

# Intro to Test Instruments

# Testing and Electricity Basics

- Voltage – electrical pressure – measured in volts and tells how much resistance can be overcome by a particular circuit
- Current – amount of electricity flowing – measured in amperes – tells how much work can be done by the source in the circuit

- Resistance – resistance to flow – measured in ohms – tells how much voltage will be required to travel through the circuit
- Alternating current(AC) – the current switches directions continually – non-battery powered

- Direct current(DC) – power source supplies current traveling in one direction – battery powered
- A *circuit* is an unbroken loop of conductive material that allows electrons to flow through continuously without beginning or end

- If a circuit is “broken,” that means its conductive elements no longer form a complete path, and continuous electron flow cannot occur in it.
- The location of a break in a circuit is irrelevant to its inability to sustain continuous electron flow. *Any* break, *anywhere* in a circuit prevents electron flow throughout the circuit.

- A resistor changes the resistance to the flow of electricity within a circuit - opposition to electric current depends on the type of material, its cross-sectional area, and its temperature – lights, tools, etc.

- A switch stops or redirects the flow of electricity
- A transformer changes the voltage of the electric current
- Wiring is color coded to tell what part of the circuit represents – critical to DC circuits since current is traveling in same direction

- Black wire is used for negative wires
- Red or white is used for positive wires
- Polarity is important in testing DC circuits
  - must put negative on negative and positive on positive or test equipment can be broken

- A multimeter or a multimeter, also known as a VOM (*Volt-Ohm-Milliammeter*), is an electronic measuring instrument that combines several measurement functions in one unit. A typical multimeter can measure voltage, current, and *resistance*.

- Digital meters – improved accuracy – more functions in one meter – auto ranging and auto polarity

- Frequency is the number of cycles completed each second by a given AC voltage
- It is usually expressed in hertz
- A tachometer is used to measure motor or fan rpm
- Continuity is an uninterrupted path for current flow

- Audio continuity tester – used to “ring out” wires in a conduit run – one lead is attached to a stripped wire at one end and touch the tester to the other wires until an audible alarm sounds
- Visual continuity tester – same concept as the audio except a light will come on

- Voltage tester – simple aid to determine whether there is a potential difference between two points
- Wiggy – a type of voltage tester that's basic component is a solenoid – when current flows through the coil a plunger gets pulled down against a spring – a pointer will tell the approximate voltage

- A pyrometer can be used to measure heat given off when a motor has friction – can tell if bearings are bad
- A stroboscope can be used to measure vibration in shafts – strobe light