In an unregulated supply the quality of the output voltage depends on that of the input. If there are spikes or dips in the AC these are seen in the DC output. Spikes in particular are troublesome for digital electronics.
A voltage regulator IC is designed to maintain a constant voltage across the load by adjusting the current. The bypass capacitor on the output eliminates any high frequency noise from the load (the voltage regulator is monitoring the load so this would lead to undesired current fluctuations).
The essence of the voltage regulator is that the sampled voltage is compared to a zener voltage and the error is used to modulate the base of the current limiting transistor. The current is adjusted (another example of negative feedback) until \( V_{\text{sampled}} = V_{\text{zener}} + 0.6V \).
Types and specifications

**LM78XX** - XX can be 05, 06, 08, 10, 12, 15, 18, or 24. These are fixed positive voltage regulators. The maximum output current is 1.5 A.

**LM79XX** - XX can be 05, 06, 08, 10, 12, 15, 18, or 24. These are fixed negative voltage regulators. The maximum output current is 1.5 A.

**LM317 and LM337** - adjustable positive and negative voltage regulators (1.2 - 37 V range, output current of 1.5 A).

\[ V_{out} = \pm 1.25 \left( 1 + \frac{R_2}{R_1} \right) V_{in} \]
A simple voltage regulator to convert 12 V to 5 or 9 V. The diode provides additional spike protection.
The voltage regulator actually regulates on current, and so it make a convenient current source. By regulating the voltage over fixed $R_1$, the current through variable $R_{load}$ is kept constant.
AC power lines transmit spikes and other high frequency interference. They can be antennas for radio stations and carry information about experiments in the next lab (laser switching is a prime example). The line filter is an LC filter to remove these, and the transient suppressor passes high voltage spikes. Many AC plug modules have this circuit built in.
It is necessary to take precautions to protect circuits from damage due to over voltage. The crowbar circuit switches the SCR on for voltages greater than the zener’s breakdown voltage. The SCR is reset by removing power from the device. The clamp also switches on when the zener breakdown voltage is exceeded, but the transistor returns to its off state when the voltage falls to its normal range.
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Go to the manufacturer’s web site to obtain a datasheet of their product. Please follow these steps:

2. View the conditions of use for the web site by following the link on the home page called Site Terms and Conditions of Use, or by following this link: http://www.national.com/webteam/site_terms_of_use.html
3. Return to the home page.
4. In the search box, enter the product number (LM117) for a specific Terminal Adjustable Regulator in the Search box and click “go”.
5. You will be presented with several options (view online, download PDF, email for example). Select how you would like to receive this datasheet.