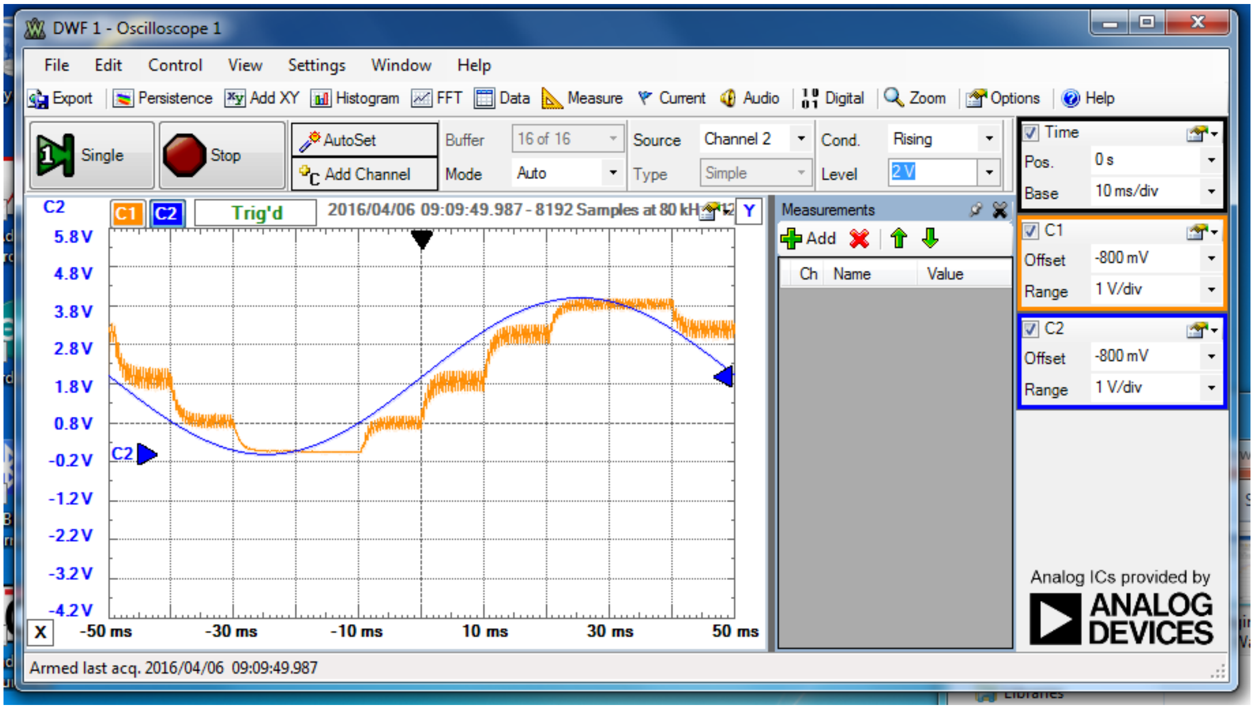
TERRAN BLAKE // ECE 241 // Lab 10 // Wednesday 7:30am



Buffer: 16 of 16
Mode: Auto
Source: Channel 2
Type: Simple
Cond.: Rising
Level: 2 V

☑ Time
Pos.: 0 s
Base: 10 ms/div

☑ C1
Offset: -800 mV
Range: 1 V/div

☑ C2
Offset: -800 mV
Range: 1 V/div

2016/04/06 09:09:49.987 - 8192 Samples at 80 kHz

Armed last acq. 2016/04/06 09:09:49.987

Image 1: Original Sine Wave at 10hz

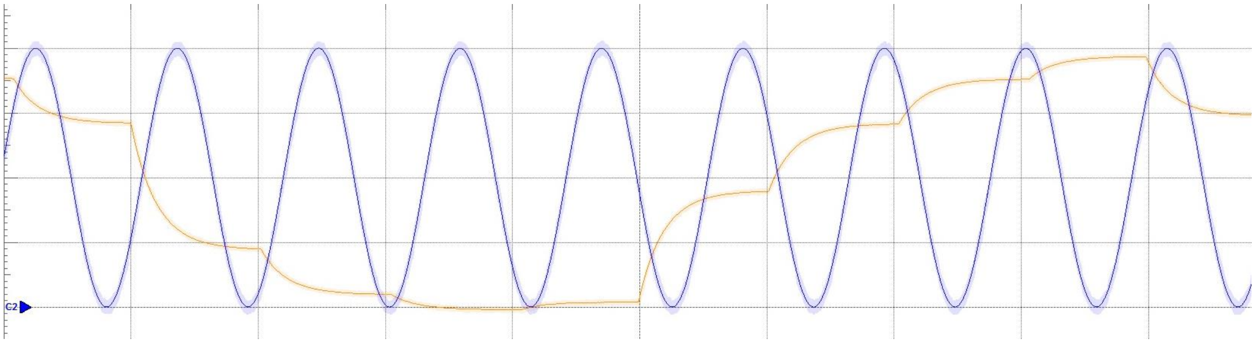
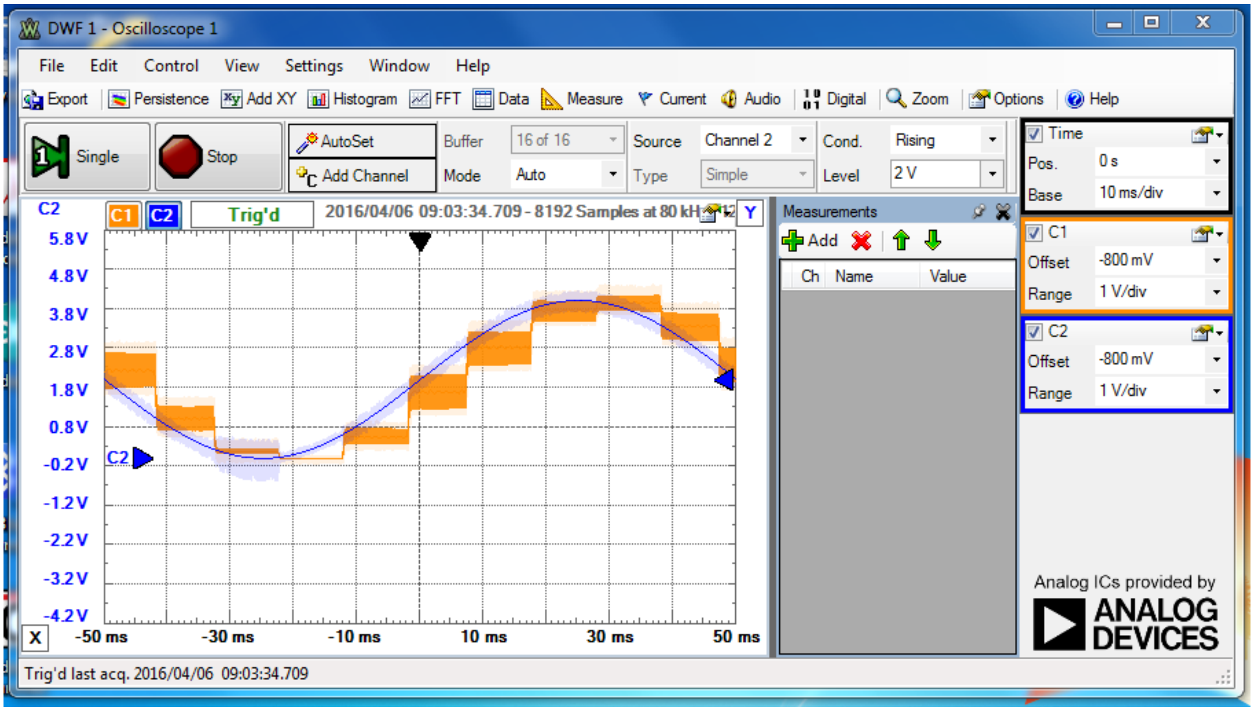


Image 2: Original Sine Wave at 90hz



Buffer 16 of 16
Mode Auto
Source Channel 2
Type Simple
Cond. Rising
Level 2 V

Time
Pos. 0 s
Base 10 ms/div

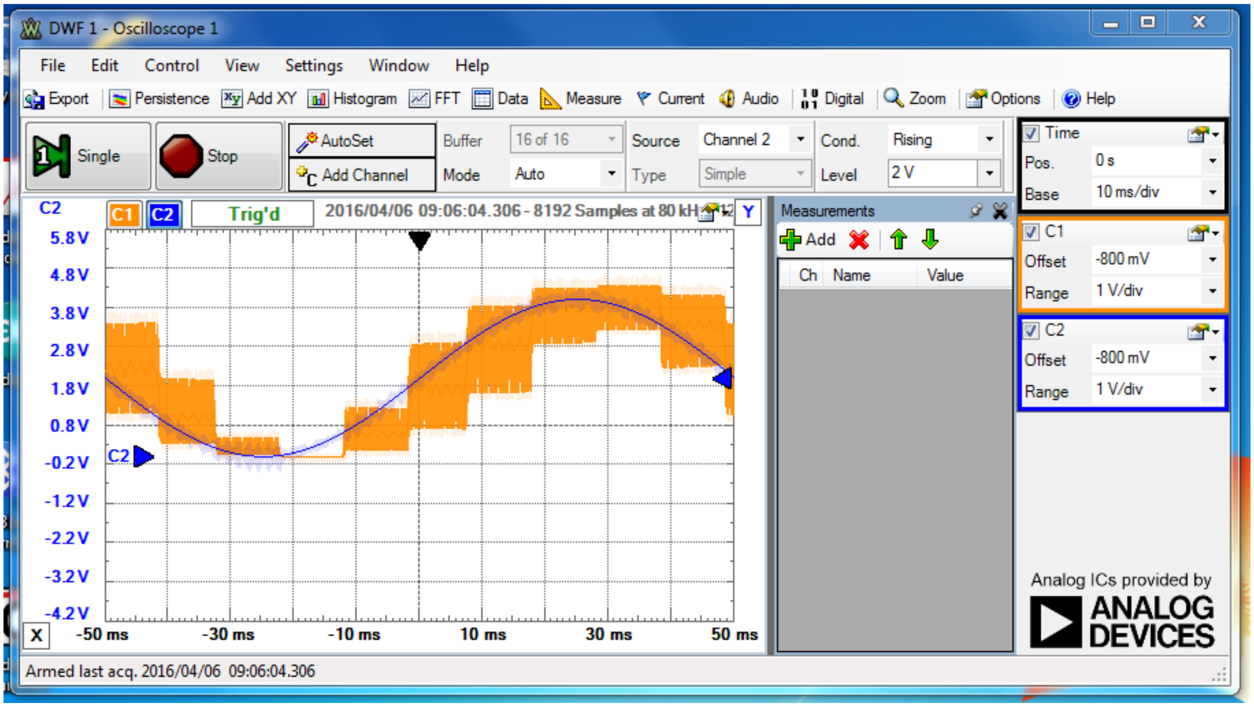
C1
Offset -800 mV
Range 1 V/div

C2
Offset -800 mV
Range 1 V/div

2016/04/06 09:03:34.709 - 8192 Samples at 80 kH

Trig'd last acq. 2016/04/06 09:03:34.709

Image 3: Sine Wave with 0.2uf capacitor and 1k resistor



Buffer 16 of 16
Mode Auto
Source Channel 2
Type Simple
Cond. Rising
Level 2 V

Time
Pos. 0 s
Base 10 ms/div

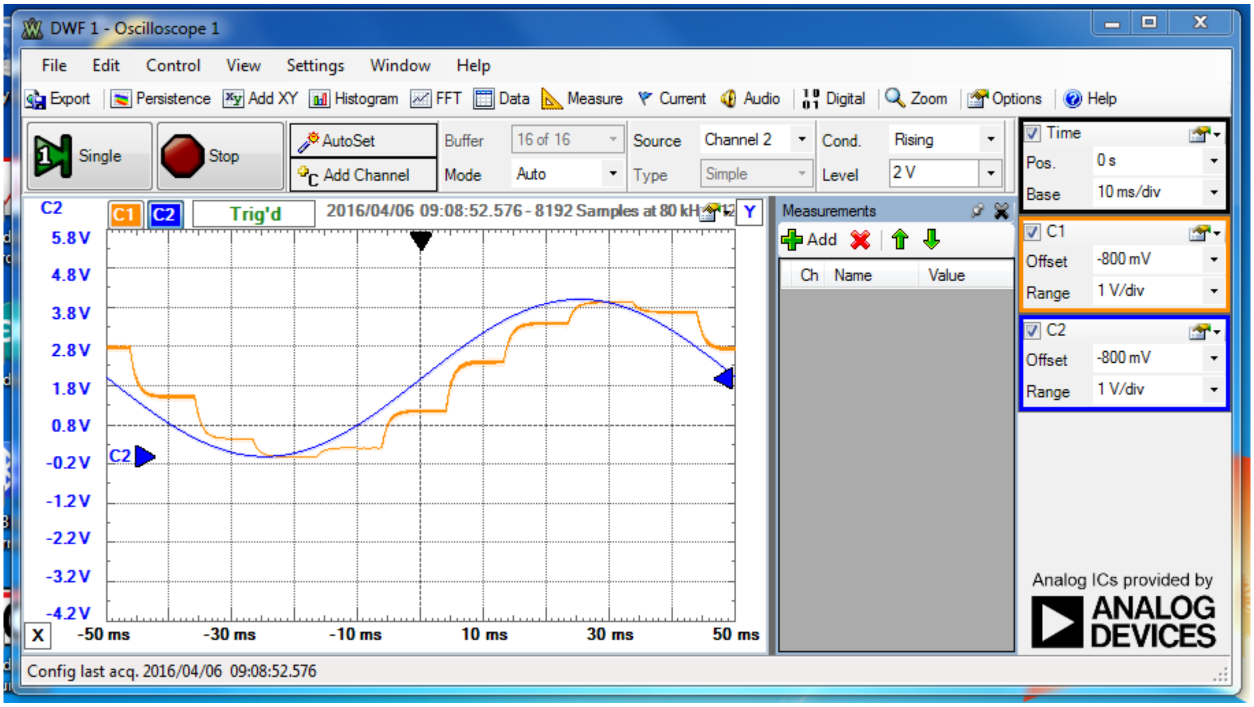
C1
Offset -800 mV
Range 1 V/div

C2
Offset -800 mV
Range 1 V/div

2016/04/06 09:06:04.306 - 8192 Samples at 80 kH

Armed last acq. 2016/04/06 09:06:04.306

Image 4: Sine Wave with PWM of 250 microseconds 10hz



DWF 1 - Oscilloscope 1

Buffer 16 of 16
Mode Auto
Source Channel 2
Type Simple
Cond. Rising
Level 2 V

Trig'd 2016/04/06 09:08:52.576 - 8192 Samples at 80 kHz

Time
Pos. 0 s
Base 10 ms/div

C1
Offset -800 mV
Range 1 V/div

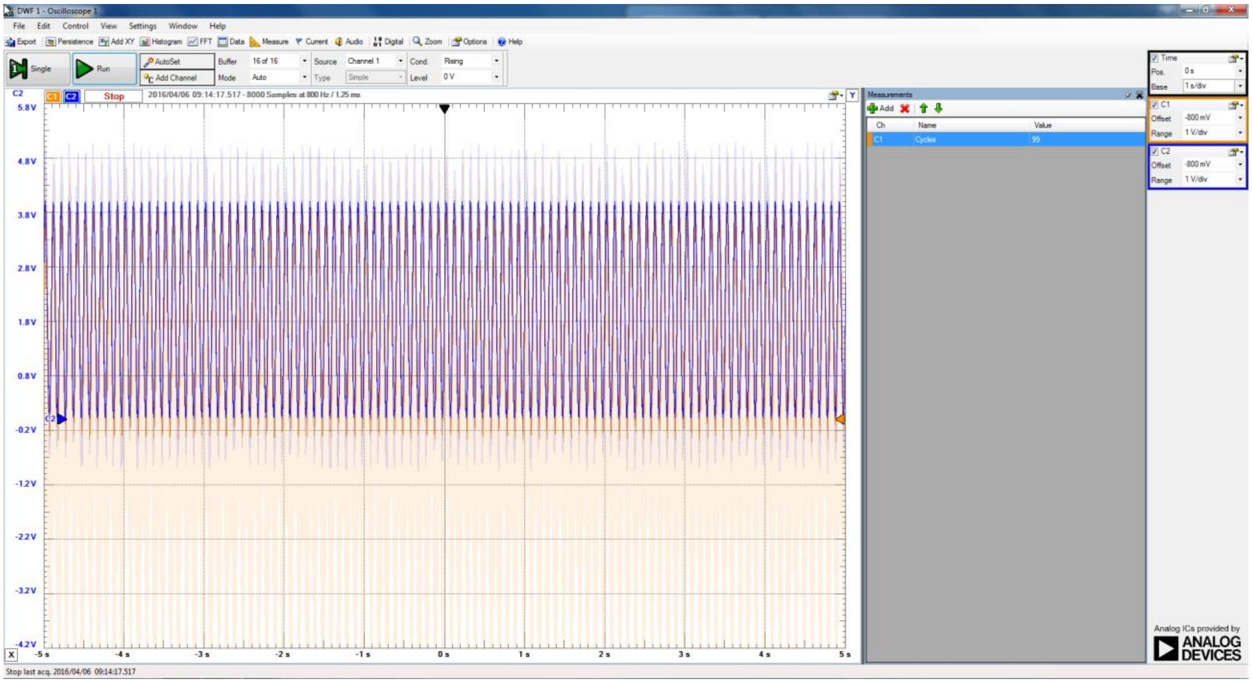
C2
Offset -800 mV
Range 1 V/div

Measurements

Ch	Name	Value

Config last acq. 2016/04/06 09:08:52.576

Image 5: Sine Wave with 10k resistor, 0.1uf capacitor, PWM at 100 microseconds, and a 10hz frequency



DWF 1 - Oscilloscope 1

Buffer 16 of 16
Mode Auto
Source Channel 1
Type Simple
Cond. Rising
Level 0 V

Stop 2016/04/06 09:14:17.517 - 8000 Samples at 800 Hz / 1.25 ms

Time
Pos. 0 s
Base 1 s/div

C1
Offset -800 mV
Range 1 V/div

C2
Offset -800 mV
Range 1 V/div

Measurements

Ch	Name	Value
C1	Cycles	99

Stop last acq. 2016/04/06 09:14:17.517

Image 6: Frequency of signal for Image 5

Questions:

1. The period had the most impact on the “cleanness” of the output waveform, because the Arduino can only process information at a certain rate, which shows when the frequency of the wave is turned up.
2. I achieved a 99 / 10Hz sampling rate, as seen in image 6. So it was very close to what it should have been.

```
#include <TimerOne.h>;

int ledPin = 13; //pin for the led
unsigned long Timer2 = 0;
const long Timer2Interval = 10; //values for the timer
unsigned long currentMillis = millis();
const long DutyCycle = 551; //value for the PWM, has been edited for parts of lab

void setup() {

  pinMode (13,OUTPUT); //pin modes for the reading

  Timer1.initialize(100);
  Timer1.pwm(9, 0, 100);

  // Serial.begin(9600); //was used as a test to check timer
  // Serial.available();

}

void loop() {

  if( millis() - Timer2 > Timer2Interval) { //keeps the program in a 10ms interval

    Timer2 = Timer2 + Timer2Interval;

    bitSet(PORTB,5); //saves the frequency

    Timer1.setPwmDuty(9, analogRead(A0)); //reads the frequency

    bitClear(PORTB,5);

    // Serial.print("hello"); // test for the timer

  }
}
```