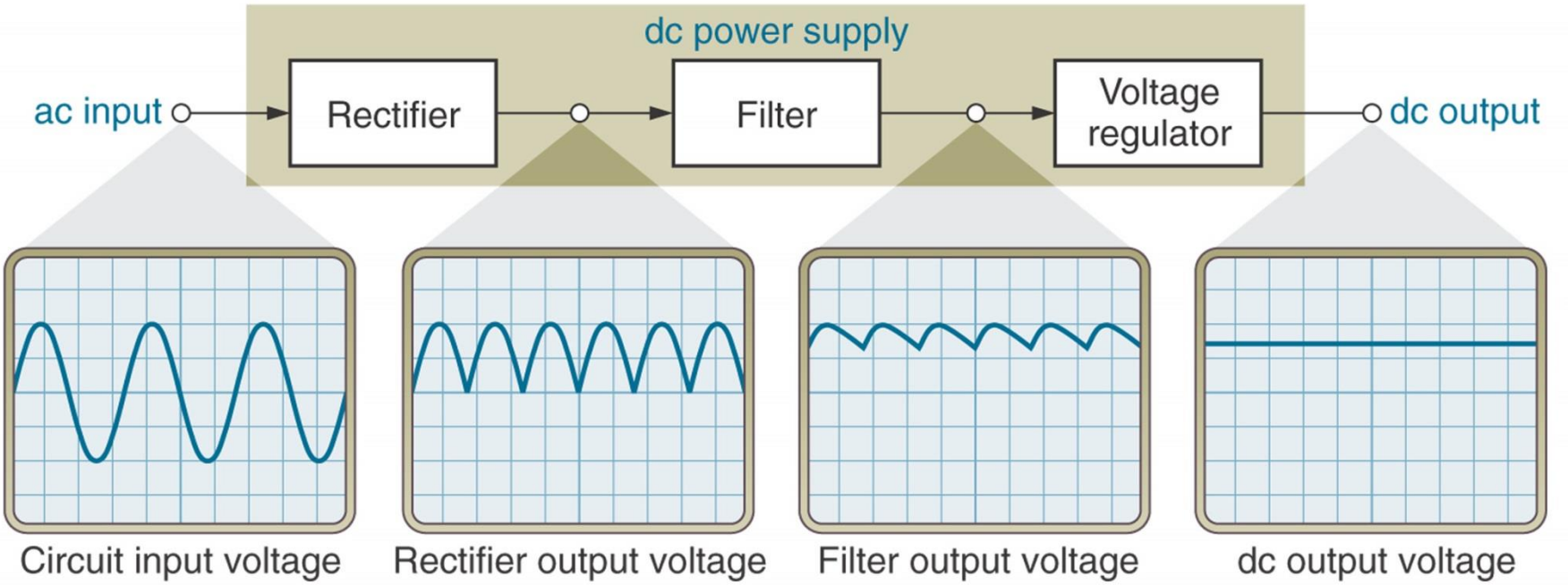
Kap. 25 - Power supply - Spenningsregulator



Kap. 25 - Power supply - Spenningsregulator

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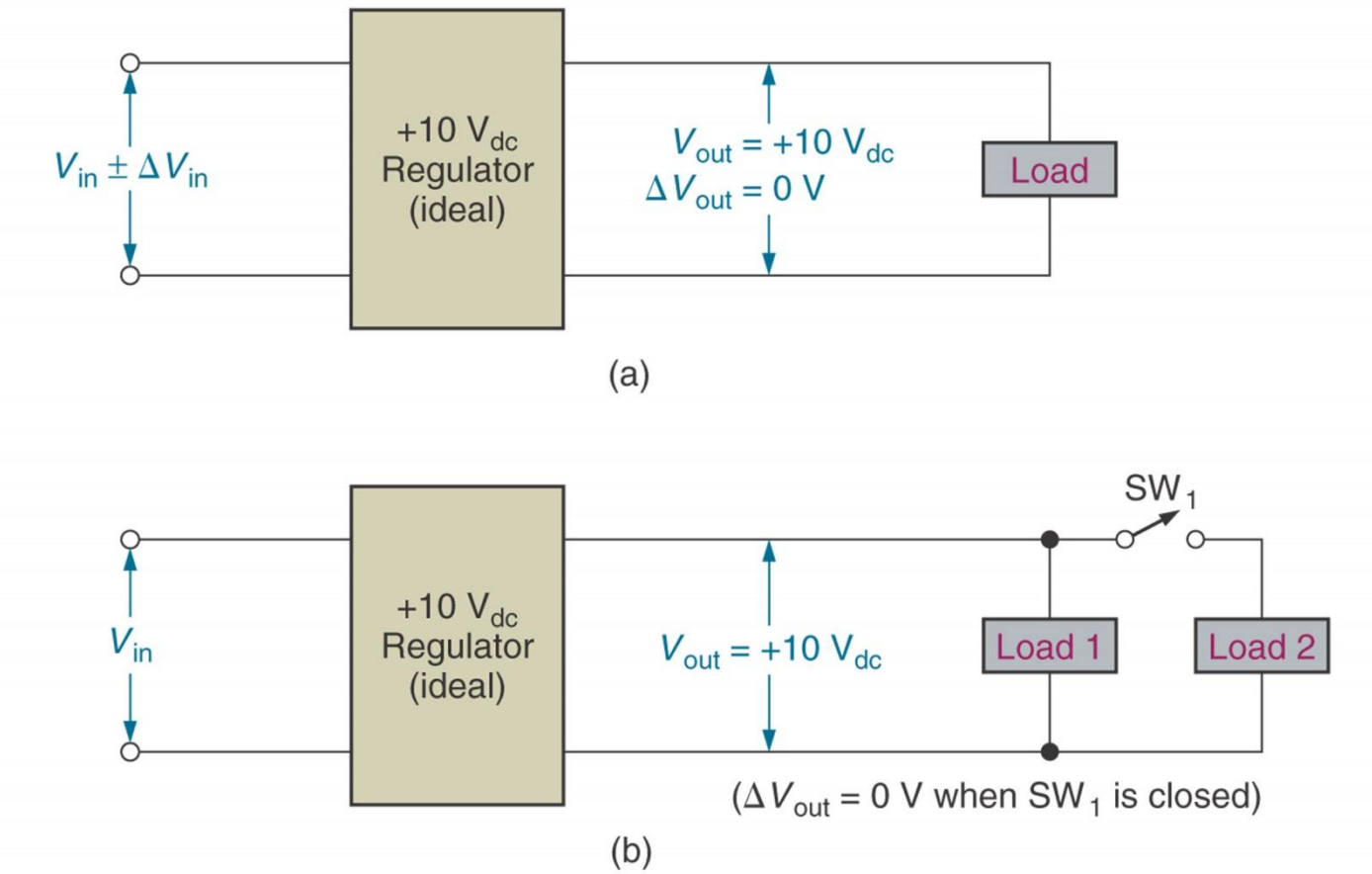


Kap. 25 - Power supply - Spenningsregulator

$$\text{line regulation} = \frac{\Delta V_{\text{out}}}{\Delta V_{\text{in}}}$$

ΔV_{out} = the change in output voltage (usually in microvolts or millivolts)

ΔV_{in} = the change in input voltage (usually in volts)

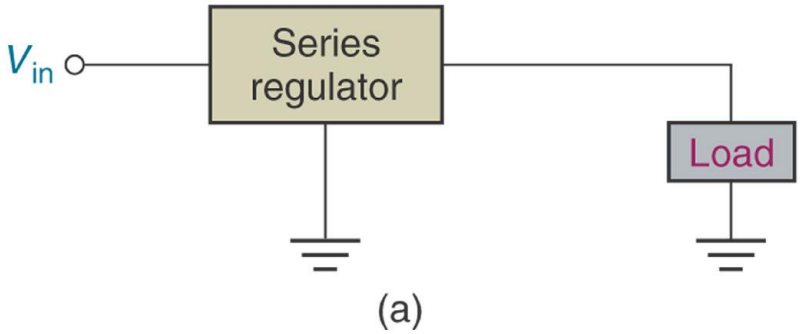
$$\text{load regulation} = \frac{V_{NL} - V_{FL}}{\Delta I_L} = \frac{\Delta V_{\text{out}}}{\Delta I_L}$$

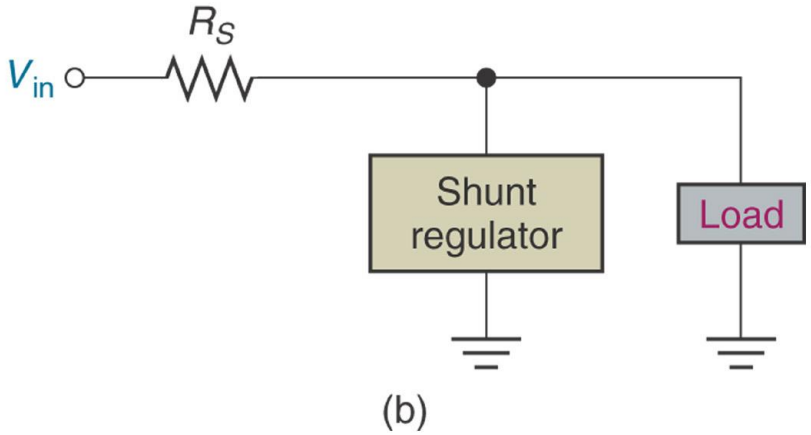
ΔV_{NL} = the no-load output voltage (i.e., the output voltage when the load is open)

ΔV_{FL} = the full-load output voltage (i.e., the load current demand is at its maximum value)

ΔI_L = the change in load current demand

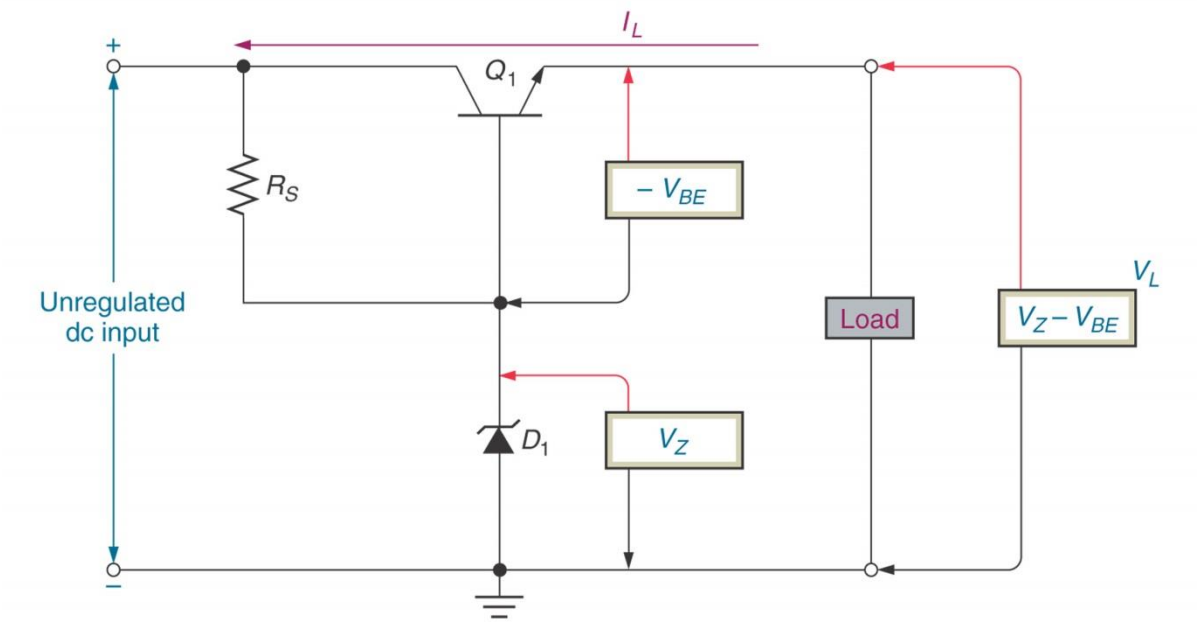
- Types of Regulators
  - Series Regulator
  - Shunt Regulator





Kap. 25 - Power supply - Spenningsregulator

- Series Regulators – circuits that have one or more devices placed in series with the load
  - Pass-Transistor Regulator – a circuit that uses a series transistor to regulate load voltage

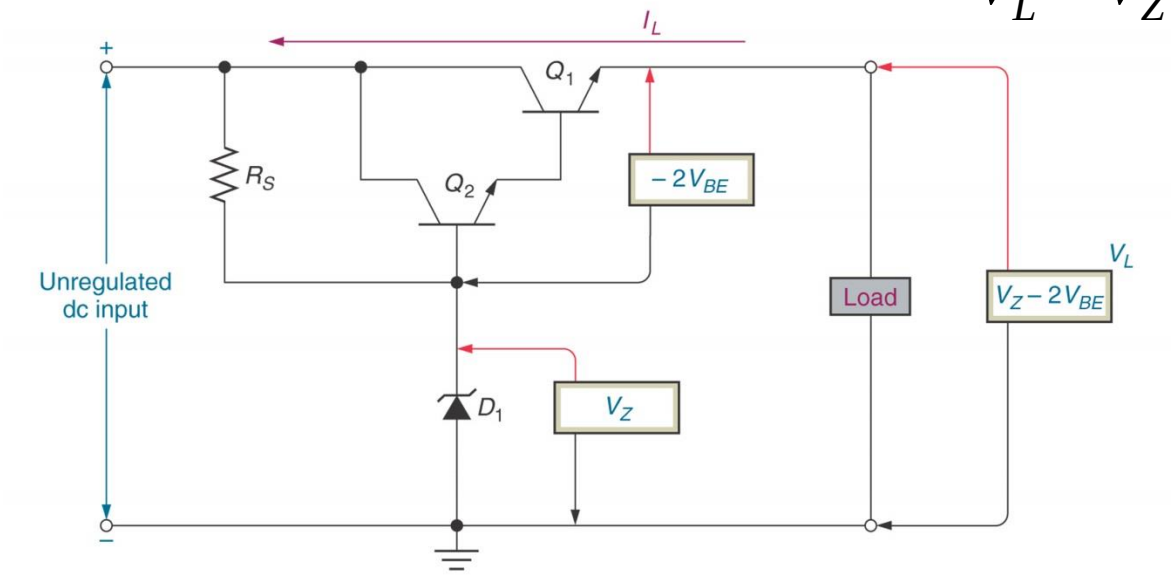


A decrease in *VL* causes *VBE* to increase, which increases conduction through the pass transistor and a relatively constant load voltage is maintained

Kap. 25 - Power supply - Spenningsregulator

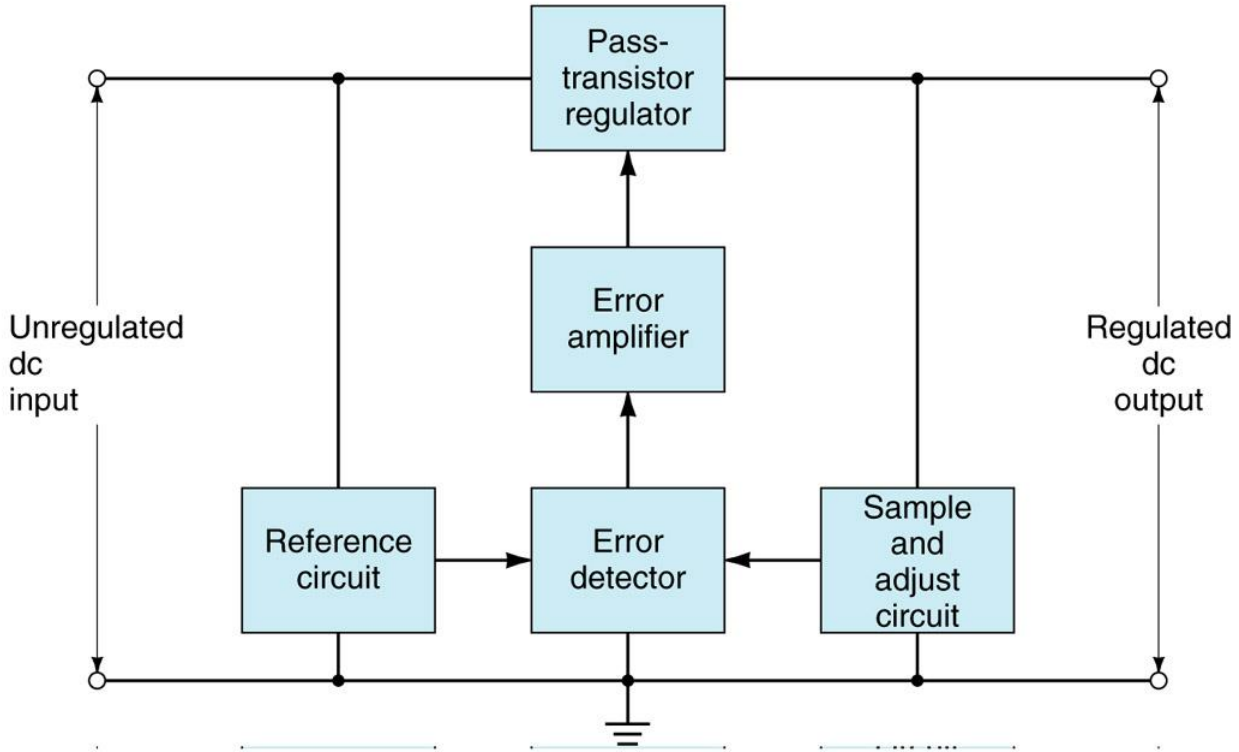
Problem: As input voltage or load current increases, the zener diode must dissipate a relatively high amount of power – reduced by using a Darlington pass-transistor regulator

$$V_L = V_Z - 2V_{BE}$$



Kap. 25 - Power supply - Spenningsregulator Series Feedback Regulator

- – a series regulator that uses an error detection circuit to provide improved line and load regulation characteristics



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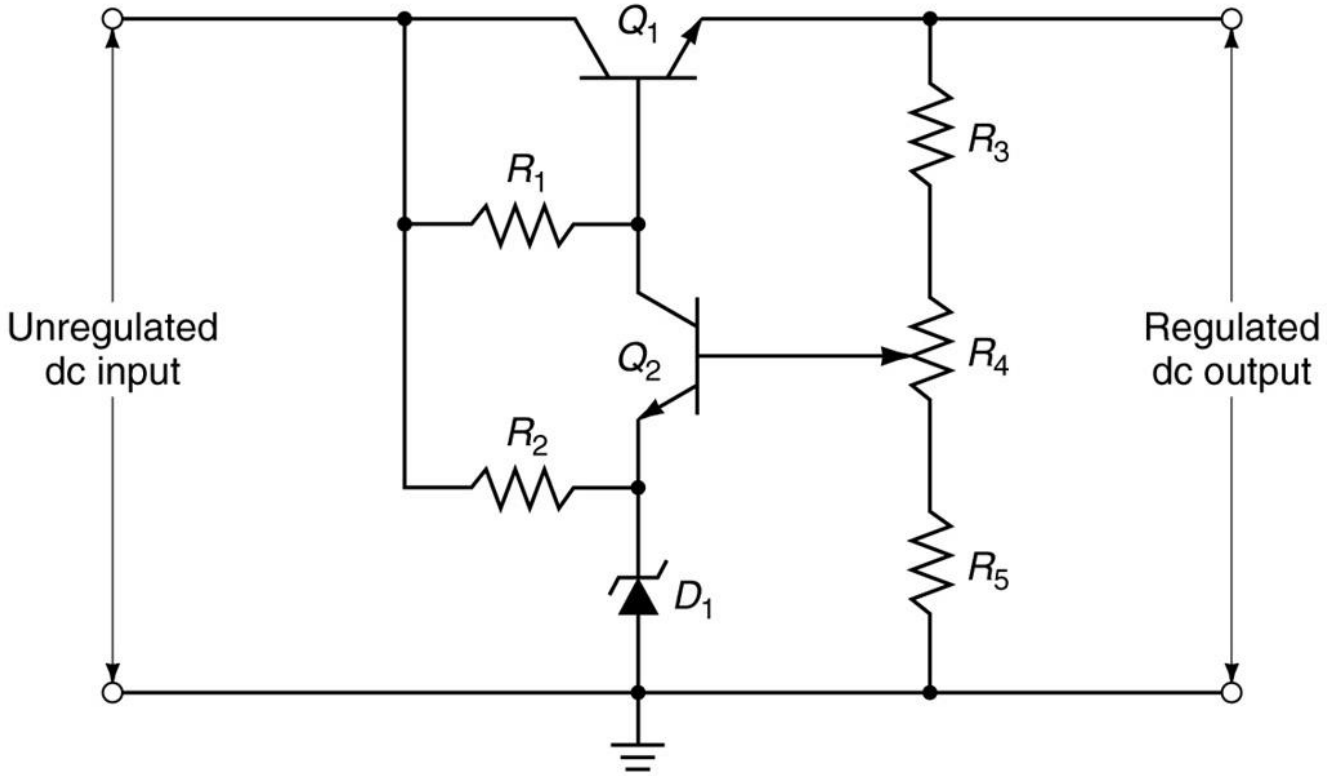
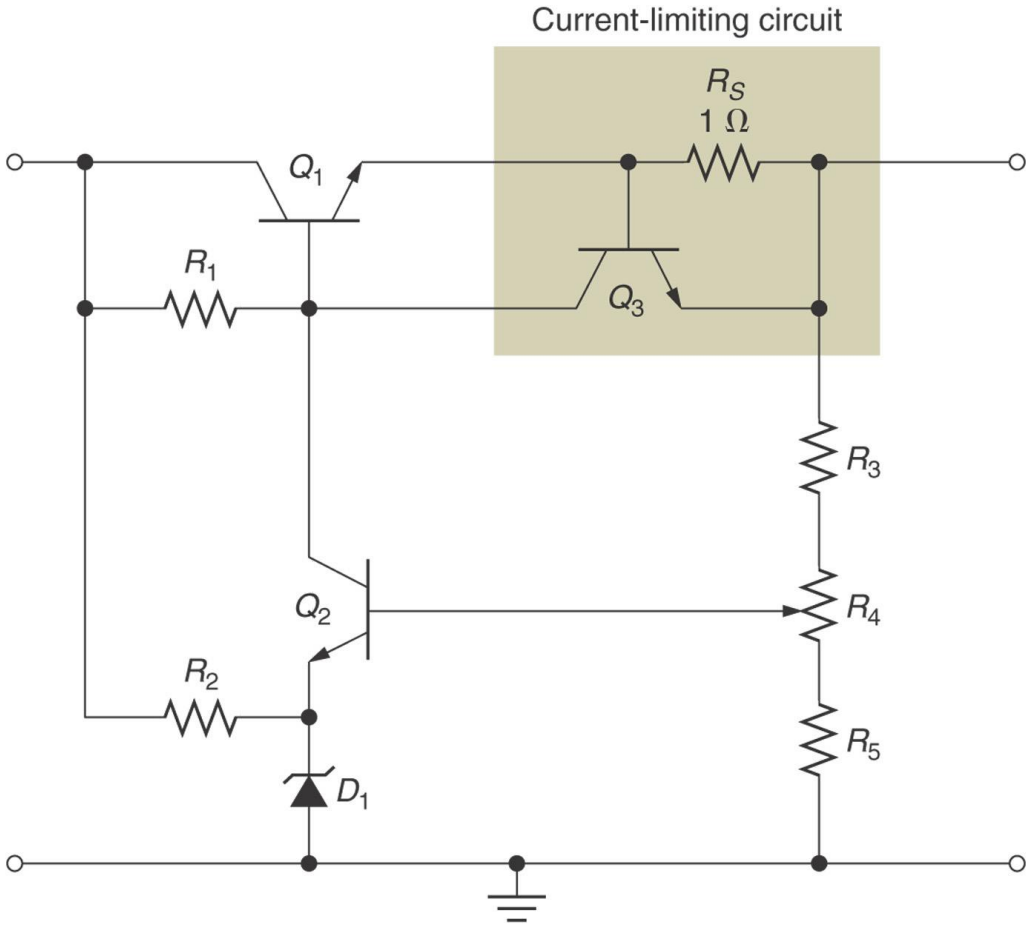


Kap. 25 - Power supply – Spenningsregulator m / sikring

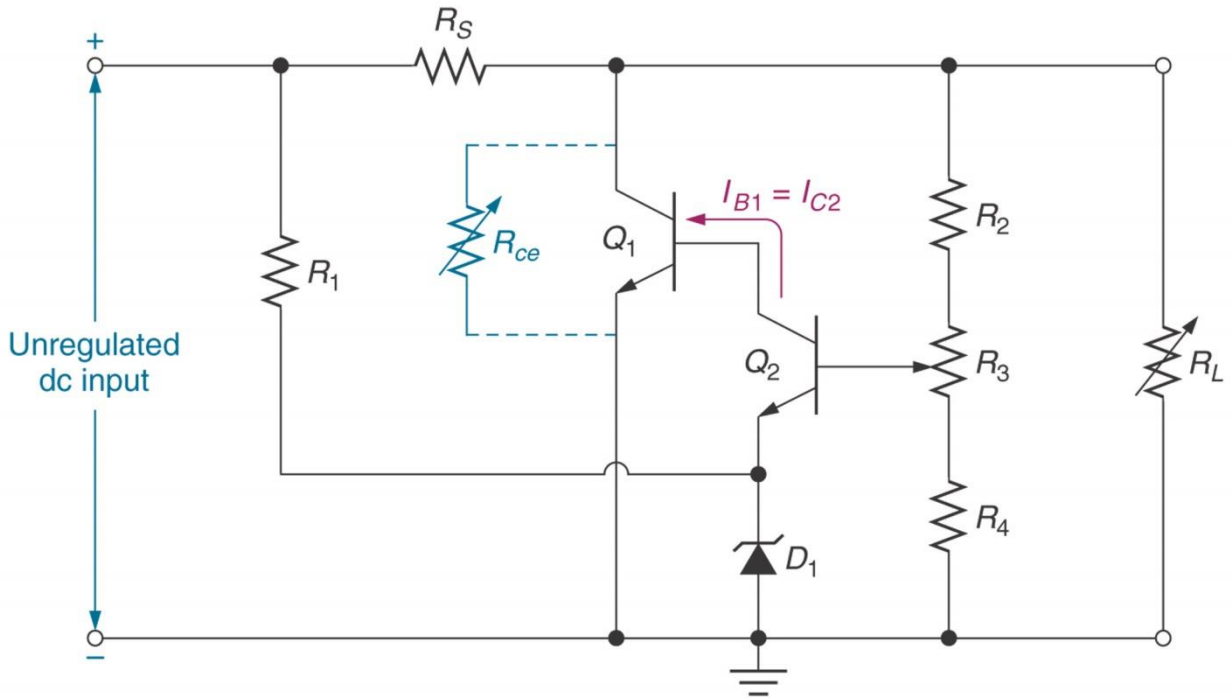


$$I_{E(\max)} \cong \frac{V_{BE(Q3)}}{R_S}$$

Kap. 25 - Power supply – Shunt Feedback Regulator

Shunt Regulator – a circuit that has a regulating transistor in parallel with the load

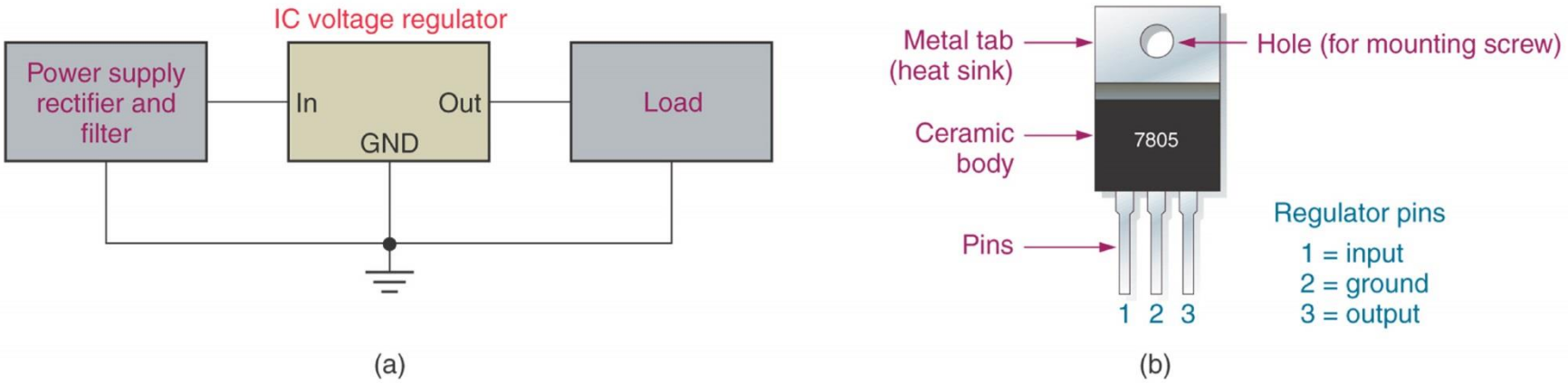
Shunt Feedback Regulator – a circuit that uses an error detection circuit to control the conduction through a shunt regulator transistor



Shunt Feedback Regulator

Kap. 25 - Power supply – Linear IC Voltage Regulators

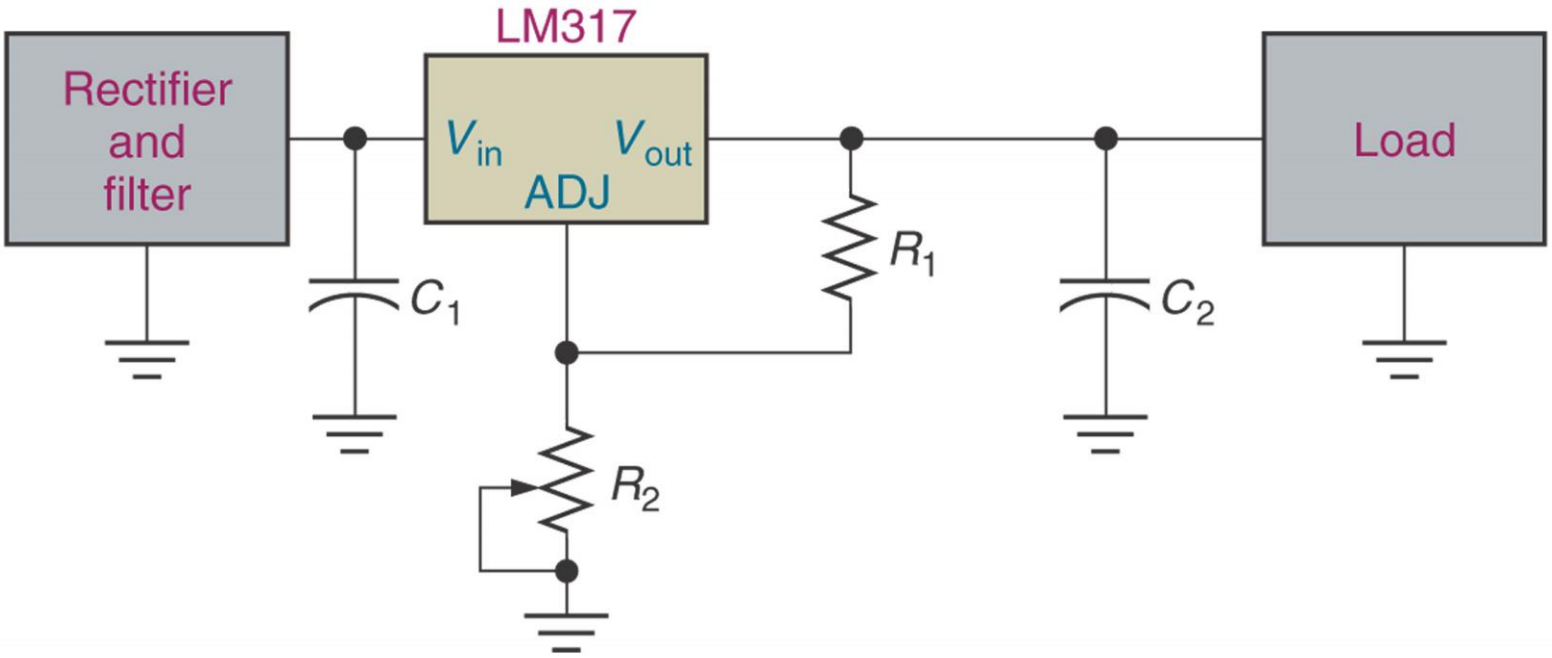
- – a device that is used to hold the output voltage from a dc power supply relatively constant over a specified range of line and load variations



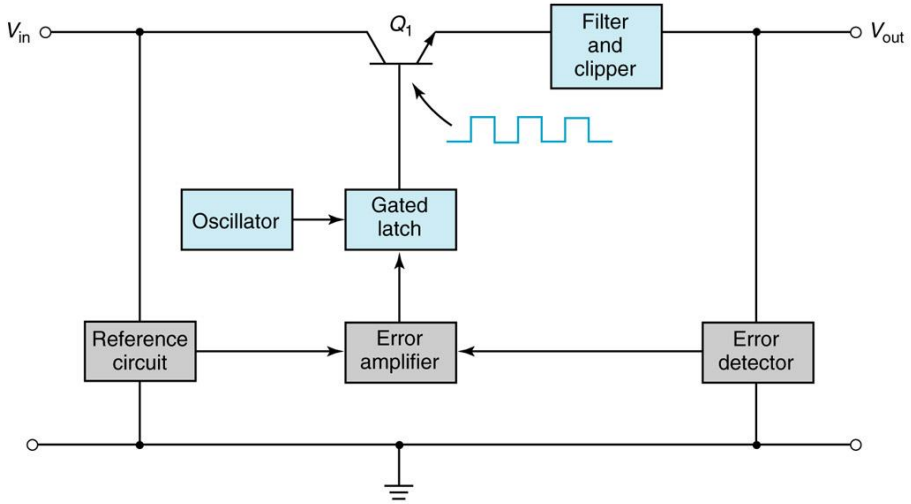
Basically Four Types

Fixed-Positive – provide a specific positive voltage
Fixed-Negative – provide a specific negative voltage
Adjustable – can be adjusted within a specified range of values
Dual-Tracking – provides equal positive and negative output voltages

Adjustable Regulators – Example LM317



Kap. 25 - Power supply – **Switching Regulators**

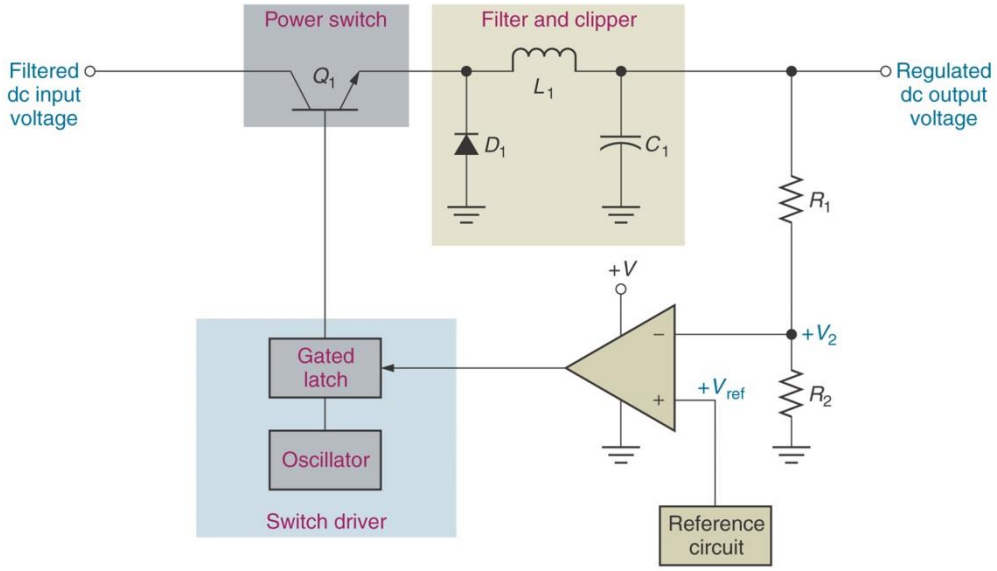


- Switching Regulator Operation – when the control circuit senses a change in the output voltage, it sends a signal to the switch driver

The power switch is constantly driven back and forth between saturation and cutoff

Average voltage at the emitter of the power switch

$$V_{ave} = V_{in}\left(\frac{T_{on}}{T_{on} + T_{off}}\right)$$



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