

# **Basic Electronics**



**By:**  
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## **Electron Flow VS Current Flow**



⌘ Two current flow models

- ☒ 1) Conventional Current Flow, Pos to Neg
- ☒ 2) Electron Flow, Neg to Pos

## Ohm's Law

⌘  $E = I * R$

⊠  $E = \text{Voltage}$

⊠  $I = \text{Current}$

⊠  $R = \text{Resistance}$

⌘ Series Formula

⊠  $R_t = R_1 + R_2 + \dots + R_x$

⌘ Parallel Formula

⊠  $1/R_t = 1/R_1 + 1/R_2 + \dots + 1/R_x$

## Batteries in Series

⌘ Voltage adds

⌘ Current supply is unchanged

## **Batteries in Parallel**



⌘ Current Adds

⌘ Voltage remains unchanged

## **Voltage Rails**



## **What is Ground?**

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- ⌘ What is Up?
- ⌘ What is zero?
- ⌘ What is zero height?

## **Voltage Drops & Current**

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- ⌘ Series
- ⌘ Parallel
- ⌘ Open's
- ⌘ Shorts

## **Current Limiting Resistors**

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## **Semiconductors**

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- ⌘ Diode
- ⌘ Zener Diode
- ⌘ LED
- ⌘ Transistors
- ⌘ FET
- ⌘ MOSFET

## **Vacuum Tubes**



- ⌘ Diode

- ⌘ Triode

## **Power Supplies**



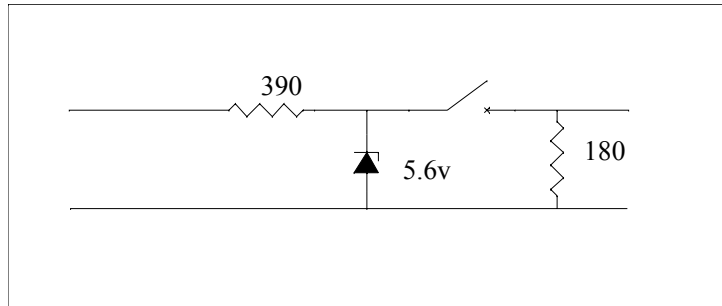
- ⌘ Rectification

  - ⊞ Half Wave

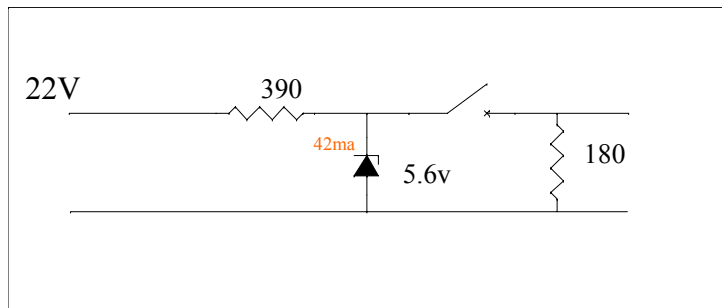
  - ⊞ Full Wave

- ⌘ Voltage Regulation

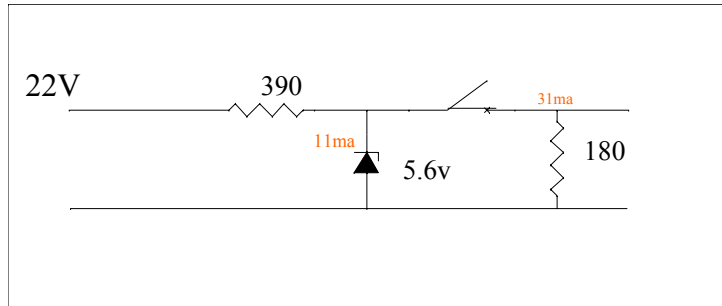
# Zener Regulator



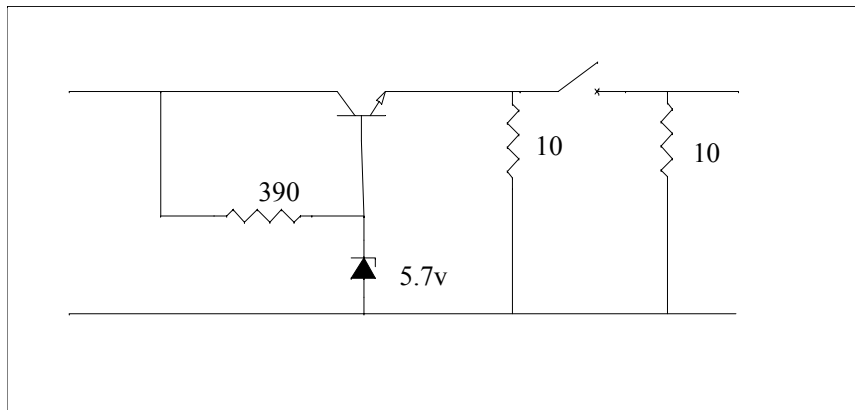
# Zener Regulator



## Zener Regulator

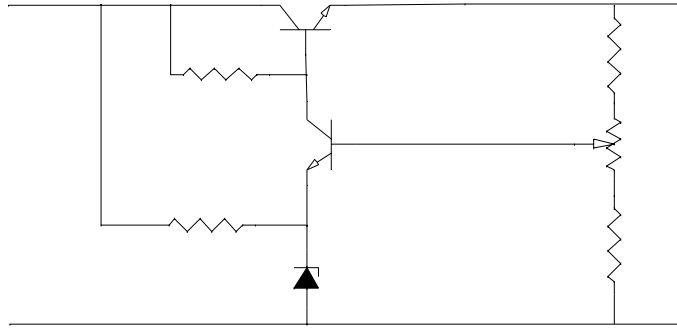


## Zener Regulator Amplified

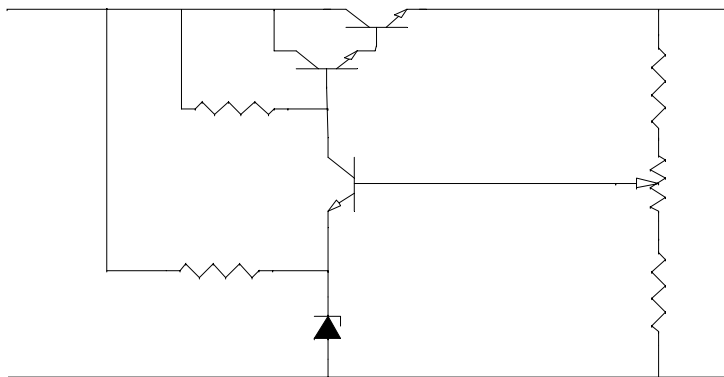




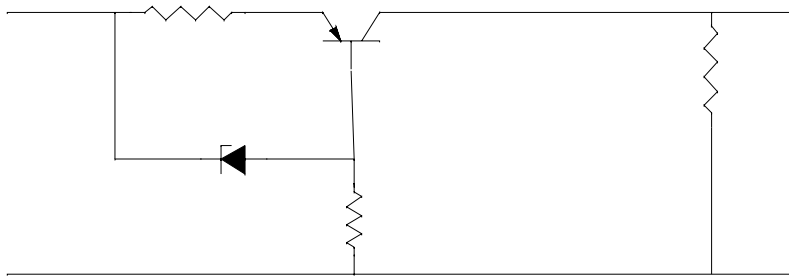
## Regulator With Error Amp



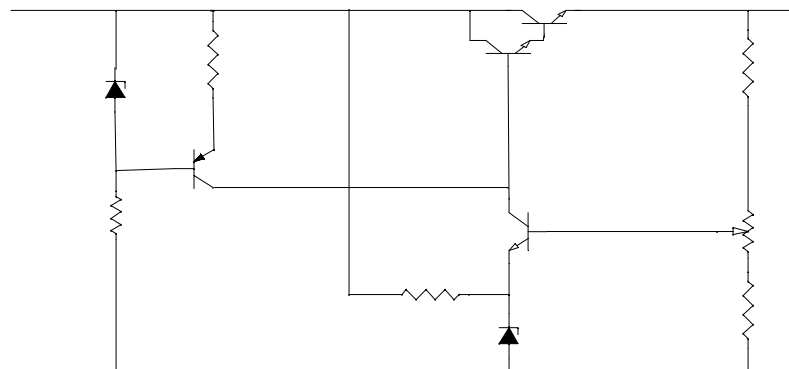
## Regulator with Power Amp



## Constant Current Source



## Regulator with improved error amp



# Regulator with voltage adjust

