**Electricity for the Stage – Stage Lighting Revealed (pg 81)**

Introduction to electricity is to first know that the one’s in charge of this logistics is the National Electrical Code.

The NEC has formulated three components of electricity that we will become familiar with throughout this semester.

They are the following:

*Voltage* – the flow of electrical current in any given circuit. Voltage short cut name is volts, V, or E (energy).

The flow of electrical current in a circuit depends on how much of these negative points travels to the positive point and back, creating a back and forth charge between the two points. This established path of electrical flow is called a circuit.

1. Volts create 1 part of a circuit due to the flow of electrical current or the force of free electrons.
2. The typical flow of electrical current formulate in a household circuit is 110volts min. to 120volts max. in the US.
3. The flow of this electrical current that keeps a charge between the negative and positive points constantly is alternating current or **AC power**.
4. Voltage is also known as “electromotive force” because the negative point – to that of the position point + it creates a free electron or electrical path of energy to flow. It is only when that electron that is removed from the atom itself, does it create the free electron to be released which formulates electricity and creates voltage or as an electromotive force, (EMF).

This can be established a number of ways the freeing of this electron by a. friction, sunlight, heat, compression, or other phenomena on certain substances and generators.

Metals are a great conductor for electrical flow of current because metal itself when the material has an electron that is removed by friction (rubbing together) for example. One of the best metal conductors is copper, because the copper’s compound or make up has an orbital structure where a single electron is easily dislodged, only a small force or voltage is created.

Other metals: aluminum, nickel, platinum, lead, iron, gold, tin, chromium…etc

Direct current (DC power) - is created when the free electron is released but is not returned or does not travel in the circuit. The electron does not have the capability to return to the atom and recharge itself. The free electron travels in only one direct, out! As the text book states that you will find low voltage in equipment that uses DC power.

Main example of DC power are **batteries,** have a positive and negative points of travel in one direction only. The voltage or free electrons travels out giving power, and does not alternate. Examples of battery operated items: car, iPods, cell phones, remote controls –garage, TV, or stereo, or laptops.

*Wattage* – the amount of power needed for the circuit. The rate of doing work or the power used to create electricity. Wattage short cut name is watts, W, or P (power). Pg 81 text, Stage Lighting Revealed

The wattage is a rate to reflect the amount of power it consumes in order to properly serve function to its circuit. Keep in mind that watts create the 2nd part of a circuit. It gives the circuit the amount of power, the NEC gives each circuit a certain amount of power per. Watts can be dimmed, when this is a capability the dimmer is given a maximum total of power capacity or load.

1. Wattage is rated by overall circuit, some manufacturer’s rate dimmers by amperage. You would have to convert the amperage to watts to know what the rate load capacity that is available.

Watt is the power used to create electricity, whether it is to heat an iron, power up a blender, cause of a lamp or light bulb to glow, or turning on an electric motor. The flow of this unit is never consumed it is recycled and kept, providing the circuit a consistent measured flow of electricity.

*Amperes* – the rate or intensity of the current flow through a conductor that passes a given point within a given (1 second) or time period.

Example: ^----^ takes one sec then ^----^----^ takes 2 seconds

1. Amperes is also known as amperage, amps, A, or I (intensity).
2. Amperage is used to describe a circuit’s electrical capacity, for example most stage circuits are 20 amps, while household circuits are 15amps to 20amps, all defined by NEC.

Keep in mind the amps are the 3rd part of a creating a fully functioning circuit. Amps are found on fuses, plus, receptacles, circuit breakers, stage dimmers, sound or lighting equipment and most electrical gear.

*Ohms* = (R) for resistance -measures the resistance in the flow of the electrical current. Every substance offers some resistance to the flow of electrical current, such as copper offers very little resistance – while others such as rubber, offers a great deal of resistance. This just means that the material does not support an easy flow of electricity.

Other materials that do not support an easy flow of electrical flow are: fiberglass, rubber, wood, concrete, plastics….

Ohm is mainly covered in whole lot in audio, that component deals with a lot more resistance than lighting does.

*An ELECTRIC CIRCUIT is measured by VOLTS, AMPS, OHMS and WATTS*

*Watts, Volts and Amps or Power, Energy and Intensity, which is important for you to remember when setting up large electrical gear.*

**Cable Amperes – pg 156 text**

Types of cable

Types of cable for stage, studio, film, or house are rated by a cable or chord. Each cable/chord has a jacket or protective covering, that covering provides a resistant to certain elements. As we just spoke about in Ohms this is where that type of resistance is also introduced.

SO = Solids and Oils, SJ = Solids and Chemical Substances, SJO= Solids, Chemical Substances and Oils.

Other cable types are SOW = Solids, Oils and Water, SJOW = Solids, Chemical Substances, Oils, and Water

Rated for either indoor or outdoor use, check with UL (Underwriters Laboratories definitions of power cables), there are over two dozen of

Commonly used stage cable amps

**Gauge Amperage**

18 ………………….3

16 ….…….…………6

14 …….……………15

12 ……..…………..20

10 …………………..25

08 ……..……………35

06 …………………..50

04 …………………..65

02 …………………..90

The lower the gauge number you can assume the higher the amperage rate of the cable.