Chapter 3
Indicating and Recording
Devices
Section 3.3

Readout Devices

► DMM (digital multimeter)
- Handheld
- tabletop
► Oscilloscopes
- Digital
- National Instruments Signal Express

DMM (digital multimeter)

► Commonly provide measurements of
  - resistance,
  - AC or DC voltage, and
  - AC or DC current (amps)
► Manual and Autoranging scales
  - manual set by user
    ► you should use smallest scale possible!
  - autorange set by DMM

Agilent 34405A Multimeter

Agilent 34405A Multimeter

- Display
- On/Off Switch
- Measurement Function and Resolution Keys
- Autorange and Manual Range
- Math Operations and Edit
- Internal Memory (Recall, Utility, and Edit Keys)
- Shift Selects (move shifted keys) and Local key
- Secondary Display Key
- Input Terminals and Current Fuse

LG #DM-441B
Digital Multi-Meter

Fluke 87
Handheld DMM

Need to record both the ________ and _______ when measuring!
Tektronix TDS 2014 DSO (Digital Storage Oscilloscope)

Oscilloscope

Two primary adjustments:
- horizontal “sweep” rate (time axis)
  - usually in units of \( \frac{\text{div}}{\text{div}} \)
- vertical amplitude
  - usually in units of \( \frac{\text{div}}{\text{div}} \)

Oscilloscope - Divisions

Determine Amplitude and Frequency of Sine Wave

Horizontal Sensitivity 2 msec/div
Vertical Sensitivity 0.2 volt/div

Function Generator

- Not a readout, but a common input device
- Generate sine, triangle and square waves
  - adjustable frequency (\( \_ = \_ \)/sec)
  - adjustable amplitude
- Connect to Output (analog)
  - often labeled 50Ω
- Usually has a TTL/CMOS output also
  - TTL/CMOS is a digital output, 0V or +5V only

BK Precision Function Generator

- Sine Wave
- Square Wave
- Triangle Wave

Output Level (Amplitude)
Frequency
Output (analog)