# Logbook

The purpose of this document is to keep track of the project on a weekly basis. Each week includes planned objectives, what was achieved and any comments regarding the work done during that week.

# Semester 1:

Semester one includes mainly of research material required for the project.

## 20 November 2017

**Objectives:**

1. Research modulation techniques used in class-D amplifiers.

* Choose a topology for circuit design
* Download datasheet

1. Research gate drivers.

* Choose an appropriate gate driver
* Download datasheet

**Results:**

1. Pulse width modulation (PWM) technique chosen.

* LM555 Timer IC is to be used for modulation
* LM741 comparator is chosen
* Datasheets downloaded

1. IR2110 MOSFET gate driver chosen.

* Datasheet downloaded

**Comments:**

* MOSFET driver will drive two MOSFET switches.
* Reduces distortion by keeping the dead time as short as possible.

## 27 November 2017

**Objectives:**

1. MOSFET switching circuit research.

* Choose MOSFETs for fast switching operation.
* What kind of designs are used
* Download datasheets

1. Signal processing research.

* Choose an appropriate low pass filter

**Results:**

1. IRLZ44NPBF N-channel MOSFET chosen.

* Circuit will include the half bridge topology. (two N channel MOSFETs required)
* Datasheet downloaded

1. Butterworth low pass filter chosen.

* Used in most class-D amplifiers.
* Good flat response.
* Requires an inductor and capacitor

**Comments:**

* Circuit tradeoffs seem to be predominantly between efficiency and heat dissipation.
* MOSFETs need to be designed to switch as fast as possible to increase efficiency.
* MOSFETs must **NOT** be on at the same time. Circuit will fail and damage the MOSFETs.

## 4 December 2017

**Objectives:**

1. Generate bill of materials

**Results:**

1. List of materials saved to google drive file

**Comments:**

* Discrete components are not yet included due to unknown values

## 18 November 2017

**Objectives:**

1. Design Pulse width modulation circuit

* Use LM741 comparator 555 BJT timer in design

**Results:**

1. Modulation circuit expected results only up to around 11kHz. PSpice displace irregular results when trying to increase the frequency higher. A reason is yet to be found.
2. LM741 comparator operates as normal when the 555 timer oscillates at a frequencies lower than 11kHz.

**Comments:**

* Problem with 555 timer oscillator frequency needs to be explored and fixed.

## 8 January 2017

**Objectives:**

1. Design switching circuit

* Include MOSFET gate driver and MOSFET transistors

**Results:**

1. Objective incomplete. Moved to next week.

**Comments:**

## 15 January 2017

**Objectives:**

1. Design low pass butterworth filter
2. Finish design switching circuit

* Include MOSFET gate driver and MOSFET transistors

**Results:**

1. Objective incomplete. Moved to next week.
2. Objective incomplete. Moved to next week.

**Comments:**

Project schedule will need to be reevaluated due to setback in the design pregress.