A. INSTRUMENTATION SET-UP FOR P2 & P3

1. Make sure the PC and all instruments (a *signal conditioner, a DAQ & a Power Amplifier* units) are connected to each other and to power sources, as shown in Figures 1 to 3.

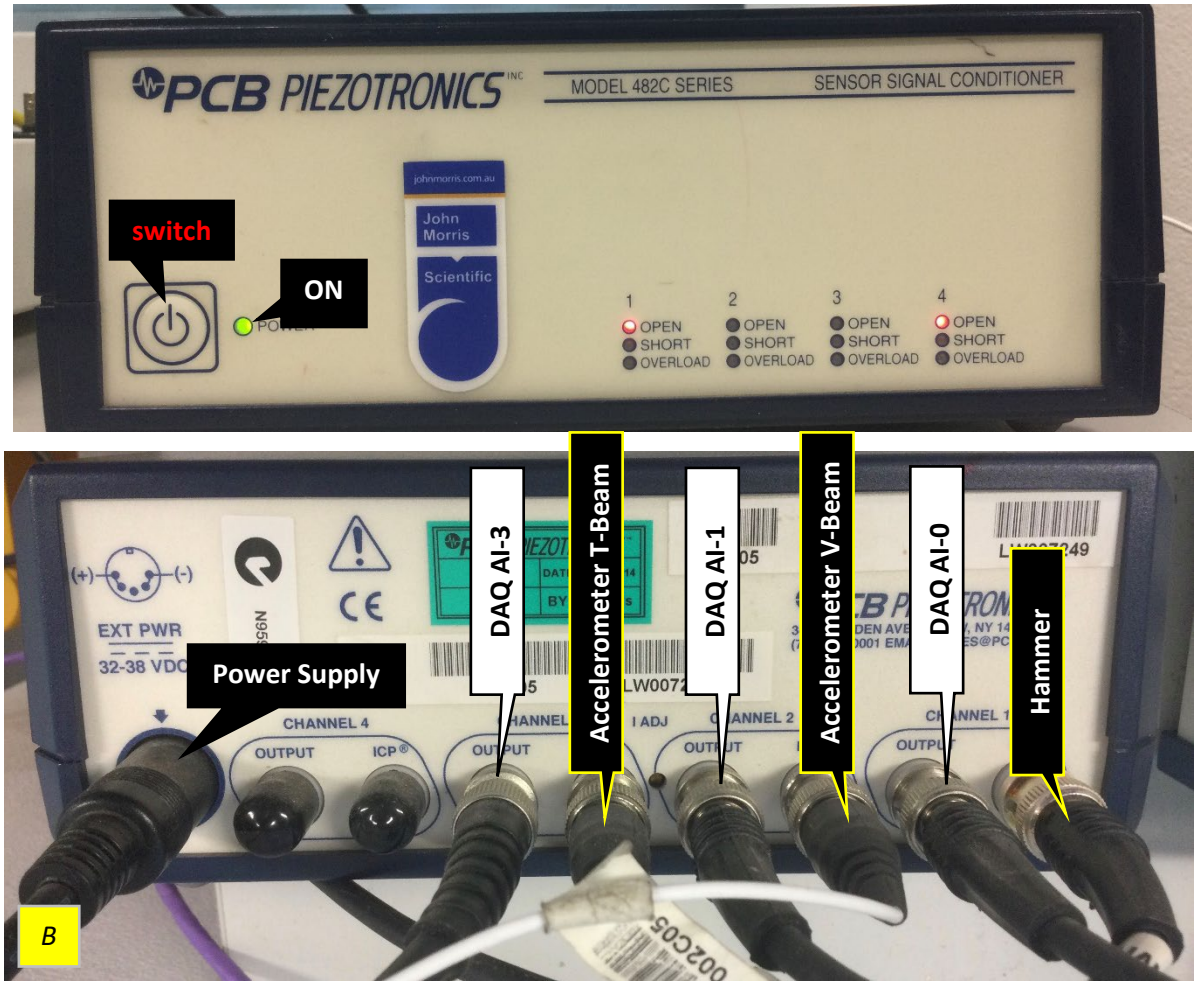

Fig. 1. Sensor Signal Conditioners (4-channels) (A) Front and (B) Rear faces

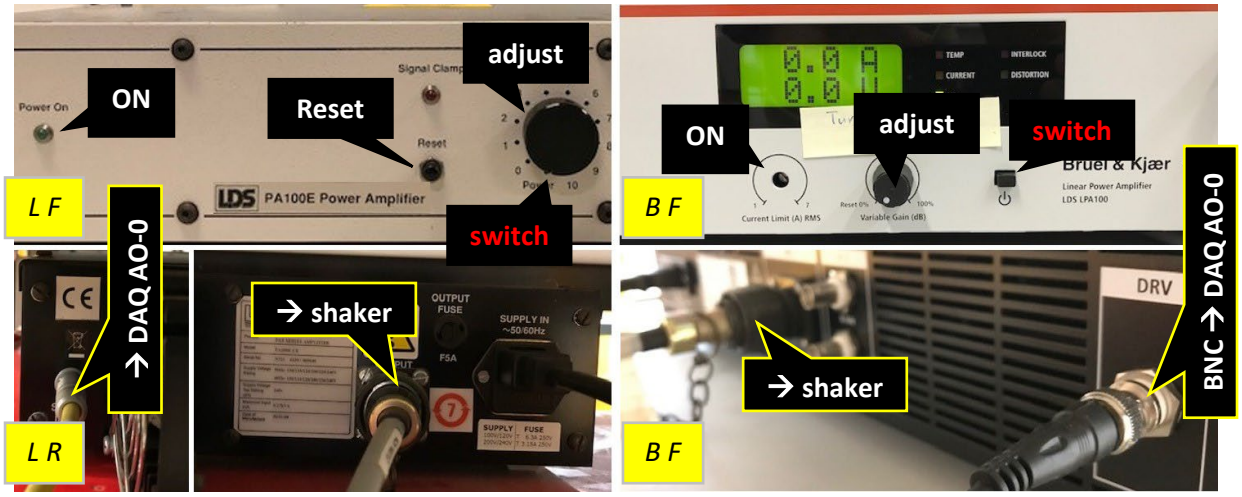

Fig. 2. Power Amplifiers of an **LDS** (LF) Front, (LR) Rear, ***or*** a **B&K** (BF) Front and (BR) Rear panels

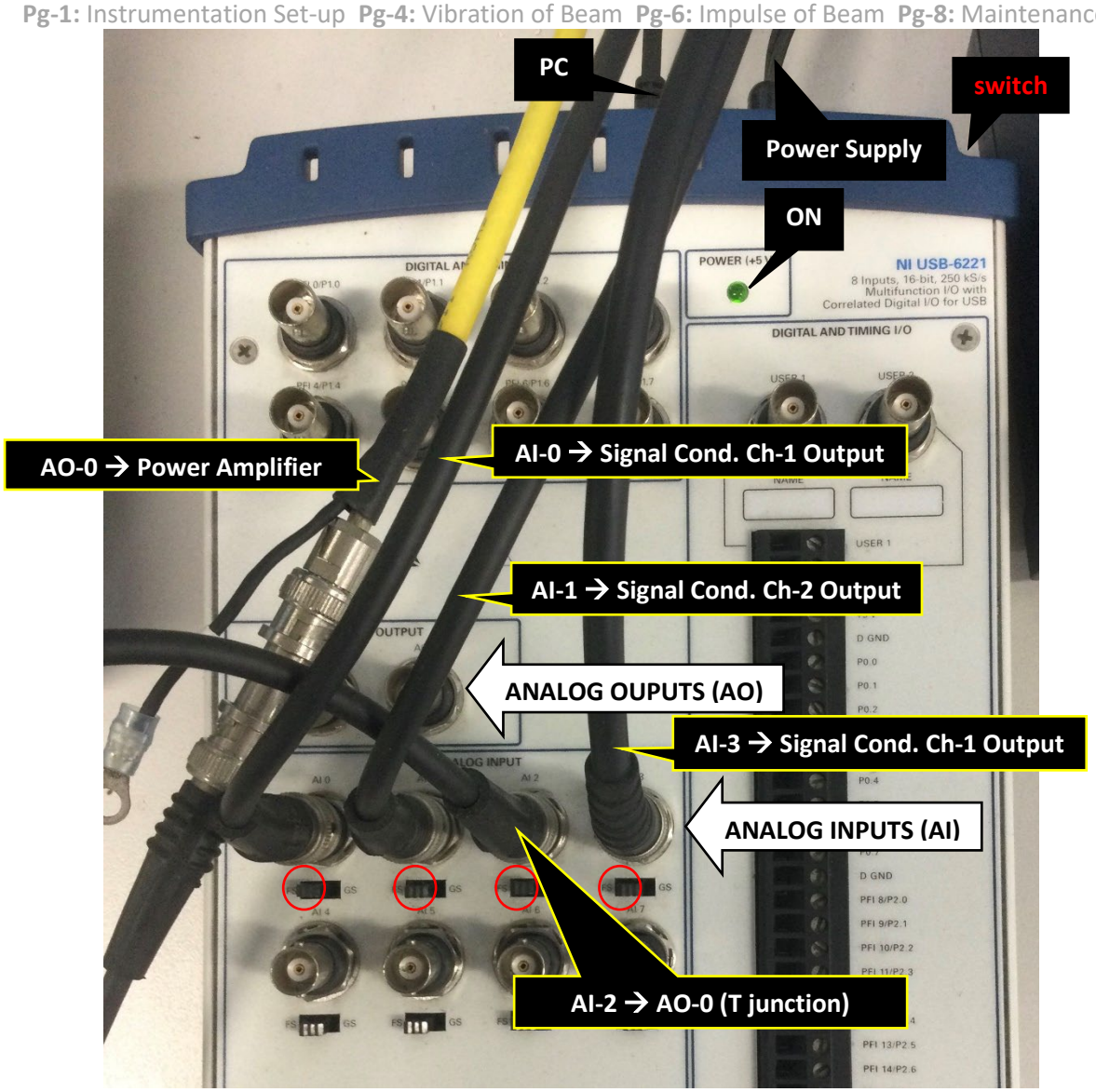

Fig. 3. NI DAQ Multi-Channels (*AO*: Analog Output; *AI*: Analog Input)

2. Test Analog Inputs of the detected NI-DAQ device when the Figure 4 is on the PC's desktop.

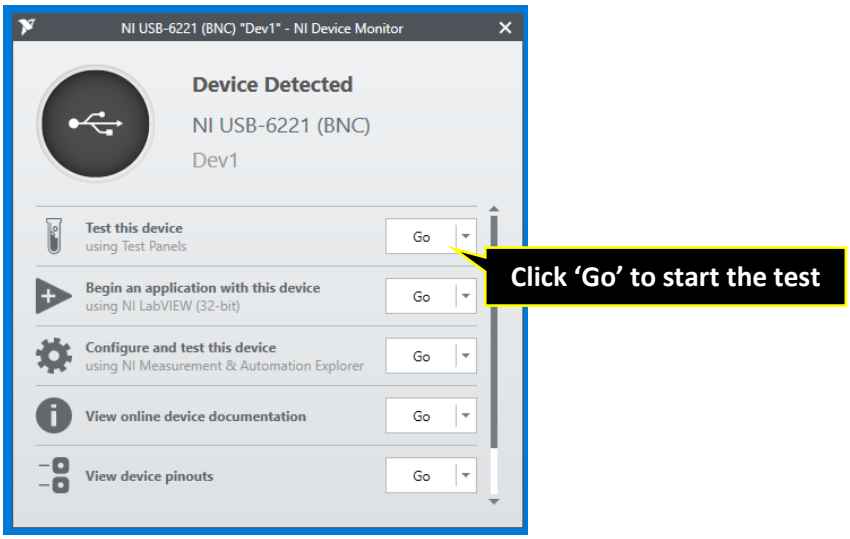

Fig. 4. A pop-up window on the PC Desktop showing the DAQ is detected

3. Otherwise, the test can be done through NI Max, by following steps shown in the Figure 5.

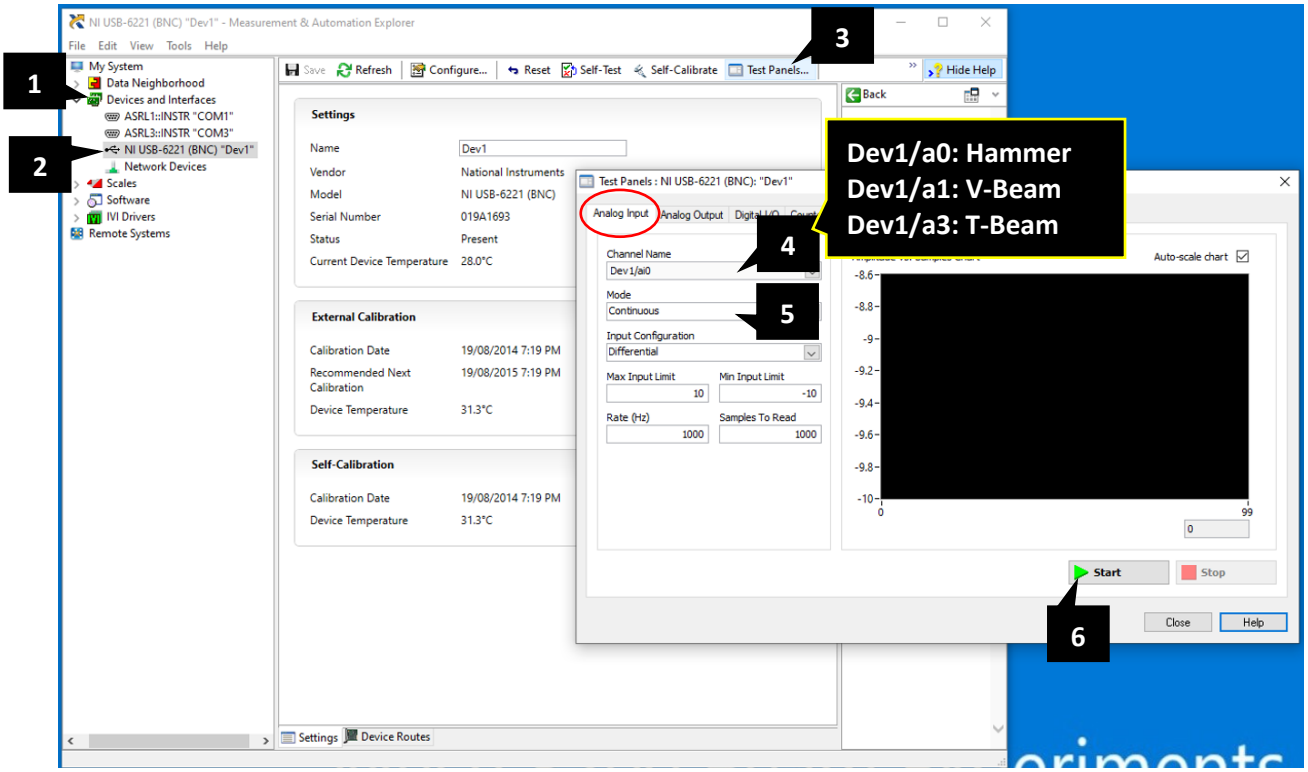

Fig. 5. Activate the Analog Output tests through NI MAX

4. Click 'Start' (step 6 in Fig. 5) and apply a light tap on the apparatus related to the Analog Input sensors, and Figure 6 shows 'PASS' results of these tests.

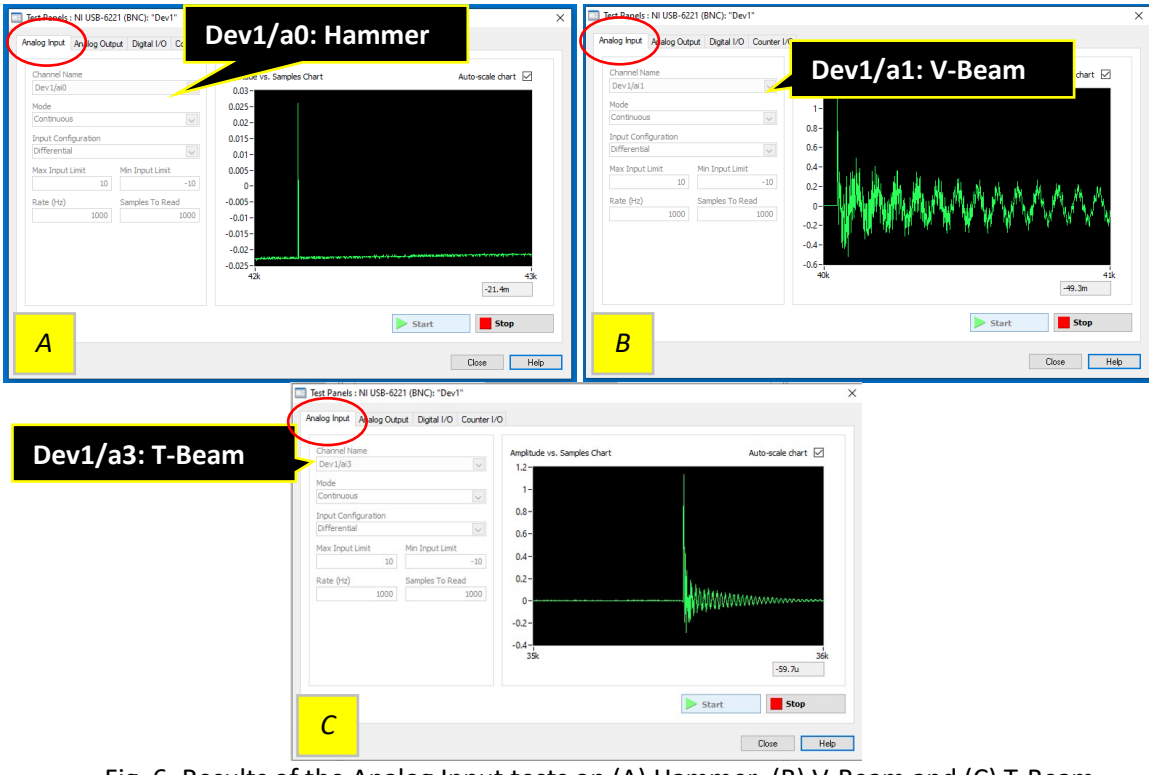

Fig. 6. Results of the Analog Input tests on (A) Hammer, (B) V-Beam and (C) T-Beam

B. VIBRATION OF BEAM (P2)

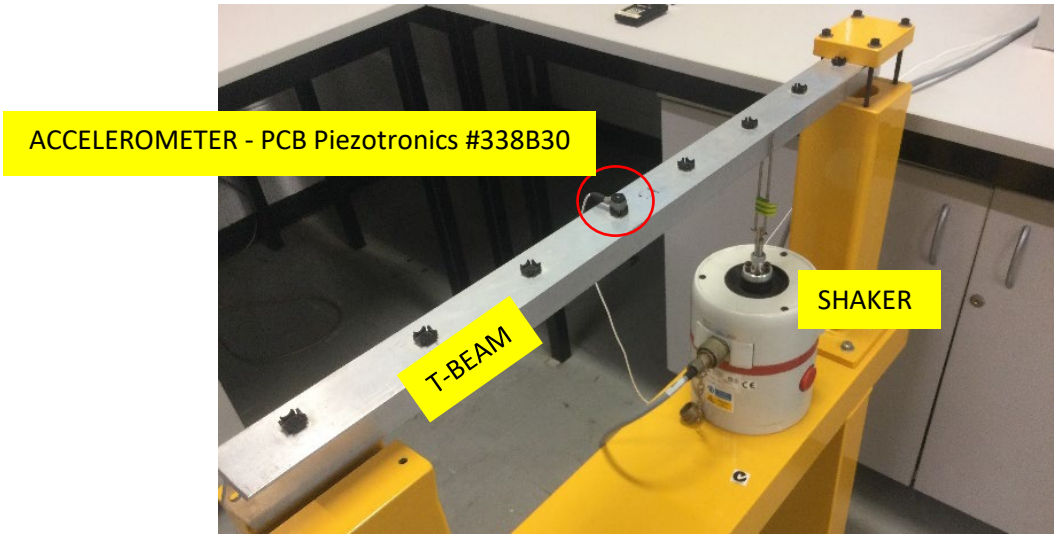

Fig. 7. The Vibration Rig Layout

PC and LabVIEW set-up

1. On the PC's Desktop, Right-click ❶ icon of the "MECH3200 Prac2 VG4R1" and ❷"Run as Administration", as shown in Figure 8.

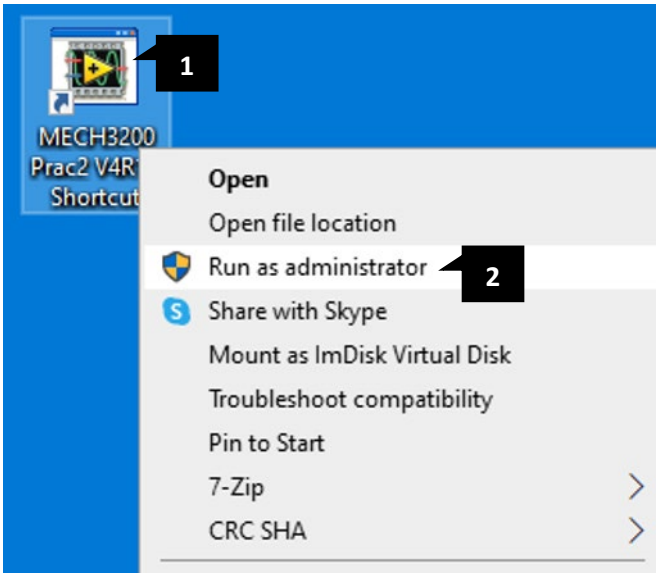

Fig. 8. Run the LabView file as an administration

2. When a window of "Swept Sine" pops-up, create a new test file on the current active window, and click "OK". You also can overwrite an old test file if it is not needed.
3. Click "Getting Started" tab, and go to "Source Setting" mini-tab at the bottom of the window, to set as the enclosed:

Start Frequency: **50**	Stop Frequency: **20,000**	Number of Steps: **1,000**

4. Turn all instruments ON (refer to 'switch' in Figures 1, 2 and 3) and make sure the respected pilot light turns Green.
5. If the "**LDS** PA1000E Power Amplifier" is used, press the 'Reset' button on the front panel, as shown in Figure 2-LF.
6. Run the test by clicking the arrow button on the "Swept Sine" window (Figure 9), and adjust the power using the dial on the front panel of the power amplifier to set a parameter.

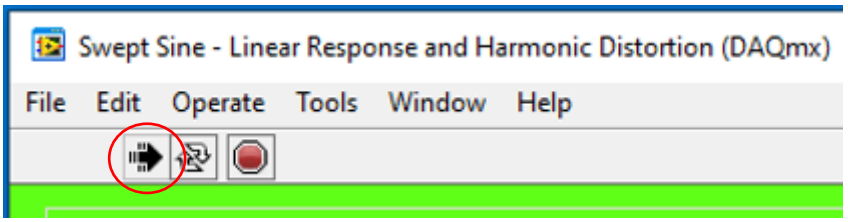

Fig. 9. A button to start the test

7. Click each tab to view the response of the set parameter, as shown in Figure 10 for "Time Domain" tab.

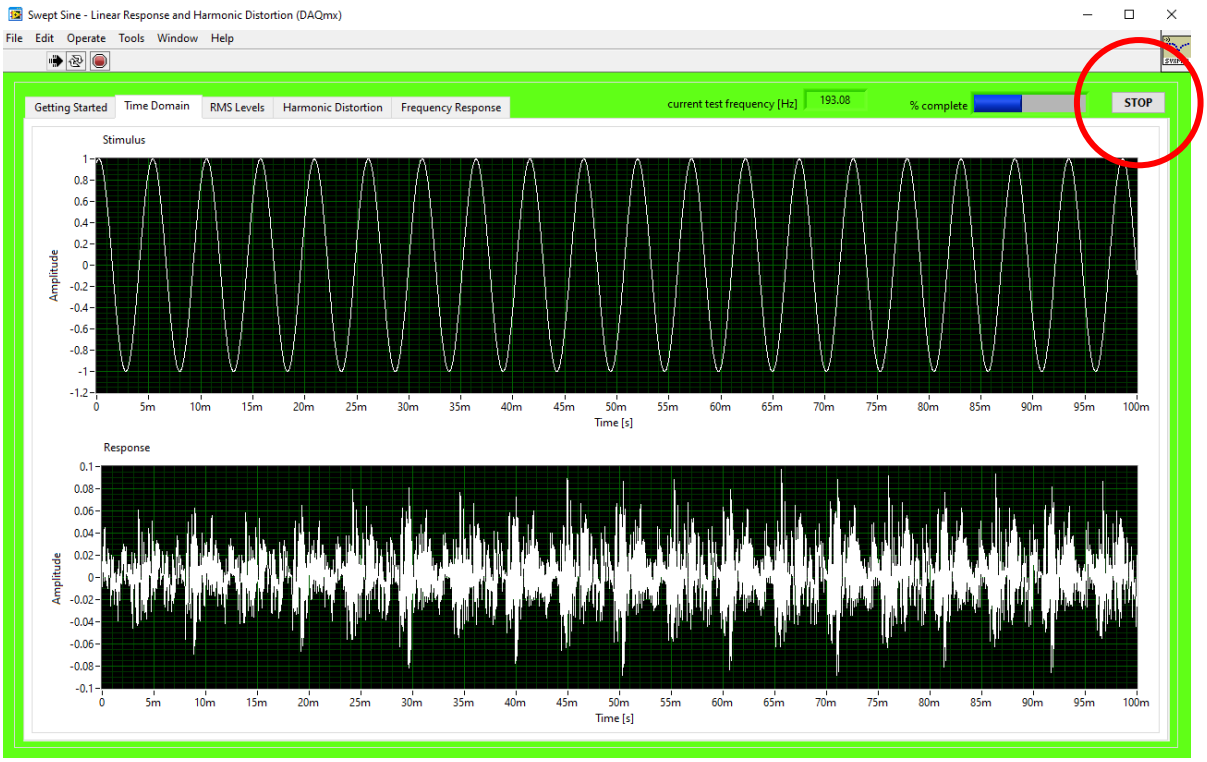

Fig. 10. A typical Time-Amplitude results of "Time Domain" tab

8. Click "Stop" button (circled in Figure 10) to end the experiment.

C. IMPULSE OF BEAM (P3)

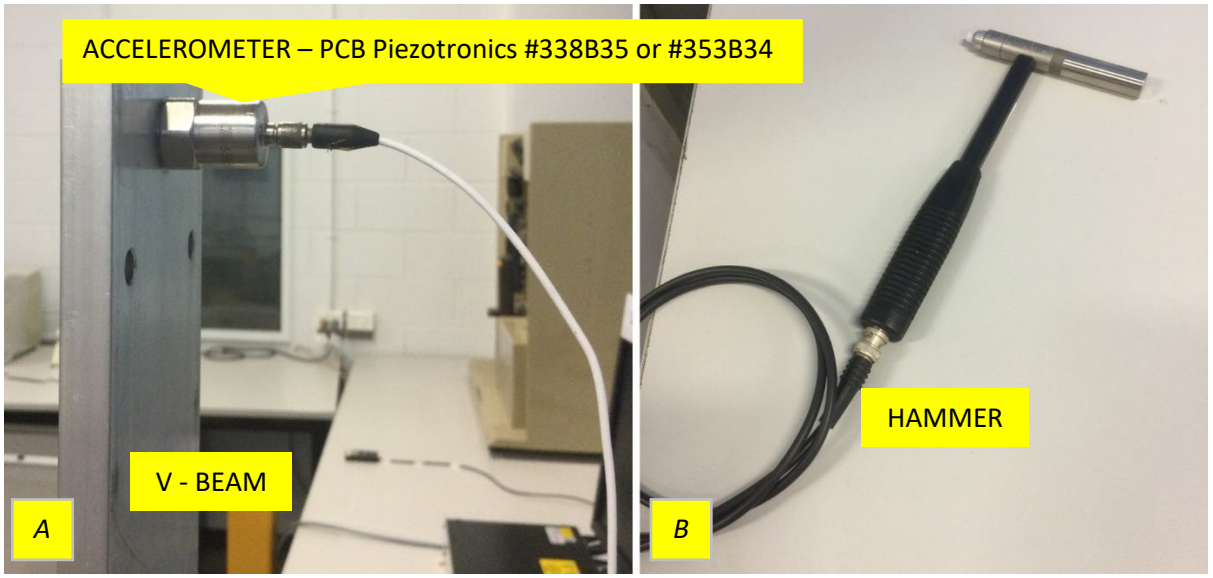

Fig. 11. The Impulse of a Vertical Beam set up (A) and connected hammer (B)

PC and LabVIEW set-up

1. Hand-tight a stud (10-32 UNF-2A to 10-32 UNF-2A PCB Piezotronics part #081B05) onto an Accelerometer (PCB Piezotronics part #338B35 or #353B34) using a flat-head screwdriver.
2. Attach the accelerometer to the back side of the V-beam, and hand-tight it (by hand)
3. Install a sensor cable (PCB Piezotronics part #FCB002C10) by screwing the microdot end of cable to the accelerometer, and hand-tight the connection, as shown in Figure 11 (A).
4. Connect the BNC end of the cable to a hammer, as shown in Figure 11 (B).
5. Open two Matlab scripts (❶ *MECH3200_EXP3_R2012a.m* and ❷ *MECH3200 EXP3 FOURIER_R2012.m*) and arrange them side-by-side.

Assure the V-Beam is stationary prior to tapping it with hammer

6. Successively RUN the ❶ *MECH3200_EXP3_R2012a.m* script and tap the hammer **once** on the front side of the V-Beam near where the accelerometer is located.

Avoid multi-taps, assure you only tap the beam ONCE

7. And wait...
8. Figure 12 shows examples of results of single-tap and multiple-taps.

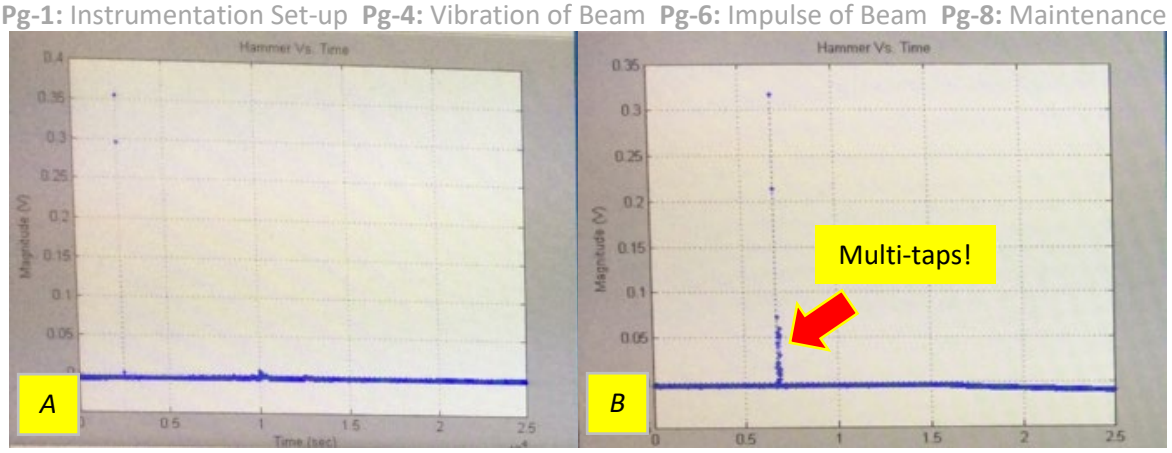

Fig. 12. Examples of plotted results of (A) a single-tap and (B) a multiple-taps

9. Go to Matlab and RUN ❷ *MECH3200 EXP3 FOURIER_R2012.m*, and wait until two or five plots of *FOURIER* results are appeared, as shown in Figure 13.
10. **NOTE**: These plots A-E in Figure 13 are resulted from a multi-taps, thus, can't be used as reference for good-results.

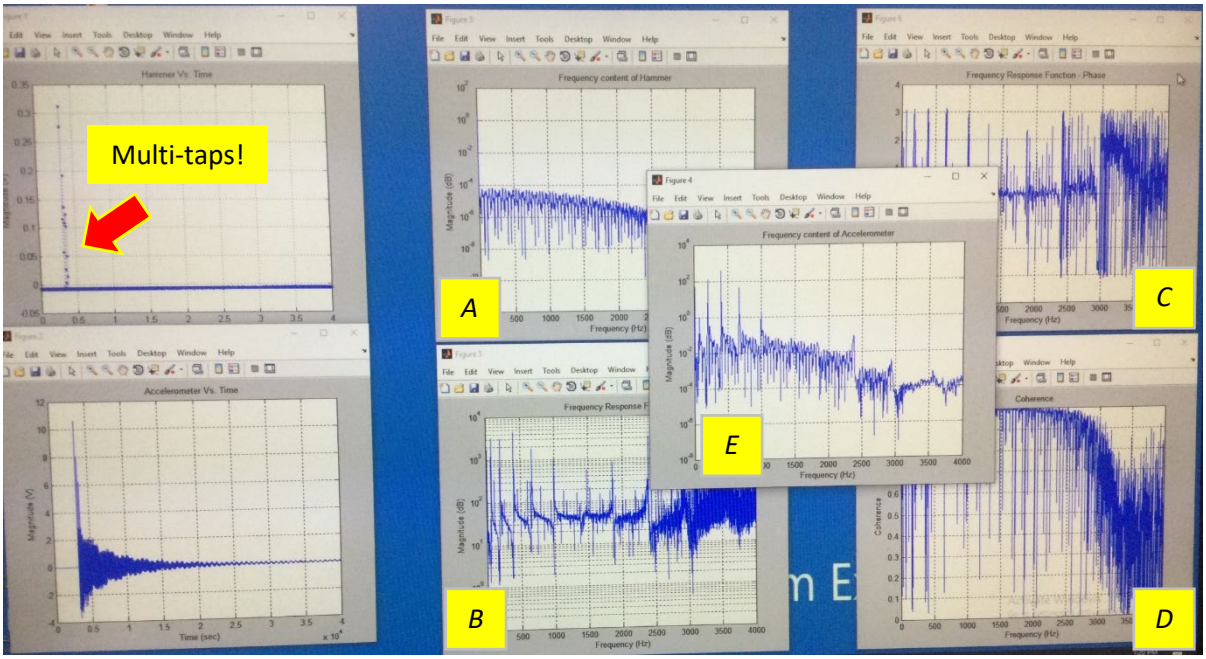

Fig. 13. An example of plotted *FOURIER* results from a multi-taps tapping (!)

Detach the sensor cable first from the accelerometer before unscrew the accelerometer from the V-Bar

Hold the rubber seal on the microdot when screw the cable onto the accelerometer

D. MAINTENANCE & REPAIR

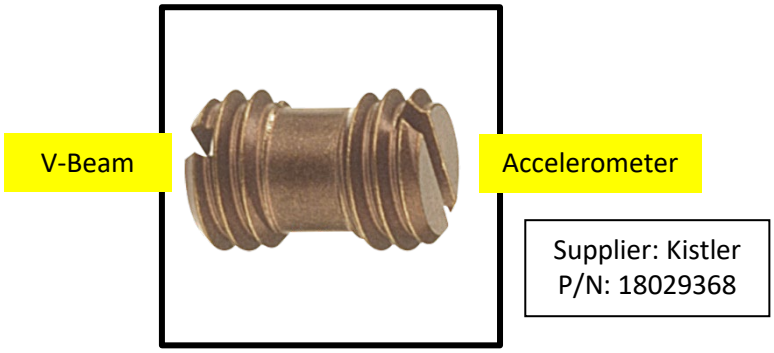

Fig. 14. Mounting Stud, 10-32 UNF to 10-32 UNF, Type 8402

V-Beam (F) Thread Maintenance

1. Cleaning up four (F) threads due to burrs or a bit of corrosion to be perform before the Semester is started, and as part of this prac's setup.

Use a Chaser Taps is preferable than a Cutting Tap

2. Clean all four threads on a V-Beam (and the Accelerometer if needed) using cotton bud that was dipped in Acetone to remove any loose dirt, rust scale, grease, or other contaminant.
3. Run slowly (*to avoid cutting a deformed thread*) a 10-31 UNF Thread-Tap on each hole to check and to remove dirt and oxidation on the surface of thread.
4. Re-check by screw an assembled Accelerometer-Mounting-Stud to each thread.
5. Use a thread repair kit (*helicoil*) if cleaning the thread would not fixed the assembled Accelerometer-Mounting-Stud to the V-Beam.

E N D