ELEC3204

Lab Report 0

Lab Introduction, Safety Requirement, and Microcontrollers

Semester 1, 2023
Session: Thursday 11-14:00

SIDs:
500482164
490429602
470205736

Introduction

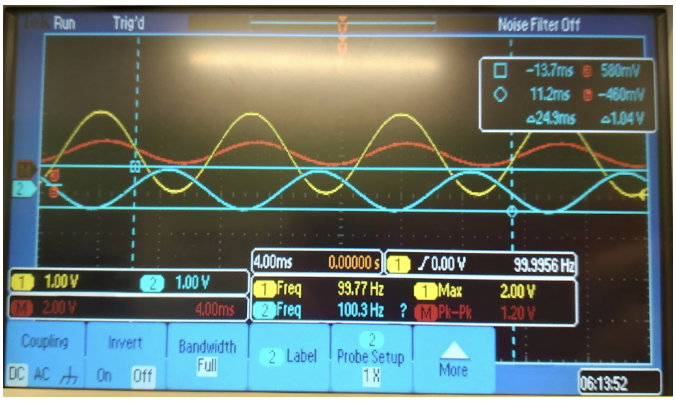
Aim: To familiarise the group with the lab arrangement and the safety protocols. Familiarise with bench-top testing equipment in Lab435 such as the function generator and the oscilloscope. Learn how to use the microcontroller, PICAXE 14 M2, which is to be used later for control in the buck converter.

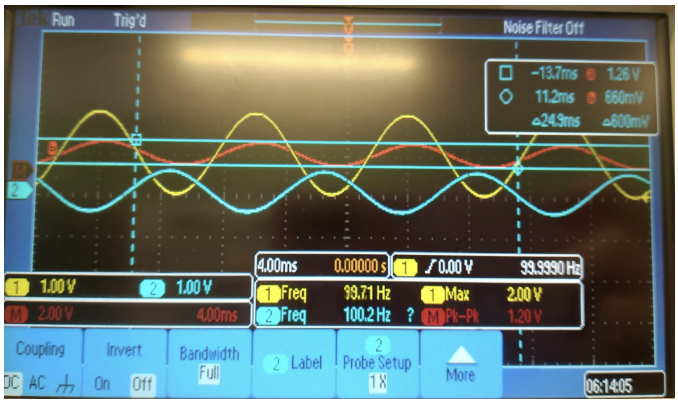
Part 1

Then channel 2 of the FG was set up as follows: sine wave, 1V pp, DC 0V offset, phase of 90, f=100Hz. The shift between the two channels was measured (as seen to the below).

The Rigol DG 1032Z FG was used to observe a waveform of the following characteristics: sine wave, 2V pp, phase 0, f=100Hz & DC offset 1V (as seen below).

Combined Waveforms

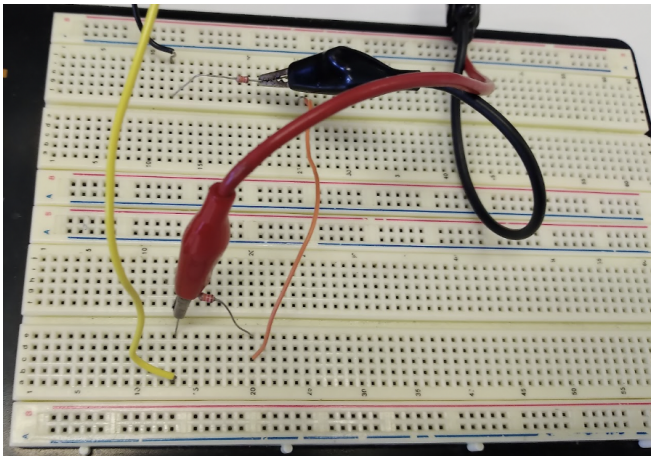




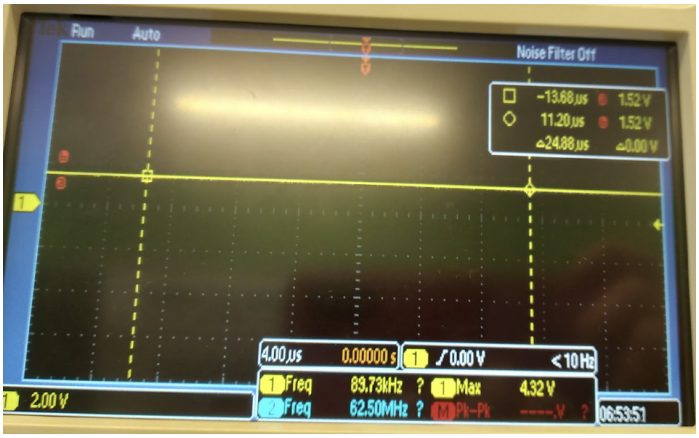
Theoretical value of the adding the two waves, $\sin(t) + 1$ and $0.5\cos(t + 90^\circ)$:
$= \sin(t) - 0.5\sin(t) + 1$
$= 0.5\sin(t) + 1$
Experimental result $0.3\sin(t) + 1.2$

Part 2

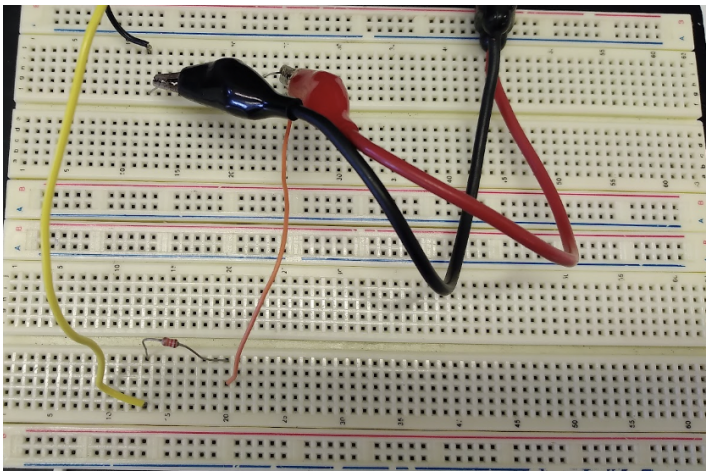
Below is the circuit measuring between A and B.



The voltage drop recorded was 1.52V.



Measuring between B and ground the voltage drop is also 1.52V



Since we used two of the same resistors, and the voltage applied was 3.1V (as seen bollow), this makes sense.

Micro-Controllers

Here the team was familiarised with PICAXE 14M2. The Lab 0 guide was followed closely to produce the following code:

```
init: let w1 = 79
setfreq M32 ` set clock frequency to 32MHz

main:
        ` Sweep through duty cycle 0 - 100%
        let w2 = w1 * 4
        for w0 = 1 to w2
                hpwm 0,0,%1111,w1,w0` single mode period for 100kHz
                pause 1000
                next w0

        goto main
```

The output PWM signal from the pins programmed by the above code can be seen to the right. The code was written to have the signal sweep through all duty cycles from 0-100%. During observation, this was observed as the on (and-off) states of the PWM output were increasing in width and then resetting at max on.