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Amplification Factor (μ) is a special case of mu-factor. It is the ratio of the change in plate voltage to a change in control-electrode voltage under the conditions that the plate current remains unchanged and that all other electrode voltages are maintained constant. It is a measure of the effectiveness of the control-electrode voltage relative to that of the plate voltage upon the plate current. The sense is usually taken as positive when the voltages are changed in opposite directions. As most precisely used, the term amplification factor refers to infinitesimal changes. 1E62

Class A Amplifier:* An amplifier in which the grid bias and the alternating grid voltages are such that plate current in a specific tube flows at all times. 1E69

The ideal class A amplifier is one in which the alternating component of the plate current is an exact reproduction of the form of the alternating grid voltage, and the plate current flows during the 360 electrical degrees of the cycle. The characteristics of a class A amplifier are low efficiency and output.

Class AB Amplifier:* An amplifier in which the grid bias and alternating grid voltages are such that plate current in a specific tube flows for appreciably more than half but less than the entire electrical cycle. 1E70

The characteristics of a class AB amplifier are efficiency and output intermediate to those of a class A and a class B amplifier. The idle plate current and attendant dissipation may be made substantially less than is possible with class A amplifiers. This amplifier has been called class A prime.

■ Definitions taken from the 1933 Report of the Standards Committee of the I.R.E. are followed by the definition number in the report.

* To denote that grid current does not flow during any part of the input cycle, the suffix 1 may be added to the letter or letters of the class identification. The suffix 2 may be used to denote that grid current flows during some part of the cycle.

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Class B Amplifier:* An amplifier in which the grid bias is approximately equal to the cutoff value so that the plate current is approximately zero when no exciting grid voltage is applied and so that plate current in a specific tube flows for approximately one half of each cycle when an alternating grid voltage is applied. 1E71

The ideal class B amplifier is one in which the alternating component of plate current is an exact replica of the alternating grid voltage for the half cycle when the grid is positive with respect to the bias voltage, and the plate current flows during 180 electrical degrees of the cycle. The characteristics of a class B amplifier are medium efficiency and output.

Class C Amplifier:* An amplifier in which the grid bias is appreciably greater than the cutoff value so that the plate current in each tube is zero when no alternating grid voltage is applied, and so that plate current in a specific tube flows for appreciably less than one half of each cycle when an alternating grid voltage is applied. 1E72

Class C amplifiers find application where high plate-circuit efficiency is a paramount requirement and where departure from linearity between input and output is permissible. The characteristics of a class C amplifier are high plate-circuit efficiency and high power output.

Control-Grid—Plate Transconductance (g_m) is the name for the plate-current-to-control-grid-voltage transconductance. This is ordinarily the most important transconductance and is commonly understood when the term "transconductance" is used. 1E56

Formerly it was known as mutual conductance. See definition of Transconductance.

Conversion Transconductance (g_c) is the quotient

* See preceding page.

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of the magnitude of a single beat-frequency component ($f_1 + f_2$) or ($f_1 - f_2$) of the output-electrode current by the magnitude of the control-electrode voltage of frequency f_1, under the conditions that all direct electrode voltages and the magnitude of the electrode alternating voltage f_2 remain constant and that no impedances at the frequencies f_1 or f_2 are present in the output circuit. As most precisely used, the term refers to infinitesimal changes. 1E60

When the performance of a frequency converter is determined, conversion transconductance is used in the same way as transconductance is used in single-frequency amplifier computations.

Deflection Factor of a cathode-ray oscillograph tube is the reciprocal of the deflection sensitivity. 3E11

Deflection Sensitivity of a cathode-ray oscillograph tube is the quotient of the displacement of the electron beam at the place of impact by the change in the deflecting field. It is usually expressed in millimeters per volt applied between the deflecting electrodes or in millimeters per gauss of the deflecting magnetic field. 3E10

Direct Capacitance between two electrodes in a multielectrode tube is the ratio of the charge placed on either electrode to its resulting change in potential above the other electrode when all remaining (n-2) electrodes are at the potential of the first electrode, the charge placed on the second electrode being equal to the sum of the charges placed on all the other electrodes.

Electrode Current is the current passing to or from an electrode through the vacuous space. 1E39

The terms grid current, anode current, plate current, etc., are used to designate currents passing to or from these specific electrodes.

Electrode Dissipation is the power dissipated in the

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form of heat by an electrode as a result of electron and/or ion bombardment. 1E46

Electrode Voltage is the voltage between an electrode and a specified point of the cathode. 1E40

The terms grid voltage, anode voltage, plate voltage, etc., are used to designate the voltage between these specific electrodes and the cathode.

Gas Amplification Factor of a phototube is the factor of increase in the sensitivity of a gas phototube due solely to the ionization of the contained gas. For a gas phototube having a structure such as to permit saturation to occur at a voltage (approximately 25 volts) less than that causing appreciable ionization, the gas amplification factor at a specified operating voltage is the ratio of the sensitivity measured at that voltage to the sensitivity measured at the saturation voltage. 4E5

Grid Driving Power is the average product of the instantaneous value of the grid current and of the alternating component of the grid voltage over a complete cycle. This comprises the power supplied to the biasing device and to the grid. 1E42

Input Capacitance of a vacuum tube is the sum of the direct capacitances between the control grid and the cathode and such other electrodes as are operated at the alternating potential of the cathode. This is not the effective input capacitance, which is a function of the impedances of the associated circuits. 1E67

Modulation Factor in an amplitude-modulated wave is the ratio of half the difference between the maximum and minimum amplitudes to the average amplitude.

In linear modulation the average amplitude of the envelope is equal to the amplitude of the unmodulated wave, provided there is no zero-frequency com-

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ponent in the modulating signal wave (as in telephony). For modulating signal waves having unequal positive and negative peaks, positive and negative modulation factors may be defined as the ratios of the maximum departures (positive and negative) of the envelope from its average value to its average value. (See Percentage Modulation.) 1T-39

Mu-Factor (**μ-factor**) is the ratio of the change in one electrode voltage to the change in another electrode voltage, under the conditions that a specified current remains unchanged and that all other electrode voltages are maintained constant. It is a measure of the relative effect of the voltages on two electrodes upon the current in the circuit of any specified electrode. As most precisely used, the term μ-factor refers to infinitesimal changes. 1E61

Output Capacitance of a vacuum tube is the sum of the direct capacitances between the output electrode (usually the plate) and the cathode and such other electrodes as are operated at the alternating potential of the cathode. This is not the effective output capacitance, which is a function of the impedances of the associated circuits. 1E68

Peak Forward Plate Voltage is the maximum instantaneous plate voltage in the direction in which the tube is designed to pass current. 1E43

Peak Inverse Plate Voltage is the maximum instantaneous plate voltage in the direction opposite to that in which the tube is designed to pass current. 1E44

Peak Plate Current is the maximum instantaneous plate current passing recurrently through the tube in the direction of normal current flow.

Percentage Modulation is the modulation factor expressed in per cent. 1T-40

Plate Resistance is the quotient of the alternating

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plate voltage by the in-phase component of the alternating plate current, all other electrode voltages being maintained constant. This is the effective parallel resistance and is not the real component of the electrode impedance. As most precisely used, the term refers to infinitesimal amplitudes.

Sensitivity of a phototube is basically defined as the quotient of the current through the tube by the radiant flux received by the cathode. The term "radiant flux" includes both visible radiation (light) and invisible infra-red and ultra-violet radiation. When stated in accordance with this basic definition, sensitivity is usually given in terms of microamperes per microwatt of radiant flux.

For convenience, sensitivity is frequently stated in terms of visible radiation only, and is then known as Luminous Sensitivity. When so stated, it is usually expressed in terms of microamperes per lumen of light flux, and depends on the color of the light or the spectral distribution of the radiant flux used to excite the phototube.

2870 Tungsten Sensitivity is the luminous sensitivity when the incident luminous flux is produced by a tungsten-filament lamp at a color temperature of 2870 degrees Kelvin.

When a phototube is used under steady illumination, its luminous sensitivity is known as Static Luminous Sensitivity. This is defined as the direct anode current produced by the light flux divided by the incident light flux of constant value.

When the light input to a phototube varies, as at audio frequency in sound reproduction, the luminous sensitivity is identified as Dynamic Sensitivity, and may be conveniently defined as the quotient of the amplitude of variation in anode current to the amplitude of variation in light input.

In high-vacuum phototubes, the dynamic sensitivity

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is ordinarily independent of frequency. In gas phototubes, the dynamic sensitivity falls off at the higher frequencies because there is a time lag between the current component produced by the secondary electrons resulting from excited atoms and positive ions arriving at the cathode. As the phase difference between these two components increases with increasing frequency of light variation, the net current variation decreases with consequent reduction in sensitivity. In the application of gas phototubes to audio frequencies, this effect is relatively unimportant but can be compensated for, if desired, in the design of the associated amplifier.

In the design of equipment utilizing phototubes, consideration should always be given to the effect of the time constant of the circuit consisting of the phototube and its associated load in reducing the performance capability of the phototube with increasing frequency.

Transconductance from one electrode to another is the quotient of the in-phase component of the alternating current of the second electrode by the alternating voltage of the first electrode, all other electrode voltages being maintained constant. As most precisely used, the term refers to infinitesimal amplitudes. 1E55

Tube Voltage Drop in a gas or vapor-filled tube is the plate voltage during the conducting period. 1E45