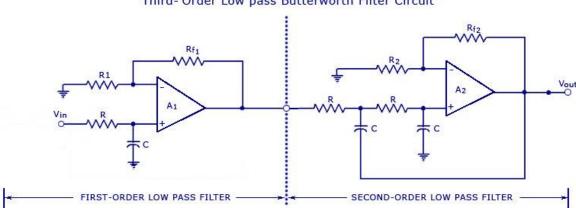
ELEC ENG 3TR4 LAB 01 FOURIER ANALYSIS

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Filter Design

For this lab, a third order Butterworth Filter was designed. This filter provides an attenuation of approximately -35db. The configuration used for this filter is as shown in the figure below.



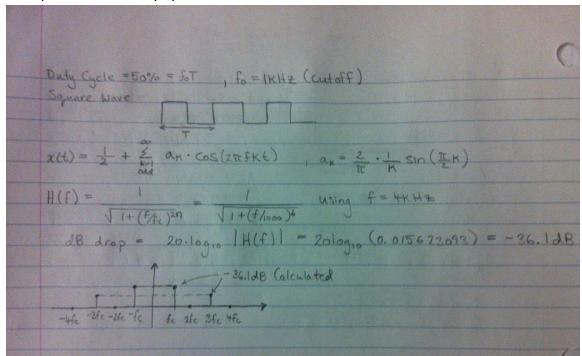
Third- Order Low pass Butterworth Filter Circuit

The values used for the various components were determined using the following calculations (on next page):

First order : (S+1)	> Second order: (S2+1.414s+1)
$\frac{V_0}{V_0} = A_{V_0} = 3 - 2K$	$V_0 = AV_0 = 3-2K$
	Vi
$A_{16}=2$	Aro = 3-1.414
$R_1 + R_{f1} = 2$	= 1.586
REI	$\frac{R_2 + R_{f2} = 1.586}{C}$
let R = IKS	Rf2 let R2 = IKR
: Rf = IKS	161 N2 - 1N3C
11	· R = 586 D
	:. Rfz = 5862 Can use Ikeresistor
for R, & R, & R, we for Rfz we can use to	can use lkeresistor wo 1.2Kr resistors in parallel giving us 600.0
for R, & R, & R, we for Rfz we can use to	can use Ikeresistor
for R, & R, & R, & R, we for Rf2 we can use to Vising a cutoff freque	can use Ikeresistor wo 1.2Kr resistors in parallel giving us 600.52 many of IKHz $\dot{\xi}$ $C = 0.1 \mu F$
for $R_1 \notin R_1 \notin R_2$ we for R_{f2} we can use to $=$ Using a cutoff freque we have $f_0 = \frac{1}{2}$	can use Ikeresistor wo 1.2Kp resistors in parallel giving us 600pp ncy of IKHZ $\stackrel{?}{\xi}$ $C = 0.1 \mu F$ 1 TRC
for $R_1 \notin R_1 \notin R_2$ we for R_{12} we can use to Using a cutoff freque we have $f_0 = \frac{1}{2}$ $1 \times 10^3 = \frac{1}{2}$	can use Ikeresistor wo 1.2K resistors in parallel giving us 600 re ncy of IKHZ $\stackrel{?}{\xi}$ $C = 0.1 \mu F$ 1 TERC
for $R_1 \notin R_1 \notin R_2$ we for R_1 we can use to vising a cutoff freque we have $f_0 = \frac{1}{2}$ $1 \times 10^3 = \frac{1}{2}$	can use Ikeresistor wo 1.2K r resistors in parallel giving us 600 r ncy of IKHZ $\stackrel{?}{\xi}$ $C = 0.1 \mu F$ 1 TRC 1 277 R(0.1 \mu F)
For $R_1 \notin R_1 \notin R_2$ we for R_{f2} we can use to vising a cutoff freque we have $f_0 = \frac{1}{2}$ $1 \times 10^3 = \frac{1}{2}$	can use Ikeresistor wo 1.2Kr resistors in parallel giving us 600.52 ncy of IKHZ & C = 0.1µF I TRC 1 277 R(0.1µF)
for R, & R, & R, we for Rfz we can use to Vising a cutoff freque we have fo = 2 1×10 ³ =	can use Ikrresistor wo 1.2Kr resistors in parallel giving us 600.52 ncy of IKHZ $\stackrel{?}{\xi}$ $C = 0.1 \mu F$ 1 TRC 1 277 R(0.1 \mu F)

Results

The following is our calculated spectrum for the output waving using a 1KHz cutoff frequency for the input with 50% duty cycle:



Below is the actual output from the oscilloscope:

DS0-X 2002A, MY51331243; Fri Feb 06 03:03:57 2015

