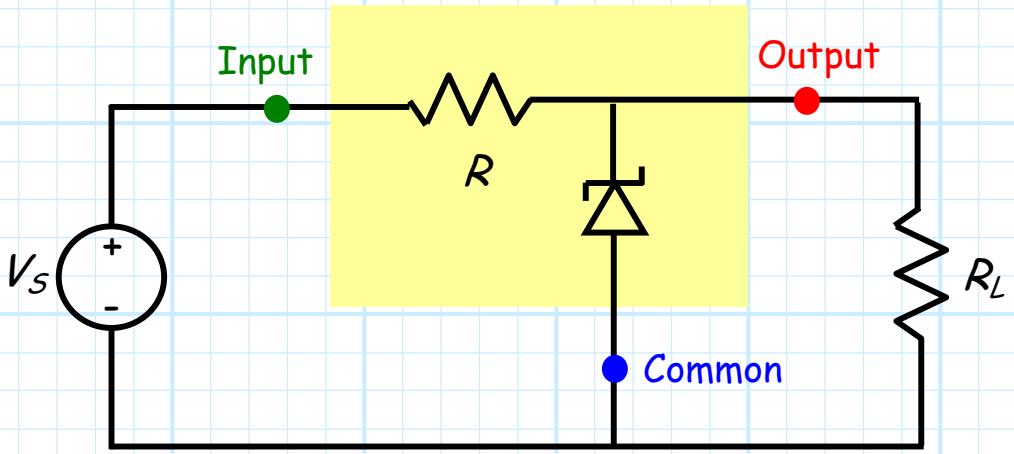
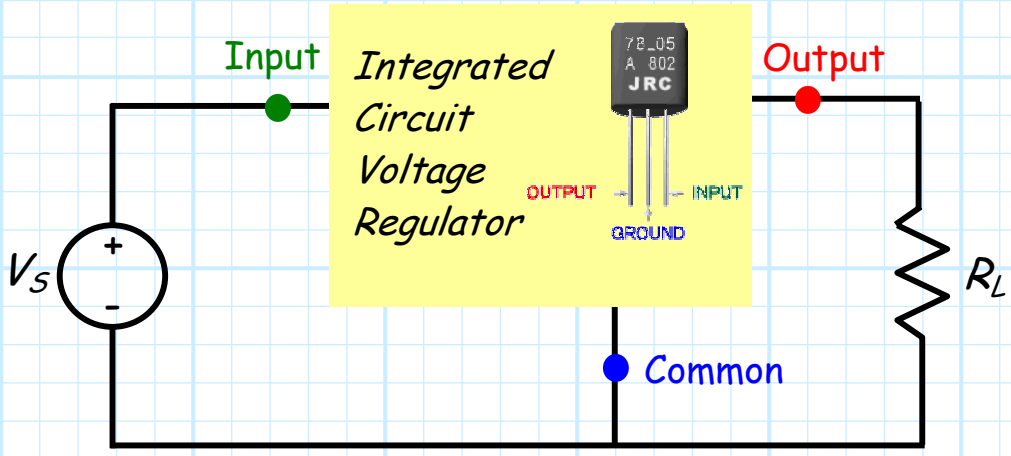
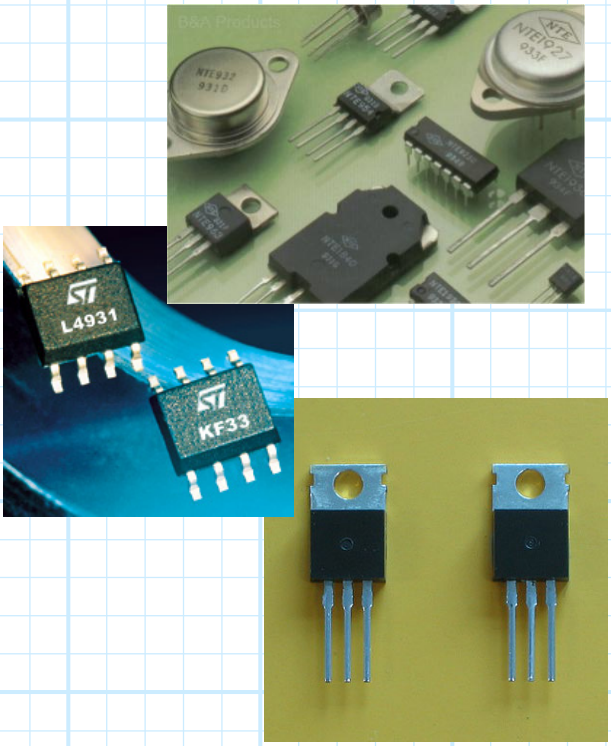
Voltage Regulators

Note that we can view a shunt regulator as a **three-terminal** device, inserted between a voltage source and a load:



Integrated circuit technology has resulted in the creation of other three terminal voltage regulator designs—regulators that do **not** necessarily use zener diodes!





These integrated circuit voltage regulators are **small** and relatively **inexpensive**.

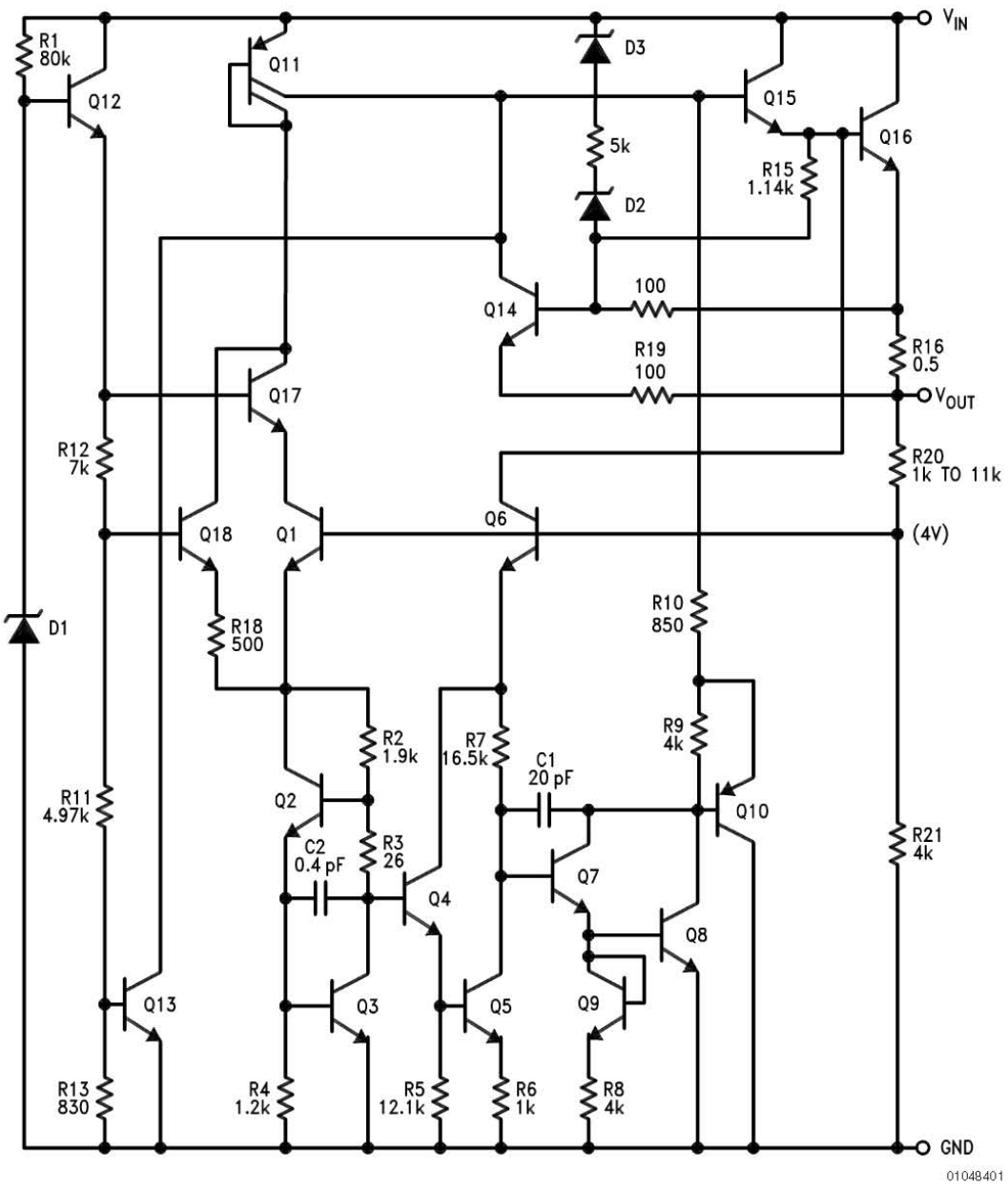
In addition, these IC regulators typically have **better** load regulation, line regulation, and/or efficiency than the zener diode shunt regulator!

Q: *Wow! The **designers** of these IC regulators obviously had a much better electronics professor than the **dope** we got stuck with! With what device did they **replace** the zener diode?*

A: The electronic design engineers did not simply "replace" a zener diode with another component. Instead, they replaced the **entire** shunt regulator design with a **complex circuit** requiring many **transistor** components.

LM341/LM78MXX Series

Schematic Diagram



Integrated circuit technology then allows this complex circuit to be manufactured in a **very small space** and at **very small cost!**