



IEEE
Std 161-1971

IEEE Standard Definitions on Electron Tubes

IEEE Std 161-1971



PUBLISHED BY

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, Inc.
345 EAST 47 STREET, NEW YORK, N. Y. 10017



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Full document details: IEEE 161-1971

IEEE
Std 161-1971

(Revision of IEEE Std 160-1957
and IEEE Std 161-1962
[ANSI C60.4-1964])

IEEE Standard **Definitions on Electron Tubes**

Sponsored by
IEEE Group on Electron Devices

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Foreword

The IEEE Standard Definitions on Electron Tubes were originally developed within the Institute of Radio Engineers. In 1912, the year of its founding, the IRE appointed its first Standards Committee, and in 1913 it published its first report on definitions of terms, letter and graphic symbols, and methods of testing and rating equipment. Subsequent and expanded reports appeared in 1915, 1922, 1926, 1928, 1931, and 1933. In 1938, a further revision was divided into separate reports on electronics, electroacoustics, electrovisual devices, radio receivers, and transmitters and antennas. In 1950, the IRE published its first standard specifically limited to definitions of terms for electron tubes, a document that superseded portions of the 1938 report on electronics, and in 1957, an extensively revised standard superseded the 1950 standard as well as specialized definition standards on magnetrons (1952), gas-filled radiation counter tubes (1952), noise (1953), phototubes (1954), microwave tubes (1956), storage tubes (1956), TR and AR tubes (1956), and physical electronics (1956). Definitions Coordinator of 57 IRE 7.S2 (IEEE Std 160-1957) was C. H. Page. In 1962 the IRE published 62 IRE 7.S2 (IEEE Std 161-1962) which included a description of noise performance of amplifiers and receiving systems and clarified certain definitions in the 1957 standard; it was reviewed by Sectional Committee C60 of the American Standards Association (now the American National Standards Institute) and approved as ASA C60.4-1964. Definitions coordinator of 62 IRE 7.S2 was W. T. Wintringham.

The present document, IEEE Std 161-1971, consists of IEEE Std 160-1957 as revised in part by the clarified definitions of "noise factor" and "noise temperature" in IEEE Std 161-1962. In all other respects, the contents of this standard remain unchanged and reflect the present inactivity in the state-of-the-art.

In May 1971, the Standards Committee of the IEEE Group on Electron Devices reviewed the two documents and determined that the definitions were still current and authoritative. Following that review, on June 3, 1971, the IEEE Standards Committee approved the preparation of a revision that would combine the clarified definitions of IEEE Std 161-1962 and the IEEE Std 160-1957 vocabulary in a single document.

At the time it reviewed IEEE Std 161-1971, the Standards Committee of the Group on Electron Devices had the following members:

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IEEE Standard Definitions on Electron Tubes

Introduction

Many definitions in this standard are applicable to devices other than electron tubes — especially semiconductor devices. These definitions have been made as general as possible, but it should always be remembered, in interpreting these definitions that they are primarily written for electron tubes.

Electron-Tube Admittance. The familiar electron-tube coefficients have been generalized so that they apply to all types of linear electron-tube transducers at any frequency. The generalizations include the familiar low-frequency concepts. At sufficiently low frequencies, the effects of lead and socket reactance become negligible, and the admittances

herein defined reduce to the familiar low-frequency coefficients.

When reference is made to alternating voltage or current components, the components are understood to be small enough so that linear relations hold between the various alternating voltages and currents.

In this Standard, an n -terminal electron tube is represented by a generalized network or transducer having n terminals, to each of which is flowing a complex alternating component of the current, and between each of which and a reference point (which may or may not be one of the n -network terminals) is applied a complex alternating voltage. The terms carrying an asterisk (*) refer to this network.

Terms defined elsewhere in this standard are indicated by italics.

Accelerating Electrode. An *Electrode* to which a potential is applied to increase the velocity of the electrons or ions in the beam.

Admittance.* See:

Driving-Point Admittance (between the j th Terminal and the Reference Terminal of an n -Terminal Network).

Electrode Admittance (of the j th Electrode of an n -Electrode Electron Tube).

Gap Admittance, Circuit.

Gap Admittance, Electronic.

Interelectrode Transadmittance (j - l Interelectrode Transadmittance of an n -Electrode Electron Tube).

Short-Circuit Driving-Point Admittance (of the j th Terminal of an n -Terminal Network).

Short-Circuit Feedback Admittance (of an Electron-Tube Transducer).

Short-Circuit Forward Admittance (of an Electron-Tube Transducer).

Short-Circuit Input Admittance (of an Electron-Tube Transducer).

Short-Circuit Output Admittance (of an Electron-Tube Transducer).

Short-Circuit Transfer Admittance (from the j th Terminal to the l th Terminal of an n -Terminal Network).

Transfer Admittance (from the j th Terminal to the l th Terminal of an n -Terminal Network).

Amplification Factor.* The μ -Factor for a specified *Electrode* and the *Control Grid* of an *Electron Tube* under the condition that the *Anode Current* is held constant.

Note 1: In a *Triode* this becomes the μ -Factor for the *Anode* and *Control-Grid* electrodes.

Note 2: In multielectrode tubes connected as *Triodes* the term *Anode* applies to the combination of *Electrodes* used as the *Anode*.

Amplifier. See:

Class-A Amplifier.

Class-AB Amplifier.

Class-B Amplifier.

Class-C Amplifier.

Amplitude Response (Camera Tubes). See:

Square-Wave Response.

Amplitude Response Characteristic (Camera Tubes). See:

Square-Wave Response Characteristic.

Angle. See:

Angle, Maximum-Deflection.

Bunching Angle (in an Electron Stream).

Effective Bunching Angle (Reflex Klystrons).

Optimum Bunching Angle.

Transit Angle.

Angle, Maximum-Deflection. The maximum plane angle subtended at the *Deflection Center* by the usable *Screen* area.

Note: In this term the hyphen is frequently omitted.

Anode (Electron Tubes). An *Electrode* through which a

principal stream of electrons leaves the interelectrode space.

Anode Breakdown Voltage (Gas Tubes). See:

Breakdown Voltage (of an Electrode of a Gas Tube).

Anode Current. See: *Electrode Current.*

Anode Strap (Magnetrons). A metallic connector between selected anode segments of a *Multicavity Magnetron*, principally for the purpose of *Mode Separation*.

Anode Voltage. See: *Electrode Voltage.*

Anode Voltage Drop. See: *Tube Voltage Drop.*

Arc. A discharge of electricity through a gas, normally characterized by a voltage drop approximately equal to the ionization potential of the gas.

Arc-Back. The flow of a principal electron stream in the reverse direction owing to the formation of a *Cathode Spot* on an *Anode*, which results in a failure of the rectifying action.

Arc-Drop Loss (Gas Tubes). The product of the instantaneous values of *Tube Voltage Drop* and current averaged over a complete cycle of operation.

Arc-Drop Voltage (Gas Tubes). See:

Tube Voltage Drop.

Arc Loss (Switching Tubes). The decrease in radio-frequency power measured in a matched termination when a *Fired Tube*, mounted in a series or shunt junction with a waveguide, is inserted between a matched generator and the termination. In the case of a *Pre-TR Tube*, a matched output termination is also required for the tube.

Arc-Through (Multielectrode Gas Tubes). The loss of control resulting from the flow of a principal electron stream in the normal direction during a scheduled non-conducting period.

Astigmatism (Electron Optical). In an *Electron-Beam Tube*, a focus defect in which electrons in different axial planes come to focus at different points.

ATR (Anti-Transmit-Receive) Tube. A gas-filled radio-frequency switching tube used to isolate the transmitter during the interval for pulse reception.

Attenuator Tube. A gas-filled radio-frequency switching tube in which a gas discharge, initiated and regulated independently of radio-frequency power, is used to control this power by reflection or absorption.

Available Conversion Gain (of a Conversion Transducer). See:

Gain, Available Conversion (of a Conversion Transducer).

Available Power (at a Port). The maximum power which can be transferred from the *Port* to a load.

Note: At a specified frequency, maximum power transfer will take place when the impedance of the load is the conjugate of that of the source. The source impedance must have a positive real part.

Available-Power Gain (of a Two-Port Linear Transducer). See:

Gain, Available-Power (of a Two-Port Linear Transducer).

Available-Power Gain, Maximum (of a Two-Port Linear Transducer). See:

Gain, Available-Power, Maximum (of a Two-Port Linear Transducer).

Avalanche. The cumulative process in which charged particles accelerated by an electric field produce additional charged particles through collision with neutral gas molecules or atoms.

Average Electrode Current. The value obtained by integrating the instantaneous *Electrode Current* over an averaging time and dividing by the averaging time.

Background Counts (Radiation Counters). *Counts* caused by *Radiation* coming from sources other than that to be measured.

Backplate (Camera Tubes). The *Electrode* to which the stored charge image is capacitively coupled.

Backward Wave (Traveling-Wave Tubes). A wave whose group velocity is opposite to the direction of electron-stream motion.

Band-Pass Tube (TR and Pre-TR Tubes). See:

Broad-Band Tube (TR and Pre-TR Tubes).

Beam Alignment (Camera Tubes). An adjustment of the electron beam, performed on tubes employing *Low-Velocity Scanning*, to cause the beam to be perpendicular to the *Target* at the *Target* surface.

Beam Bending (Camera Tubes). Deflection of the scanning beam by the electrostatic field of the charges stored on the *Target*.

Beam-Deflection Tube. An *Electron-Beam Tube* in which current to an output *Electrode* is controlled by the transverse movement of an electron beam.

Beam-Indexing Color Tube. A *Color Picture Tube* in which a signal, generated by an electron beam after deflection, is fed back to a control device or element in such a way as to provide an image in color.

Beam Modulation, Percentage (Image Orthicons). One hundred times the ratio of 1) the *Signal Output Current* for highlight illumination on the tube to 2) the *Dark Current*.

Beam Power Tube. An *Electron-Beam Tube* in which use is made of directed electron beams to contribute substantially to its power-handling capability, and in which the *Control Grid* and the *Screen Grid* are essentially aligned.

Blemish (Charge-Storage Tubes). An imperfection of the storage surface which produces a spurious output.

Breakdown (in a Gas Tube). A runaway increase in an *Electrode Current*.

Breakdown Transfer Characteristic (Gas Tubes). A relation between the *Breakdown Voltage* of an *Electrode* and the current to another *Electrode*.

Breakdown Voltage (of an Electrode of a Gas Tube). The voltage of an *Electrode* at which *Breakdown* occurs to that *Electrode*.

Note 1: The *Breakdown Voltage* is a function of the other *Electrode Voltages* or currents and of the environment.

Note 2: In special cases where the *Breakdown Voltage* of an *Electrode* is referred to an *Electrode* other than the *Cathode*, this reference *Electrode* shall be indicated.

Note 3: This term should be used in preference to "Pickup Voltage," "Firing Voltage," "Startup Voltage," etc., which are frequently used for specific types of *Gas Tubes* under specific conditions.

Note 4: See:

Critical Grid Voltage (Multielectrode Gas Tubes)

Broad-Band Tube (TR and Pre-TR Tubes). A gas-filled fixed-tuned tube incorporating a band-pass filter of geometry suitable for radio-frequency switching.

Bunching. The action in a velocity-modulated electron stream that produces an alternating convection-current component as a direct result of the differences of electron transit time produced by the *Velocity Modulation*. See:

Optimum Bunching.

Overbunching.

Reflex Bunching.

Space-Charge Debunching.

Underbunching.

Bunching Angle (in an Electron Stream). In a given *Drift Space*, the average *Transit Angle* between the processes of *Velocity Modulation* and energy extraction at the same or different gaps. See also:

Effective Bunching Angle (Reflex Klystrons).

Bunching, Optimum. See:

Optimum Bunching.

Bunching Parameter. One-half the product of 1) the *Bunching Angle* in the absence of *Velocity Modulation* and 2) the depth of *Velocity Modulation*.

Note: In a reflex klystron the *Effective Bunching Angle* must be used.

Camera Tube. An *Electron Tube* for the conversion of an optical image into an electrical signal by a scanning process.

Capacitance.* See:

Cathode Interface (Layer) Capacitance.

Electrode Capacitance (n-Terminal Electron Tubes).

Gap Capacitance, Effective.

Input Capacitance (n-Terminal Electron Tubes).

Interelectrode Capacitance (j-l Interelectrode Capacitance C_{jl} of an n-Terminal Electron Tube).

Output Capacitance (n-Terminal Electron Tubes).

Short-Circuit Input Capacitance (n-Terminal Electron Tubes).

Short-Circuit Output Capacitance (n-Terminal Electron Tubes).

Short-Circuit Transfer Capacitance (Electron Tubes).

Signal Electrode Capacitance.

Target Capacitance (Camera Tubes).

Cathode (Electron Tubes). An *Electrode* through which a primary stream of electrons enters the interelectrode space. See also:

Cold Cathode.

Filament.

Hot Cathode (Thermionic Cathode).

Indirectly Heated Cathode (Equipotential Cathode, Unipotential Cathode).

Ionic-Heated Cathode.

Photocathode.

Semitransparent Photocathode.

Cathode Coating Impedance. The impedance, excluding the *Cathode Interface (Layer) Impedance*, between the base metal and the emitting surface of a coated *Cathode*.

Cathode Current. See:

Electrode Current.

Cathode Glow. A luminous layer which covers all or part of the *Cathode* in a *Glow-Discharge Tube*.

Cathode Heating Time (Gas Tubes). The time required for a *Cathode* to attain operating temperature under stated operating conditions.

Cathode Heating Time (Vacuum Tubes). The time required for the time rate of change of the *Cathode Current* to reach maximum value.

Note 1: All *Electrode Voltages* are to remain constant during measurement. The tube *Elements* must all be at room temperature at the start of the test.

Note 2: See: *Operation Time*.

Cathode Interface (Layer) Capacitance. A capacitance which, in parallel with a suitable resistance, forms an impedance approximating the *Cathode Interface Impedance*.

Note: Because the *Cathode Interface Impedance* cannot be represented accurately by the two-element RC circuit, this value of capacitance is not unique.

Cathode Interface (Layer) Impedance. An impedance between the *Cathode* base and coating.

Note: This impedance may be the result of a layer of high resistivity or a poor mechanical bond between the *Cathode* base and coating.

Cathode Interface (Layer) Resistance. The low-frequency limit of *Cathode Interface Impedance*.

Cathode Preheating Time. The minimum period of time during which the heater voltage should be applied before the application of other *Electrode* voltages.

Cathode-Ray Tube. An *Electron-Beam Tube* in which the beam can be focused to a small cross section on a surface and varied in position and intensity.

Cathode Spot (of an Arc). An area, on the *Cathode* of an *Arc*, from which the electron emission density is extremely high.

Cell-Type Tube (TR, ATR, and Pre-TR Tubes). A gas-filled radio-frequency switching tube which operates in an external resonant circuit. A tuning mechanism may be incorporated in either the external resonant circuit or the tube.

Characteristic. See:

Breakdown Transfer Characteristic (Gas Tubes).

Constant-Current Characteristic.

Control Characteristic (Gas Tubes).

Counting-Rate-vs-Voltage Characteristic.

Decay Characteristic.

Diode Characteristic (Multielectrode Tubes).

Dynamic Characteristic (Electron Tubes).

Electrode Characteristic.

Emission Characteristic.

Grid Characteristic.

Grid-Drive Characteristic.

Knee of Transfer Characteristic (Image Orthicons).

Load (Dynamic) Characteristic (Electron Tubes Connected in a Specified Operating Circuit at a Specified Frequency).

Persistence Characteristic (Camera Tubes).

Persistence Characteristic (Decay Characteristic) (of a Luminescent Screen).

Spectral Characteristic (of a Luminescent Screen).

Spectral Sensitivity Characteristic (Camera Tubes or Phototubes).

Square-Wave Response Characteristic (Camera Tubes).

Static Characteristic (Electron Tubes).

Transfer Characteristic.

Transfer Characteristic (Camera Tubes).

Charge-Storage Tube. A *Storage Tube* in which information is retained on a surface in the form of electric charges.

Circuit Efficiency (of the Output Circuit of Electron Tubes). The ratio of 1) the power at the desired frequency delivered to a load at the output terminals of the output circuit of an oscillator or amplifier to 2) the power at the desired frequency delivered by the electron stream to the output circuit.

Circuit Gap Admittance. See:

Gap Admittance, Circuit.

Class-A Amplifier. An amplifier in which the *Grid Bias* and alternating *Grid Voltages* are such that *Anode Current* in a specific tube flows at all times.

Note: The suffix 1 is added to the letter or letters of the class identification to denote that *Grid Current* does not flow during any part of the input cycle. The suffix 2 is used to denote that current flows during some part of the cycle.

Class-AB Amplifier. An amplifier in which the *Grid Bias* and alternating *Grid Voltages* are such that *Anode Current* in a specific tube flows for appreciably more than half but less than the entire electrical cycle.

Note: The suffix 1 is added to the letter or letters of the class identification to denote that *Grid Current* does not flow during any part of the input cycle. The suffix 2 is used to denote that current flows during some part of the cycle.

Class-B Amplifier. An amplifier in which the *Grid Bias* is approximately equal to the cutoff value so that the *Anode Current* is approximately zero when no exciting *Grid Voltage* is applied, and so that *Anode Current* in a specific tube flows for approximately one half of each cycle when an alternating grid voltage is applied.

Note: The suffix 1 is added to the letter or letters of

the class identification to denote that *Grid Current* does not flow during any part of the input cycle. The suffix 2 is used to denote that current flows during some part of the cycle.

Class-C Amplifier. An amplifier in which the *Grid Bias* is appreciably greater than the cutoff value so that the *Anode Current* in each tube is zero when no alternating *Grid Voltage* is applied, and so that *Anode Current* in a specific tube flows for appreciably less than one half of each cycle when an alternating *Grid Voltage* is applied.

Note: The suffix 1 is added to the letter or letters of the class identification to denote that *Grid Current* does not flow during any part of the input cycle. The suffix 2 is used to denote that current flows during some part of the cycle.

Cloud Pulse (Charge-Storage Tubes). The output resulting from *Space-Charge* effects produced by the turning on or off of the electron beam.

Cold Cathode. A *Cathode* whose operation does not depend on its temperature being above the ambient temperature.

Cold-Cathode Tube. An *Electron Tube* containing a *Cold Cathode*.

Collector. An *Electrode* that collects electrons or ions which have completed their functions within the tube.

Color Cell. In a repeating pattern of phosphors on the *Screen* of a *Color Picture Tube*, the smallest area containing a complete set of all the primary colors contained in the pattern.

Note: If the cells are described by only one dimension as in the line type of *Screen*, the other dimension is determined by the resolution capabilities of the tube.

Color Center (Color Picture Tubes). A point or region (defined by a particular color-selecting electrode and *Screen* configuration) through which an electron beam must pass in order to strike the phosphor array of one primary color.

Note: This term is *not* to be used to define the *Color Triad* center of a *Color Picture Tube Screen*.

Color Field Corrector. A device located external to the tube producing an electric or magnetic field which affects the beam after deflection as an aid in the production of uniform color fields.

Color Picture Tube. An *Electron Tube* used to provide an image in color by the scanning of a *Raster* and by varying the intensity of excitation of phosphors to produce light of the chosen primary colors.

Color Plane (Multibeam Color Picture Tubes). A surface approximating a plane containing the *Color Centers*.

Color Purity Magnet. A magnet in the neck region of a *Color Picture Tube* to alter the electron beam path for the purpose of improving color purity.

Color-Selecting-Electrode System. A structure containing a plurality of openings mounted in the vicinity of the *Screen* of a *Color Picture Tube*, the function of this structure being to cause electron impingement on the proper *Screen* area by using either masking, focusing,

deflection, reflection, or a combination of these effects.

Note: For examples, see:

Shadow Mask.

Focusing and Switching Grille.

Color-Selecting-Electrode System Transmission. The fraction of incident primary electron current which passes through the *Color-Selecting-Electrode System*.

Color Triad (of a Phosphor-Dot Screen). A *Color Cell* of a three-color phosphor-dot *Screen*.

Commutation Factor (Gas Tubes). The product of the rate of current decay and the rate of the inverse voltage rise immediately following such current decay.

Note: The rates are commonly stated in amperes per microsecond, and volts per microsecond.

Composite Controlling Voltage. The voltage of the *Anode* of an *Equivalent Diode* combining the effects of all individual *Electrode Voltages* in establishing the *Space-Charge-Limited Current*.

Compression Ratio (Gain or Amplification). The ratio of 1) the magnitude of the gain (or amplification) at a reference signal level to 2) its magnitude at a higher stated signal level.

Condensed-Mercury Temperature. The temperature measured on the outside of the tube envelope in the region where the mercury is condensing in a glass tube, or measured at a designated point on a metal tube.

Conductance. See:

Conductance for Rectification.

Conversion Transconductance (of a Heterodyne Conversion Transducer).

*Electrode Conductance.**

Equivalent Conductance (A TR Tubes).

Equivalent Noise Conductance.

*Interelectrode Transconductance (j-l Interelectrode Transconductance).**

Conductance for Rectification. The quotient of 1) the *Electrode* alternating current of low frequency by 2) the in-phase component of the *Electrode* alternating voltage of low frequency, a high-frequency sinusoidal voltage being applied to the same or another *Electrode* and all other *Electrode Voltages* being maintained constant.

Constant-Current Characteristic. The relation between the voltages of two *Electrodes* with the current to one of them as well as all other voltages maintained constant.

Contact Potential Difference. The difference between the *Work Functions* of two materials, divided by the electronic charge.

Control Characteristic (Gas Tubes). A relation between *Critical Grid Voltage* and *Anode Voltage*.

Control Electrode. An *Electrode* used to initiate or vary the current between two or more *Electrodes*.

Control-Electrode Discharge Recovery Time (Attenuator Tubes). The time required for the *Control-Electrode* discharge to deionize to a level such that a specified fraction of the *Critical High-Power Level* is required to ionize the tube.

Control Grid. A *Grid*, ordinarily placed between the *Cathode* and an *Anode*, for use as a *Control Electrode*.

Control Ratio (Gas Tubes). The ratio of the change in *Anode Voltage* to the corresponding change in *Critical Grid Voltage*, with all other operating conditions maintained constant.

Convection Current. In an electron stream, the time rate at which charge is transported through a given surface.

Convection-Current Modulation. The time variation in the magnitude of the *Convection Current* passing through a surface, or the process of directly producing such a variation.

Convergence (Multibeam Cathode-Ray Tubes). A condition in which the electron beams intersect at a specified point.

Convergence, Dynamic (Multibeam Cathode-Ray Tubes). The process whereby the locus of the point of convergence of electron beams is made to fall on a specified surface during scanning.

Convergence Electrode. An *Electrode* whose electric field converges two or more electron beams.

Convergence Magnet. A magnet assembly whose magnetic field converges two or more electron beams.

Convergence Plane (Multibeam Cathode-Ray Tubes). A plane containing the points at which the electron beams appear to experience a deflection applied for the purpose of obtaining *Convergence*.

Convergence Surface (Multibeam Cathode-Ray Tubes). The surface generated by the point of intersection of two or more electron beams during the scanning process.

Conversion Transconductance (of a Heterodyne Conversion Transducer). The quotient of 1) the magnitude of the desired output-frequency component of current by 2) the magnitude of the input-frequency (signal) component of voltage when the impedance of the output external termination is negligible for all of the frequencies which may affect the result.

Note: Unless otherwise stated, the term refers to the cases in which the input-frequency voltage is of infinitesimal magnitude. All direct *Electrode Voltages* and the magnitude of the local-oscillator voltage must remain constant.

Conversion Transducer. An electric transducer in which the input and the output frequencies are different.

Note: If the frequency-changing property of a *Conversion Transducer* depends upon a generator of frequency different from that of the input or output frequencies, the frequency and voltage or power of this generator are parameters of the *Conversion Transducer*.

Conversion Voltage Gain (of a Conversion Transducer). See:

Gain, Conversion Voltage (of a Conversion Transducer).

Converter Tube. An *Electron Tube* that combines the mixer and local-oscillator functions of a *Heterodyne Conversion Transducer*.

Count (Radiation Counters). A single response of the counting system.

Note: See also:

Tube Count.

Counter Tube, Externally Quenched. A radiation-counter tube that requires the use of an external quenching circuit to inhibit *Reignition*.

Counter Tube, Gas-Filled, Radiation. A *Gas Tube* used for detection of *Radiation* by means of gas ionization.

Counter Tube, Gas-Flow. A radiation-counter tube in which an appropriate atmosphere is maintained by a flow of gas through the tube.

Counter Tube, Geiger-Mueller. A radiation-counter tube operated in the *Geiger-Mueller Region*.

Counter-Tube, Proportional. A radiation-counter tube operated in the *Proportional Region*.

Counter Tube, Self-Quenched. A radiation-counter tube in which *Reignition* of the discharge is inhibited by internal processes.

Counting Efficiency (Radiation-Counter Tubes). The average fraction of the number of ionizing particles or quanta incident on the *Sensitive Volume* that produce *Tube Counts*. The operating conditions of the counter and the condition of irradiation must be specified.

Counting-Rate-vs-Voltage Characteristic. The relation between counting rate and voltage applied to a radiation-counter tube for constant *Radiation* intensity.

Coupling Coefficient, Small Signal (for an Electron Stream). The ratio of 1) the maximum change in energy of an electron traversing the *Interaction Space* to 2) the product of the *Peak Alternating Gap Voltage* by the electronic charge.

Critical Anode Voltage (Multielectrode Gas Tubes). Synonymous with *Anode Breakdown Voltage (Gas Tubes)*.

Critical Field (Magnetrons). The smallest theoretical value of steady magnetic flux density, at a steady *Anode Voltage*, that would prevent an electron emitted from the *Cathode* at zero velocity from reaching the *Anode*.

Critical Grid Current (Multielectrode Gas Tubes). The *Grid Current* corresponding to the *Critical Grid Voltage*, before anode *Breakdown*.

Note: The *Critical Grid Current* is a function of the other *Electrode Voltages* or currents and of the environment.

Critical Grid Voltage (Multielectrode Gas Tubes). The *Grid Voltage* at which anode *Breakdown* occurs.

Note 1: The *Critical Grid Voltage* is a function of the other *Electrode Voltages* or currents and of the environment.

Note 2: See:

Breakdown Voltage (of an Electrode of a Gas Tube).

Critical High-Power Level (Attenuator Tubes). The radio-frequency power level at which ionization is produced in the absence of a *Control-Electrode* discharge.

Critical Voltage (Magnetrons). The highest theoretical

value of steady *Anode Voltage*, at a given steady magnetic flux density, at which electrons emitted from the *Cathode* at zero velocity would fail to reach the *Anode*.

Current. See:

Average Electrode Current.

Convection Current.

Critical Grid Current (Multielectrode Gas Tubes).

Dark Current.

Electrode Current (Electron Tubes).

Electrode Dark Current (Camera Tubes or Phototubes).

Equivalent Noise Current.

Fault Electrode Current.

Field-Free Emission Current (of a Cathode).

Inflection-Point Emission Current.

Gas (Ionization) Current (Vacuum Tubes).

Inflection-Point Emission Current.

Inverse Electrode Current.

Peak Cathode Current (Steady State).

Peak Electrode Current.

Preoscillation Current.

Signal Output Current (Camera Tubes or Phototubes).

Space-Charge-Limited Current (Vacuum Tubes).

Starting Current of an Oscillator.

Transfer Current (Gas Tubes).

Current Amplification (Multiplier Phototubes). The ratio of 1) the *Signal Output Current* to 2) the photoelectric signal current from the *Photocathode*.

Current Generator. A two-terminal circuit element with a terminal current independent of the voltage between its terminals.

Note: A *Current Generator* has zero internal admittance.

Cutoff Field (Magnetrons). See:

Critical Field (Magnetrons).

Cutoff Voltage (Electron Tubes). That *Electrode Voltage* which reduces the value of the dependent variable of an *Electron Tube* characteristic to a specified low value.

Note: A specific cutoff characteristic should be identified as follows: current-vs-grid-cutoff voltage, spot-brightness-vs-grid-cutoff voltage, etc.

Cutoff Voltage (Magnetrons). See:

Critical Voltage (Magnetrons).

Cyclotron Frequency. The frequency at which a charged particle traverses an orbit in a steady, uniform, magnetic field, and zero electric field.

Cyclotron-Frequency Magnetron Oscillations. Those oscillations whose frequency is substantially the *Cyclotron Frequency*.

Dark Current (Camera Tubes or Phototubes). See:

Electrode Dark Current.

Dead Time (Radiation Counters). The time interval, after the start of a *Count*, during which a *Radiation Counter* is insensitive to further *Ionizing Events*.

Note: See also:

Recovery Time.

DC Electron-Stream Resistance. The quotient of *Elec-*

tron-Stream Potential and the direct-current component of stream current.

Decay (Charge-Storage Tubes). The reduction in magnitude of stored charge by any cause other than *Erasing*.

Decay Characteristic. See:

Persistence Characteristic.

Decay Time (Charge-Storage Tubes). The time interval during which the magnitude of the stored charge decays to a stated fraction of its initial value.

Note: The fraction is commonly $1/e$, where e is the base of natural logarithms.

Decelerating Electrode (Electron-Beam Tubes). An *Electrode* the potential of which provides an electric field to decrease the velocity of the beam electrons.

Deflecting Electrode. An *Electrode* the potential of which provides an electric field to produce deflection of an electron beam.

Deflection Center. The intersection of the forward projection of the electron path prior to deflection and the backward projection of the electron path in the field-free space after deflection.

Deflection Factor (Cathode-Ray Tubes). The reciprocal of the *Deflection Sensitivity*.

Deflection Plane. A plane perpendicular to the tube axis containing the *Deflection Center*.

Deflection Sensitivity (Cathode-Ray Tubes). The quotient of the displacement of the electron beam at the *Target* or *Screen* by the change in the magnitude of the deflecting field.

Note: *Deflection Sensitivity* is usually expressed in millimeters (or inches) per volt applied between the *Deflecting Electrodes*, or in millimeters (or inches) per ampere in the deflecting coil.

Deflection Yoke. An assembly of one or more electromagnets to produce deflection of one or more electron beams.

Deflection-Yoke Pull-Back.

1) **Color.** The distance between the maximum possible forward position of the yoke and the position of the yoke to obtain optimum color purity.

2) **Monochrome.** The maximum distance the yoke can be moved along the tube axis without producing neck shadow.

Deionization Time (Gas Tubes). The time required for a tube to regain its preconduction characteristics after anode-current interruption.

Note: See also:

Recovery Time.

Depth of Velocity Modulation, Small-Signal. The ratio of the peak amplitude of the *Velocity Modulation* of an electron stream, expressed in equivalent volts, to the *Electron-Stream Potential*.

Diode (Electron Tube). A two-electrode *Electron Tube* containing an *Anode* and a *Cathode*.

Note: See also:

Equivalent Diode.