Ruining The Magic

Electronics

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Chapter 1. Introduction

The goal of this book is to provide you a basic understanding of electronics and circuit design. It will also serve as reference material for other books in the Ruining The Magic Series.

I try to cover a wide range of topics. Sometimes this means I'll leave out details or entire topics. There's a chapter for further reading at the end of this book.

Chapter 2. Important Definitions

Voltage

The electrical *force* that causes current to flow in a circuit. Measured in *Volts*.

Current

The flow of electrical charge through an electronic circuit. Measured in *Amperes* (often shortened to *Amps*).

Chapter 3. Concepts

3.1. Ohm's Law

Ohm's law says that current between two points on a conductor (e.g. a wire) is directly proportional to the voltage.

It provides an equation, which can be represented in 3 ways depending on what value you need:

```
I = V / R
  or
V = I · R
  or
R = V / I
```

where

- **I** is the current through the conductor, in amps.
- **V** is the voltage measured across the conductor, in volts.
- **R** is the resistance of the conductor, in ohms.

(TODO: Some kind of example? A common one is the "flashlight example.")

3.2. Analog vs Digital

Electronic signals can be analog or digital. Analog signals are working with signals that change continuously over time — for example, you can adjust a potentiometer and it can be put at any value and digital signals are working with Analog electronics work with

Chapter 4. Common Components

Diode

A component that conducts current mostly in one direction.

Light Emitting Diode

A diode that emits light when powered. (Often shortened to *LED*.)

Transistor

lol i guess i have to fucking learn about these now.

Integrated Circuit (IC)

a collection of electronic circuits combined into one component. These make basically everything easier.

4.1. Transistor Types

Bipolar Junction Transistor (BJT)

NPN or PNP, which I have no idea what they mean.

Field-Effect Transistor (FET)

Fuck if i even know.

Metal-Oxide-Semiconductor Field-Effect Transistor (MOSFET)

fuck it idk.

Chapter 5. Analog Electronics

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Chapter 6. Digital Electronics

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Chapter 7. Boolean Algebra

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