GLOSSARY OF LIGHTING AND ELECTRONIC TERMS

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ABSTRACT

This glossary of lighting and electronic terms is presented as an aide to the user of JKL's product line of lamps and lighting accessories. Many of the specialized terms used in JKL's applications information, specifications and literature will be defined.

A

A/D Converter: Analog to digital converter.

Active Component: A component capable of voltage or current gain or switching.

AGC: Automatic gain control.

Ambient: Associated with a given environment.

Ampere: A unit of electrical current or rate of flow of electrons. One volt across 1 ohm equals 1 ampere. *Abbreviation: AMP*.

Analog: Representation of one quantity by means of another quantity proportional to the first.

Angle of Incidence: The angle between a wave or beam striking a surface and a line perpendicular to that surface.

Anode: Positive electrode

B

Ballast Resistor: A series resistance used to maintain a constant lamp current.

Ballast: The electrical device required for all discharge lamps that limit current throughout the lamp. Additional functions may be incorporated in the basic unit such as starting circuits and dimming controls.

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Bias: Voltages or currents required by an element for proper operation. Transistors and tubes require dc bias; transducers, sometimes use A/C biases.

Bifilar: Two wires or filaments wound side by side.

Borosilicate Glass: A glass with a low coefficient of expansion usable at high temperatures commonly used for lamp envelopes.

Buffer: A circuit that increases the driving capability of a signal.

C

Cathode: Negative electrode.

CCFL: Cold Cathode Fluorescent Lamp

CCFT: Cold Cathode Fluorescent Tube.

Celsius Temperature Scale (C°): Also called centigrade temperature scale. Zero°C = freezing point of water, 100°C = boiling point of water. 1.8C°(+32F°)

Choke: Inductance used to block current above a certain frequency.

Chromaticity: The color of light, as defined by its chromaticity coordinates, generally using the CIE diagram.

CIE Chromaticity Coordinates: Typically, the Cartesian coordinates used to define a color in the 1931 CIE color space. They are designated as x, y, z and are the ratios of each of the tristimulus values X, Y and Z in relation to the sum of the three. A latter but less used CIE 1976 system is available using u'/v' coordinates.

CIE Tristimulus Colorimeter: An instrument used to measure color-using tristimulus

CIE Tristimulus Values: The CIE tristimulus values represent the red, green and the blue stimuli required to match a color and are designated as X, Y and Z.

CIE: The Commission Internationale d' Eclairage (CIE) is the international commission on illumination; they are devoted to international cooperation in the field of lighting.

CIELAB: The internationally accepted color space model used as a standard to define color within many industries. This 3-dimensional model designates L for the lightness axis, a for the red-green axis, and b for the yellow-blue axis.

Clock: Pulse generator supplying synchronizing signals to various components of a digital system.

Color Rendering Index (CRI): Method of determining color shift of a test object under white light from a test lamp in relation to a standard lamp at the same color temperature.

Common Mode: Applied to both sides of a balanced line or amplifier simultaneously.

Contact Potential: Millivoltage appearing across the junction of two dissimilar metals.

Correlated Color Temperature: Term used to describe the color of white light sources. Specifically, it is the temperature of a Planckian (blackbody) radiator, which produces the

Chromaticity most similar to that of the light source. It is usually expressed in degrees Kelvin.

D

D/A Converter: Digital to analog converter.

Damp: To make oscillation come to rest.

Darlington Connection: Two transistors with the emitter of the first feeding the base of the second, providing a current gain of B1B2.

Decoupling: Filtering to prevent undesired A/C signal coupling.

Degauss: To move residual permanent magnetization.

Differential: Applied between the two sides of a balanced line or amplifier.

Diffuser: Device or material used to scatter light.

Direct Coupling: Coupling of two stages or circuits by a wire, resistor or battery.

Dominant Wavelength: A single wavelength of light often expressed in nm (nano-meters) that matches the chromaticity of a source when combined in suitable proportions and intensity with white light.

Dumet: This is the name of an alloy composite, commonly in the form of wire, of 42% nickel, 58% iron, with a cladding of OFHC copper to the extent of 18-28% by weight. Dumet is widely used in lamps and electron tubes as electrical lead-wires and feedthroughs.

Duty Factor: Ratio of working time to total time.

E

Electrode: The elements in a discharge lamp, which are used to introduce the electrical field, inducing ionization of the fill gasses. The elements in a tungsten filament lamp which start as the exterior leads and pass through the glass envelope providing an attachment point for the filament providing the electrical current.
EMI: Electromagnetic interference.

Encapsulation: Insulation coating around an electronic device, an epoxy or other resin material is often used. The cured resin material forms the device exterior surface after it has been removed from the encapsulation mold.

ESD: Electrostatic discharge damage.

F

Faraday Shield: An electromagnetic shield that passes magnetic and or electromagnetic fields.

Ferrite: A powdered magnetic material compressed and bonded into a desired shape; used as a core for inductors; capable of high Q at high frequencies.

Filter Photometer: A photometer that incorporates a filter with a response to match the CIE photopic function. Photopic quantities are obtained directly by measuring the light after it passes through the filter.

Fluorescence: Emission of light by a substance when exposed to radiation or impact of particles; ceases within a few nanoseconds after bombardment.

Fuse: A protective device that opens a circuit on overcurrent.

G

Gaussian Distribution: A continuous symmetrical distribution of data about the mean; normal distribution, bell curve.

Getter: Metal alloy used to remove residual gasses in a discharge lamp.

H

Harmonic: A sinusoid having a frequency that is an integral multiple of the fundamental frequency.

Hermetic Seal: A seal preventing the passage of air, water, vapor, or other gases.

Hue: The attribute of color by which a color is perceived to be red, green, blue, yellow etc. Achromatic colors like black; white and gray do not exhibit hue.

Hysteresis: A lag effect similar to mechanical friction, sometimes expressed by the graphic words "slop," "stickiness," or "dead zone."

I

Illuminance: Luminous flux incident on a surface per unit area. The SI unit of illuminance is the Lux (lumen/m2) and the English unit of illuminance is the foot-candle (lumen/ft2). 1 lux =0.0929 fc and reciprocally 1 fc=10.76 lux.

Impedance: (z) A measure, in ohms, of the opposition to current flow in an ac circuits. Includes resistance and reactance.

Incandescence: The emission of light by raising a material to a high temperature.

Infant Mortality: The occurrence of premature catastrophic-type failures at a rate substantially greater than that observed during life prior to wearout.

Infrared (IR): Invisible energy above 780nm.

Integrated: A multitude of parts brought together and made one.

Integrating Sphere: Spherical enclosure with diffuse reflecting walls includes ports for sensor and test lamp. Used for equipment to determine flux and average color.

Interface: The circuitry or connections between a computer and an I/O device such as a thermistor or a line printer.

Inverter: A device for converting DC to AC by switching DC alternately in inverted polarity.

J

Jack: A connector into which a plug may be inserted.

K

Kelvin: (K) SI unit of temperature in reference to absolute zero -273.16 centigrade. Used to express the color temperature of a white light source.

L

Lambertian Surface: A perfectly diffusing surface, which has a uniform intensity regardless of the angle of view or area of surface viewed.

Life Test: The test of a component or unit under the conditions which approximate, or simulate by acceleration, a normal lifetime of use. The test is performed to determine life expectancy or reliability throughout a predetermined life expectancy.

Light Guide: See light pipe.

Light Pipe: A transparent plastic rod, sheet, or molded shape that transmits light from one end to the other, whether rigid or flexible, straight or bent. Molded version's are often made from acrylic or polycarbonate.

Load: The device that receives the output of a signal source.

LPW: Lumen Per Watt, rating of the efficiency of a light source.

Lumen: SI equivalent of M.S.C.P (Mean Spherical Candlepower), M.S.C.P4(=lumen.

Luminance: Luminous flux emitted from a surface; per unit solid angle, per unit area, in a given direction. The SI unit is the Nit (cd/m 2) and the English unit is the footlambert [1/(x cd/ft2]. One cd/m2 = 0.2919 fL and reciprocally 1 fL = 3.426 cd/m2. Nit is derived from Nitere a Latin word expressing lights or sparkles.

Luminescent: A material, which gives off light when, stimulated from an external energy source. Readmission of light from a material at a longer wavelength than the stimulating wavelength, in relation to Stoke's law.

Luminous Flux: Radiant flux weighed by the 1931 CIE photopic V (() function. The SI unit of luminous flux is the Lumen. The luminous flux per steradian from a source whose luminous intensity is one candela is one lumen. See also Lumen.

Luminous Intensity (Candlepower): The luminous flux per unit solid angle emitted or reflected from a point source. The SI unit is the candela.

M

Metamerism: producing the same color sensation to an observer-using source with different spectral energy components.

MTBF: Mean Time Before failure

MTTF: Mean Time To failure

MTTFF: Mean Time to First Failure

N

NC: (1) normally closed (2) no connection.

Negative Impedance: Also called negative resistance because there is not any inductance or capacitance in the circuit. A characteristic of certain electrical devices or circuits, instead of increasing, the voltage decreases when the current is increased and vice-versa.

Neon Bulb: A glass envelope filled with neon gas and containing two or more insulated electrodes. The tube will not conduct until the potential difference between two electrodes reaches the firing, or ionization potential, and will remain conductive until the voltage is reduced to the extinction level.

Nit: See Luminance.

O

Operating Life: The minimum length of times which a component, system, or device operates within specified tolerances.

P

Parasitic Oscillation: An undesirable high frequency oscillation caused by stray inductance or capacitance and at a frequency unrelated to the operating frequency.

Passive Component: A component that is not capable of amplification or switching action.

Penning gases: Aids in starting of mercury discharge lamps, argon is commonly used.

Pettier Effect: Heating or cooling of a junction of dissimilar metals when a current is passed through them.

Phase: The position of one waveform with respect to another of the same frequency, expressed in degrees, with 360(representing one complete cycle.

Phosphor: Chemical substances coating the inside of the glass envelope of a fluorescent lamp. The phosphor produces fluorescence when excited by 253.7nm ultraviolet radiation from the mercury discharge inside the lamp. In a white light CCFL, the phosphor coating is a tri-phosphor RGB (Red-Green-Blue) type. It is composed of individual red, green, and blue emitting phosphors.

Photometer: An instrument used to measure photometric quantities such as luminance, illuminance, luminous flux and luminous intensity.

Photometry: The science of measuring visible light based upon the response of an average human observer. Based on the photopic curve in the 380-780nm range.

Photonics: The broad range science and technology of light and UV/IR energy primarily in relation to electronics, radiometry, and photometry.

Photopic Vision: High light level human vision primarily utilizing the retinal cones in the 380-780nm energy range. Peak response is about 555nm for photopic vision.

Photoresistive: Changing resistance with light intensity.

Photovoltaic (PV): Generating a voltage as a result of light radiation.

Potting A rubber or plastic-insulating compound in which an assembly may be encapsulated for protection from vibration, moisture, etc.

Potting Shell: A casing which and electronic device is placed in and embedded with a resin material, epoxy is often used as the insulting embedding material.

Q

Quiescent: At rest, bias conditions without signal.

R

Radiometry: The measurement of radiation in the infrared, visible, and ultraviolet portion of the spectrum.

Radix: The base of a number system.

Relaxation Oscillator: An oscillator whose frequency is determined by the charging time of the RC circuit.

Residual Magnetism: The remaining magnetism in an electromagnet after the magnetizing current has been reduced to zero.

Resonance: The condition wherein the frequency of an externally applied force equals the natural oscillation frequency of a system.

Rheostat: A two-terminal variable resistor, especially one of high power rating.

Ringing: A damped oscillation following a step change in output.

Royer Oscillator: Common circuit configuration for inverters. Provides low voltage DC to high voltage AC step-up for operating cold cathode fluorescent lamps.

S

Saturation: The point at which increasing one quantity no longer has an effect on a second quantity; commonly applied to base current vs. collector current and to magnetizing current vs. magnetic flux. The attribute of color perception that expresses the degree of departure from gray of the same lightness.

Scotopic Vision: Low light level human vision utilizing the retinal rods of a dark-adapted eye. Peak response for scotopic vision is about 510nm, which shifted slightly lower than for photopic vision.

Significant Figure, Significant Digit: A part of a number whose true value is known, and is not simply the result of mathematical computation or zeros serving as placeholders.

Single-Ended: Having the signal appearing from one line to ground, rather than differentially between two lines balanced around ground.

Slewing: Moving as rapidly as possible from one point to another.

Solid State Device: A device that controls electric current within solid materials, as opposed to vacuum, gases, or liquids.

Spectroradiometer: An instrument to measure the spectral energy radiated by a source. The energy in the visible region of the spectrum can be used to calculate photometric and colorimetric parameters.

Spurious Signals: Unwanted signals of chance or questionable origin.

Square-Law Detector: One whose output is proportional to the square of the input.

Standard Illuminant: A series of spectral power distribution curves recommended by the CIE as standard light sources for light measurement. These are typically used as reference illuminants for calculating CIELAB. Examples are illuminants A, B, C. D55, D55, etc.

Steradian: The steradian is the unit of solid angle and it is the solid angle subtended at the center of a sphere by an area on its surface equal to the square of the radius. A sphere has 4(steradians.

Stray Capacitance: The capacitance introduced into a circuit by the leads, wires, connectors, PC-Board traces, housings, and circuit components. In relation to CCFL's with circuits, using A/C (alternating current) at certain frequencies the energy path may be by capacitative coupling. Two conductive materials with an air gap or insulating material may act as a capacitor allowing energy to pass from one surface to the other.

Strobe: To gate on and off at a regular rate.

Sync Pulse: In facsimile and television, a pulse transmitted at the end of a line or field to keep the transmitter and receiver in synchronism.

Synchronous: In time coincidence, in step.

T

Thermionic: producing emission of electrons by heating.

Transducer: A device that converts energy from one form to another, typically for the purposes of measurement or control.

Transient: A short pulse or oscillation, as opposed to steady-state conditions.

Trimmer: A small capacitor or resistor adjustable by screwdriver or thumbwheel for purposes of alignment.

Tristimulus Values: The values of three required for matching a color. The CIE tristimulus values are designated as X, Y, Z and can be used accurately to define a color.

U

Ultraviolet (UV): Energy in the 100-380nm range below the blue/violet visible spectrum.

Ultraviolet A: Energy in the 320-380nm range.

Ultraviolet B: Energy in the 280-320nm range.

Ultraviolet C: Energy in the 100-280nm range.

uW: Microwatt

V

V/F: Voltage to frequency conversion.

Vacuum Thermal converter (VTC): A true RMS measuring device consisting of a thermocouple mounted on an electrically heated wire in a sealed glass envelope with a vacuum. Accurately responds to very wide frequency ranges with high crest factors.

Virtual Ground: Not actually grounded, but at ground potential for purposes of most calculations.

Visible Light: Electromagnetic radiation in the spectral range from 380-780 nm that is visible to the human observer.

W

Weibull Distributions: Used to predict the percentage of failures of a population for various values of fatigue life.

X

Xenon: A rare gas used in small high-pressure arc lamps to produce a high-intensity source of light. Fill gas for stroboscopic flash lamps. Fill gas for producing UV radiation.

Z

Zener Diode: a type of semiconductor diode used in voltage limiting circuits; when voltage reaches a certain value, the device becomes a conductor.

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