ELEC 2120-005
Lab 2 – Introduction to TIMS
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Introduction

The purpose of this lab was to build familiarity with the PC-MODULES CONTROLLER, the PicoScope 6 digital scope to measure signals in lab, as well as with the TIMS S&S SFP software.

Part A

The first part of the lab involves becoming acclimated with the PC-BASED INPUTS module. This involves the 2kHz MESSAGE and 8.3kHz SAMPLE CLOCK master signals. The 2kHz MESSAGE was connected to the Scope ChA. The 8.3kHz SAMPLE CLOCK was connected to ChB. These signals were captured on the PicoScope. After adjusting the scope settings, the signals on ChA & ChB were pictured on the scope shown below in Figure 1.

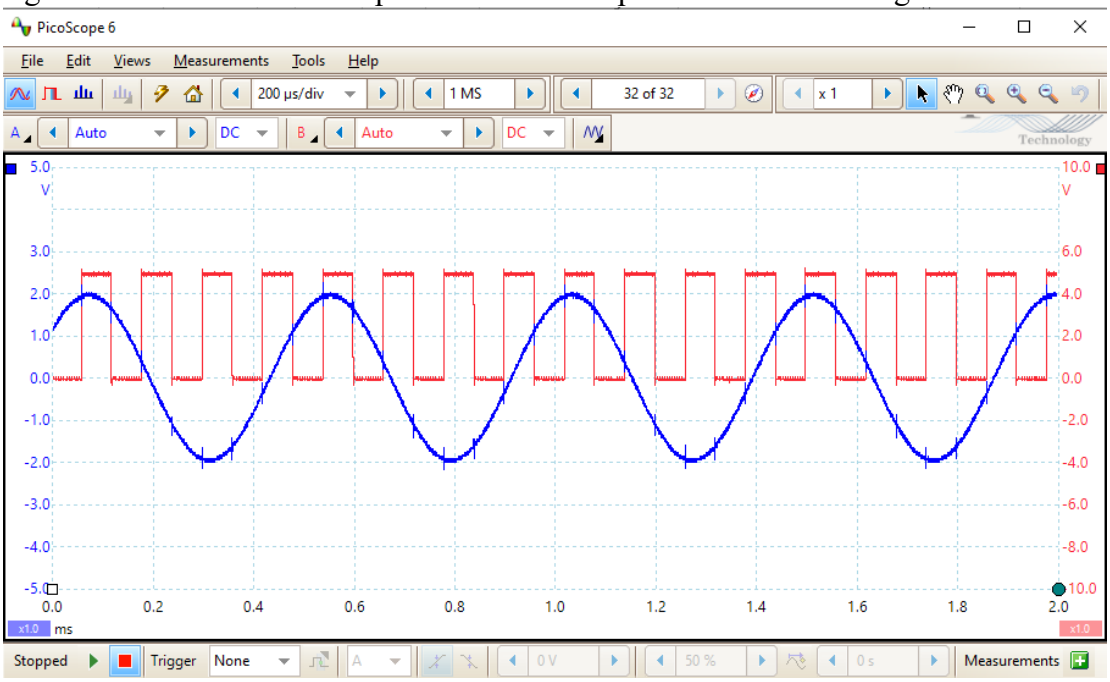

Figure 1. PicoScope output for Part A

The scope settings were then adjusted to show the two signals pictured in Figure 1 in the frequency domain. The spectrum range was changed to 10kHz. This output is shown in Figure 2. Note the blue spike ~2kHz corresponding to the signal on ChA.

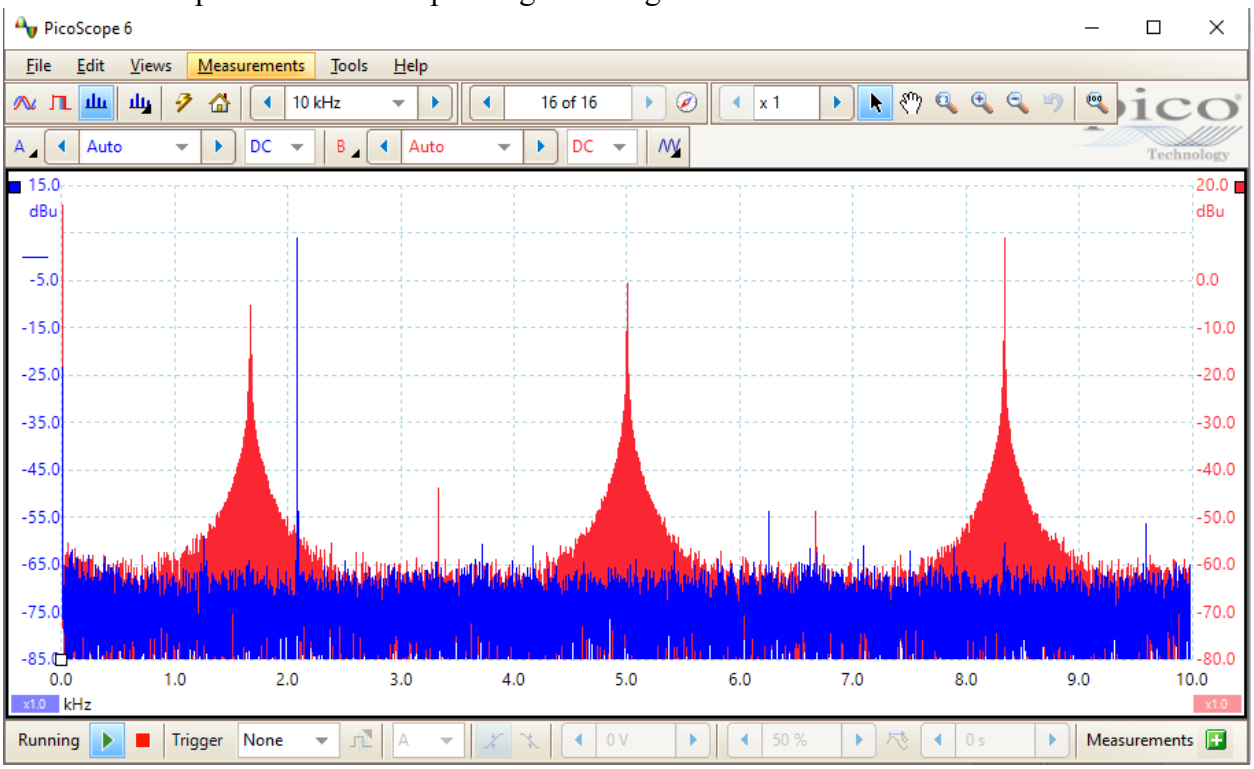

Figure 2. Frequency Domain plot of Signals in Figure 1

Part B

The purpose of Part B is to understand the need for Triggering. The key idea is that triggering stabilizes the signal output, providing a more static picture. When a trigger is set, the instrument scan starts at the same amplitude and phase of the input signal and the output appears more uniform. Without the trigger, the display is jittery and difficult to read.

Part C

Many cases in signals lab require specific signals. The SFP application can generate these signals and send them to the PC-MODULES CONTROLLER as so-called ARB outputs. After hitting LOAD ARB on the SFP display, two signal appear in the ARB viewer window. There is one sinusoidal wave and one square wave. In the ARB viewer shows snapshot at a moment in time. On the Pico display, there is also a square wave and sinusoidal wave, however the signals appear very choppy and erratic as the signal isn't scaled properly. Loading the signal from LAB 2 tab produces only on sinusoidal signal in ARB1 and not signal on ARB2. The signal has a longer wavelength then the one generated by the LAB1 tab. On the Pico display, two sinusoids in phase with one another with the same amplitude can be seen, meaning ARB 1 & 2 were generating the same signal.

Part D

The final part of the lab involves utilizing the TRIPLE ADDER modules. The TRIPLE ADDER was inserted in slot 10. The 2kHz MESSAGE sinusoid goes to input a0 and scope channel ChA. Output A goes to ChB and the ChB scaling was set to +/- 5V. Initially, the gain a0 was set to 1.0. Both signals appear as the same sinusoid. Next, a0 gain was increased to 2.0 and the output signal (ChB) appeared as a sinusoid in phase with the input signal but with double the amplitude. Finally, the 8.3kHz signal was connected to a1 of the TRIPLE ADDER module. On the SFP, a0 gain was set to 1.0 and the a1 gain was set to 0.5. The output of the TRIPLE ADDER module for these inputs is shown below in Figure 3. Note the red signal (ChB) is the output.

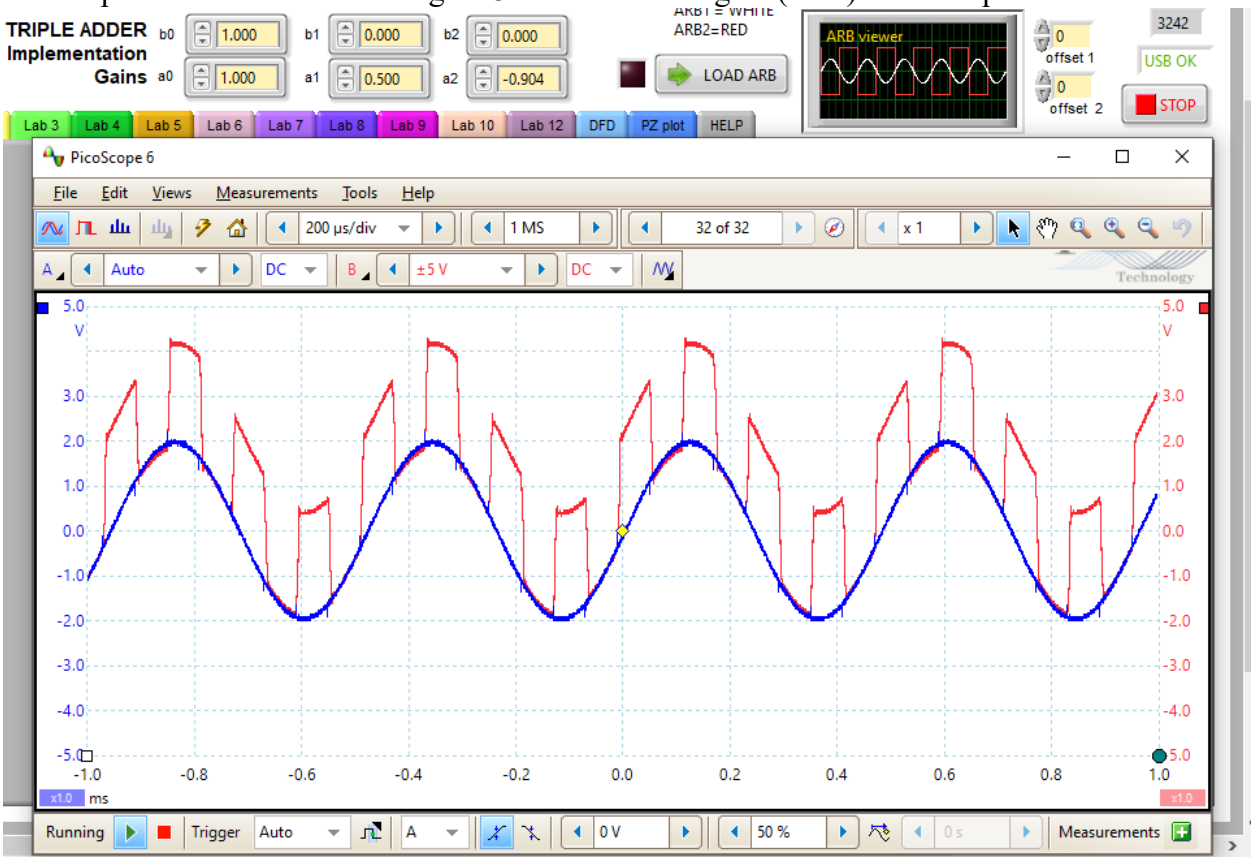

Figure 3. Scope Display and SFP Settings for Triple Adder module

Conclusion

In conclusion, this lab built familiarity with the PC-MODULES CONTROLLER software and PicoScope 6. The lab highlighted the need for triggering to observe a clean output display. This lab also exhibited how a triple adder module could be used to produce an output signal as the sum of two input signals (a sinusoid and square wave).