EE 322 Advanced Analog Electronics, Spring 2011
Lecture 18, February 23, 2010

1 Topics on exam

1. 723 voltage regulator
2. LM 317, linear regulators and current supplies
3. Switching regulators
4. Sinusoidal oscillators
5. Bistable, astable circuits

2 723 voltage regulator

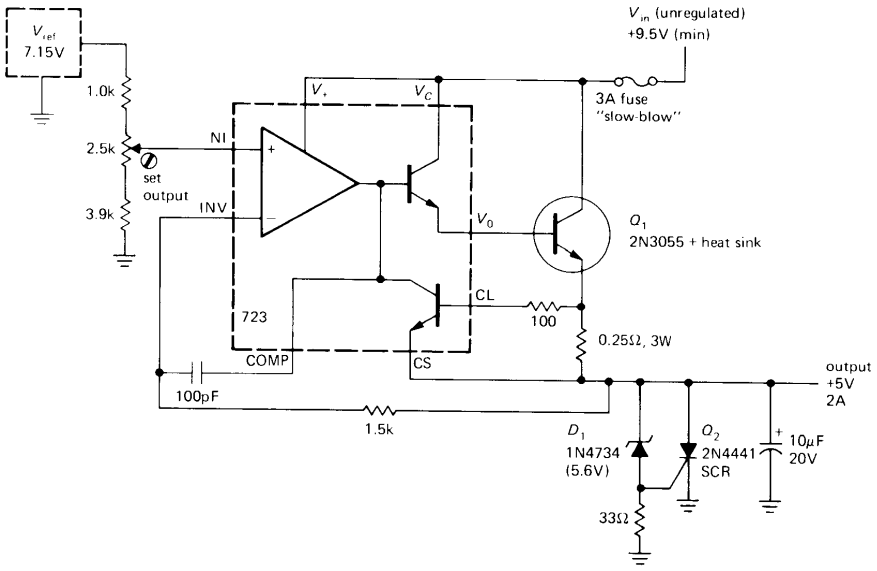


Figure 6.5. Five volt regulator with outboard pass transistor and crowbar.

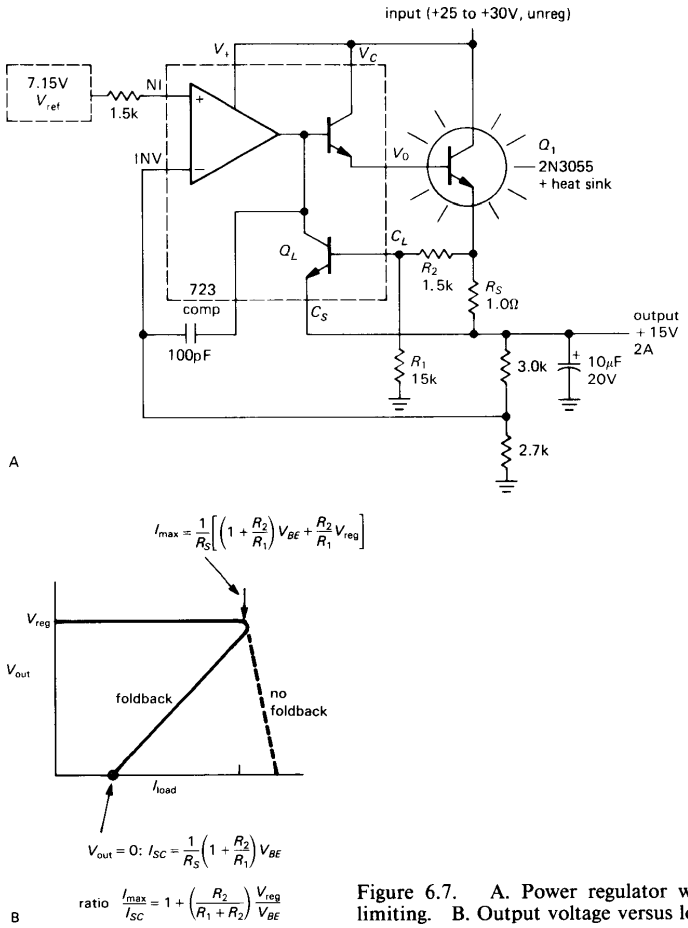


Figure 6.7. A. Power regulator with foldback current limiting. B. Output voltage versus load current.

1. Design for voltage output
2. Design for current limit
3. Design for foldback
4. Using external pass transistor

3 LM 317, linear regulators, current supplies

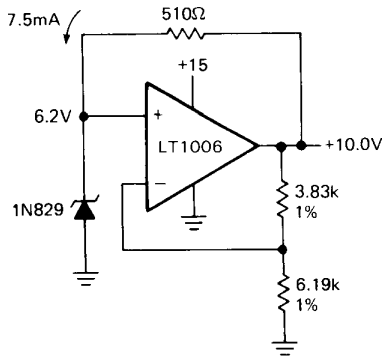


Figure 6.21

1. Adjustable and fixed

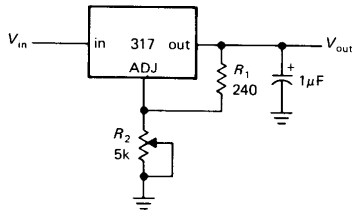


Figure 6.29. Three-terminal adjustable regulator.

2. Using external pass transistor

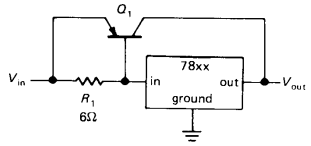
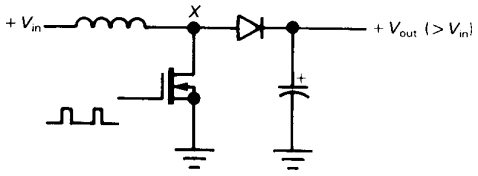


Figure 6.36. Three-terminal regulator with current-boosting outboard transistor.

3. Current supply

4 Switching regulators

1. Step-up



2. Step-down

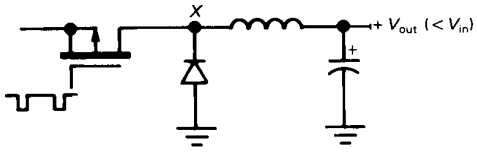
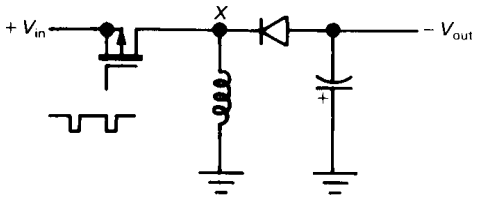


Figure 6.40. Step-down switcher.

3. Inverting



4. Be able to draw the voltage waveforms for any switching regulator

5. Understand continuous and discontinuous modes

6. Understand the feedback mechanism.

5 Sinusoidal oscillator

1. Understand that unity loop gain produces oscillations

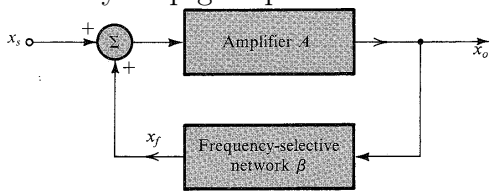


FIGURE 13.1 The basic structure of a sinusoidal oscillator. A positive-feedback loop is formed by an amplifier and a frequency-selective network. In an actual oscillator circuit, no input signal will be present; here an input signal x_s is employed to help explain the principle of operation.

2. Be able to compute the loop gain for a circuit

3. Wien Bridge oscillator

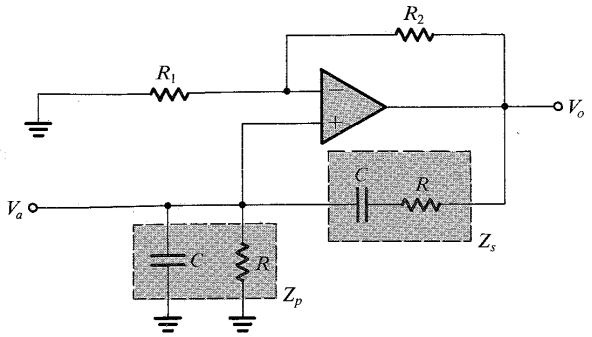


FIGURE 13.4 A Wien-bridge oscillator without amplitude stabilization.

4. Phase-shift oscillator

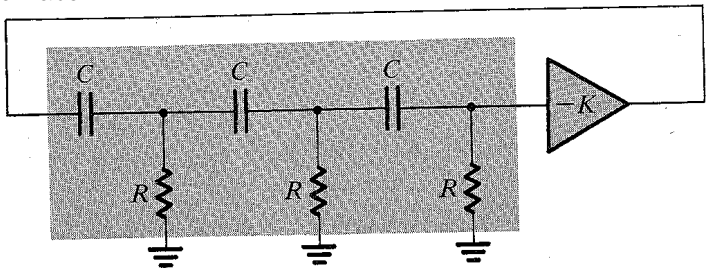


FIGURE 13.7 A phase-shift oscillator.

6 Bistable, astable, monostable

1. Understabe positive feedback

2. Undersand hysteresis

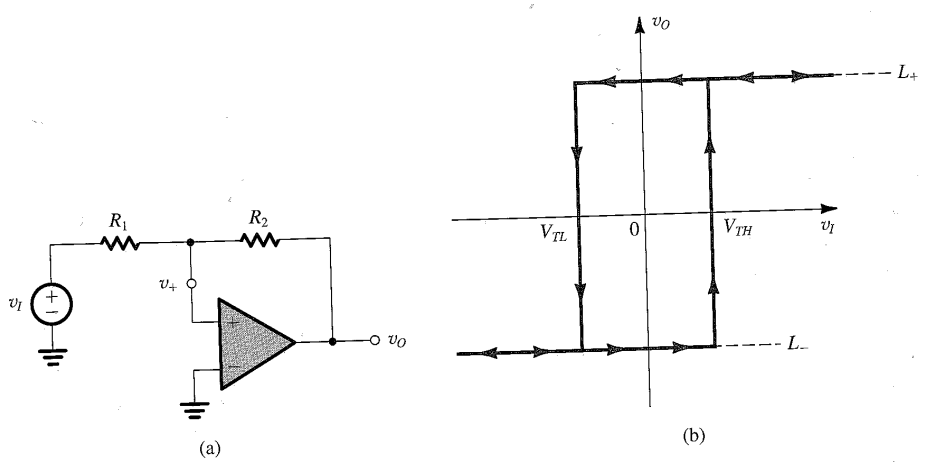


FIGURE 13.20 **(a)** A bistable circuit derived from the positive-feedback loop of Fig. 13.17 by applying v_I through R_1. **(b)** The transfer characteristic of the circuit in (a) is noninverting. (Compare it to the inverting characteristic in Fig. 13.19d.)

3. Be able to compute frequency and period of astable and monostable circuits

4. Astable

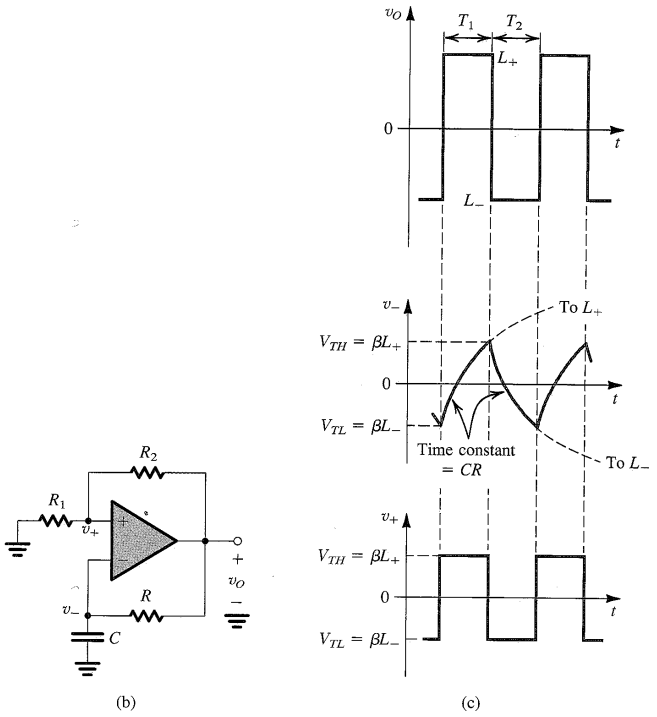


FIGURE 13.24 *(Continued)* **(b)** The circuit obtained when the bistable multivibrator is implemented with the circuit of Fig. 13.19(a). **(c)** Waveforms at various nodes of the circuit in (b). This circuit is called an astable multivibrator.