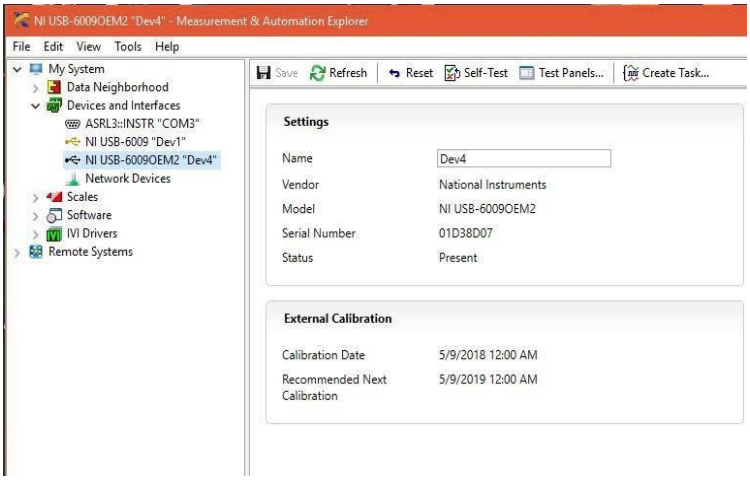
Start on the edges, and with force, clamp the stress relief down with the vice grip. Continue to clamp the stress relief down, making sure the top is level, and every connection is established. When complete, as shown, there are no visible copper connectors. Carefully insert the IDC socket into your USB-6009.



The image to the left shows the ribbon cable successfully added to the IDC socket. Notice that there are no visual connectors.

USB-6009 OEM Software

Plug the USB-6009 OEM into your computer via the USB A to B cable. An NI Device Monitor should open. Close this window, and open NI MAX. Under “Devices and Interfaces” find your device and click Create Task... Select Acquire Signals → Analog Input → Voltage.
Now you must select which port you want to use. Look at http://www.ni.com/pdf/manuals/371728b.pdf for more info. about what each port does. Choose any of the ports, and record/ make sure you can remember which port you chose.



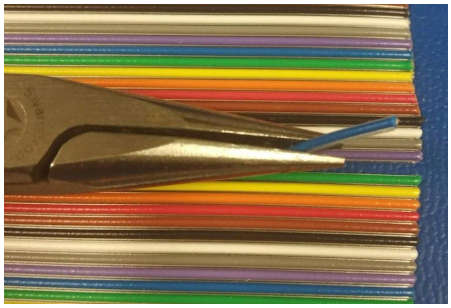
Waveform Generator Connections

As stated above, we used an Agilent 33600A Waveform Generator to create simulated signals, but any function generator should do. Begin by getting a coaxial cable with alligator clips and plug it into the generator. Use the figure below to identify which port and cable is associated with the port you chose above. For example, if you chose AI 2, your wire would be number 7. When counting the wires, start from the bottom and count up. As noted to the right, grounds are pins 3,4,13, and 14.

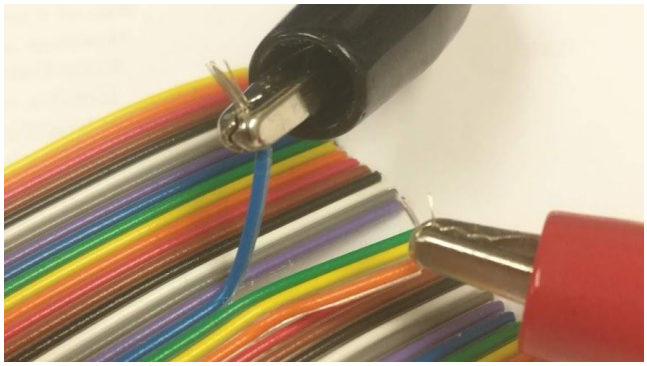
+5 V	34	33	PFI 0
D GND	32	31	P1.3
P1.2	30	29	P1.1
P1.0	28	27	P0.7
P0.6	26	25	P0.5
P0.4	24	23	P0.3
P0.2	22	21	P0.1
P0.0	20	19	D GND
LED	18	17	D+
VBUS	16	15	D–
AI GND	14	13	AI GND
AI 4 (AI 0–)	12	11	AI 0 (AI 0+)
AI 5 (AI 1–)	10	9	AI 1 (AI 1+)
AI 6 (AI 2–)	8	7	AI 2 (AI 2+)
AI 7 (AI 3–)	6	5	AI 3 (AI 3+)
AI GND	4	3	AI GND
AO 1	2	1	AO 0

ATTENTION: Consider putting down paper, or some sort of shield between the knife and whatever surface you are cutting on, as to not damage your surface.

Once you have identified the wires you need, use a knife to cut the wires free as shown to the right.



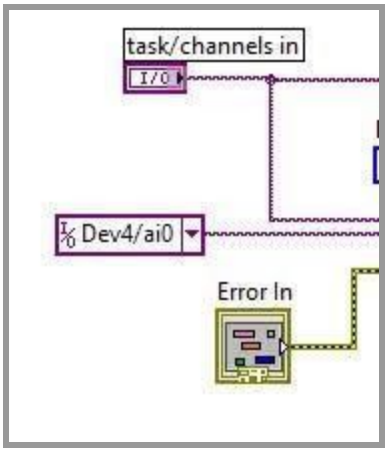
You only need an inch (couple centimeters) of wire, enough to use wire strippers and pliers. Once the wire is free, in one hand use a set of pliers to grip and hold the wire steady. In the other hand, use wire strippers to strip the wires. Once both your AI pin and ground pin are stripped, use the alligator clips to connect the Waveform Generator to the USB-6009.



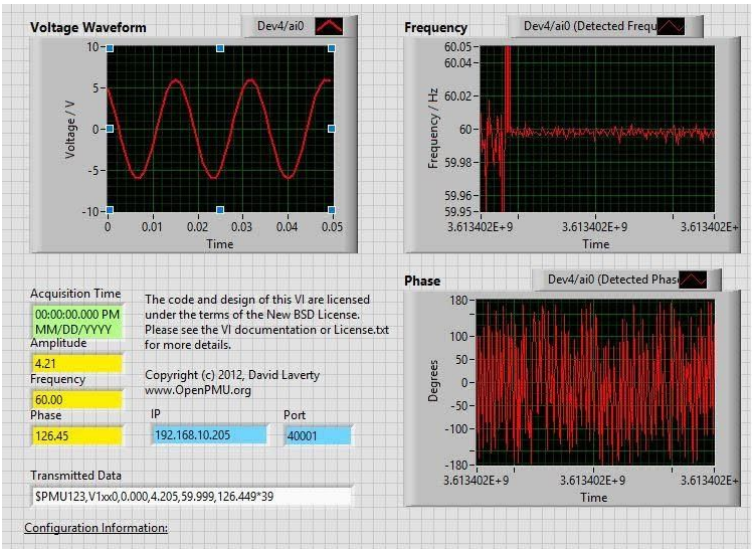
Testing

Now that the Waveform Generator is connected to the USB-6009, and thus your computer, open NI MAX. Under Data Neighborhood → NI-DAQmx Tasks → Your Task In the Configuration window, set the Acquisition Mode to Continuous Samples. Set your graphic representation to Graph. Click Run, to first see background noise. On your Function Generator, set the Frequency to around 5 Hz, and the Amplitude to 1 V. While NI MAX is running, turn the Function on. You should observe the function. Mess around with Amplitude and Frequency values on the Function Generator, and the Samples to Read and Rate (Hz) values in NI MAX.

Connecting to LabVIEW



Once you've verified that NI MAX can read the functions generated, open LabVIEW, and the VI 00 Main Simulated Signal. Navigate to the Block Diagram, and open the VI 14 Function Generator Signal. Open the Block Diagram, and change the DAQmx Physical Channel to whatever port you chose. Leave everything else unchanged. Set the Function Generator Frequency to 60 Hz and the Amplitude to 7 Volts. Run 00 Main Simulated Signal. You should see your function through the output graphs in 00 Main Simulated Signal. Change the Frequency and Amplitude values on the Function Generator and see how it changes in LabVIEW.



2 or 3 Signals

If you would like to use the VI 00 Main (triple phase) you will have to complete the hardware setup as above, except with 2 or 3 signals. The means stripping the wires, connecting the USB-6009 to the Function Generator, and setting up the signal processing in NI MAX. Once you have completed those steps, ensure that you are receiving all signals in NI MAX, and open 00 Main Three Phase. When running the VI you should see similar outputs to that of the single phase signal.