Introduction to Lab Equipment
• Lab objectives
  ➢ Gain familiarity with key lab equipment
  ➢ Set up and analyze simple electronic circuits using basic equipment

• Key lab equipment includes
  • Breadboards and associated BNC cables and connectors
  • Keithley 2430 Source Measure Unit (SMU)
  • Keysight DSOX1102A Oscilloscope
  • Agilent 33220A Function Generator
Breadboard schematic showing buses and connection strips.

This is an example of a Bus. A Bus is often used as way of delivering a common voltage to the entire system, in this case the bread board. You may use a bus to make a common ground for the circuits you will build in this class.

This is a connection strip.
Keithley 2400 Source Measure Unit (SMU)
The Front Panel at a Glance

1. Graph Mode/Local Key
2. On/Off Switch
3. Modulation/Sweep/Burst Keys
4. State Storage Menu Key
5. Utility Menu Key
6. Help Menu Key
7. Menu Operation Softkeys
8. Waveform Selection Keys
9. Manual Trigger Key (used for Sweep and Burst only)
10. Output Enable/Disable Key
11. Knob
12. Cursor Keys
13. Sync Connector
14. Output Connector

Agilent 33220A Function Generator
• Function generator and oscilloscope measurements
  - Build simple series circuit
  - Force a frequency of 100 Hz and a peak-to-peak amplitude of 5 V with the function generator
  - Measure voltage and frequency across R1 with oscilloscope by using Channels 1 and 2 and positioning one side of each probe on each side of R1 and the other side to ground

*Test circuit for Section 5.1*
• **Keithley SMU measurements**
  
  - Build simple series and parallel circuits shown below
  
  - **Force 10 V DC with first Keithley through circuit on left in (a)**
    - Measure voltages in R1 and R2 with second Keithley
    - Measure current in circuit from Keithley used as voltage source
  
  - **Force 5 mA DC with first Keithley through circuit on right in (b)**
    - Measure currents in R3 and R4 with second Keithley
  
  - Measure the impedance of the two resistors with the Keithley SMU by pressing Ω under Measure and then Auto Range for use in calculations

---

Test circuits for Section 5.2