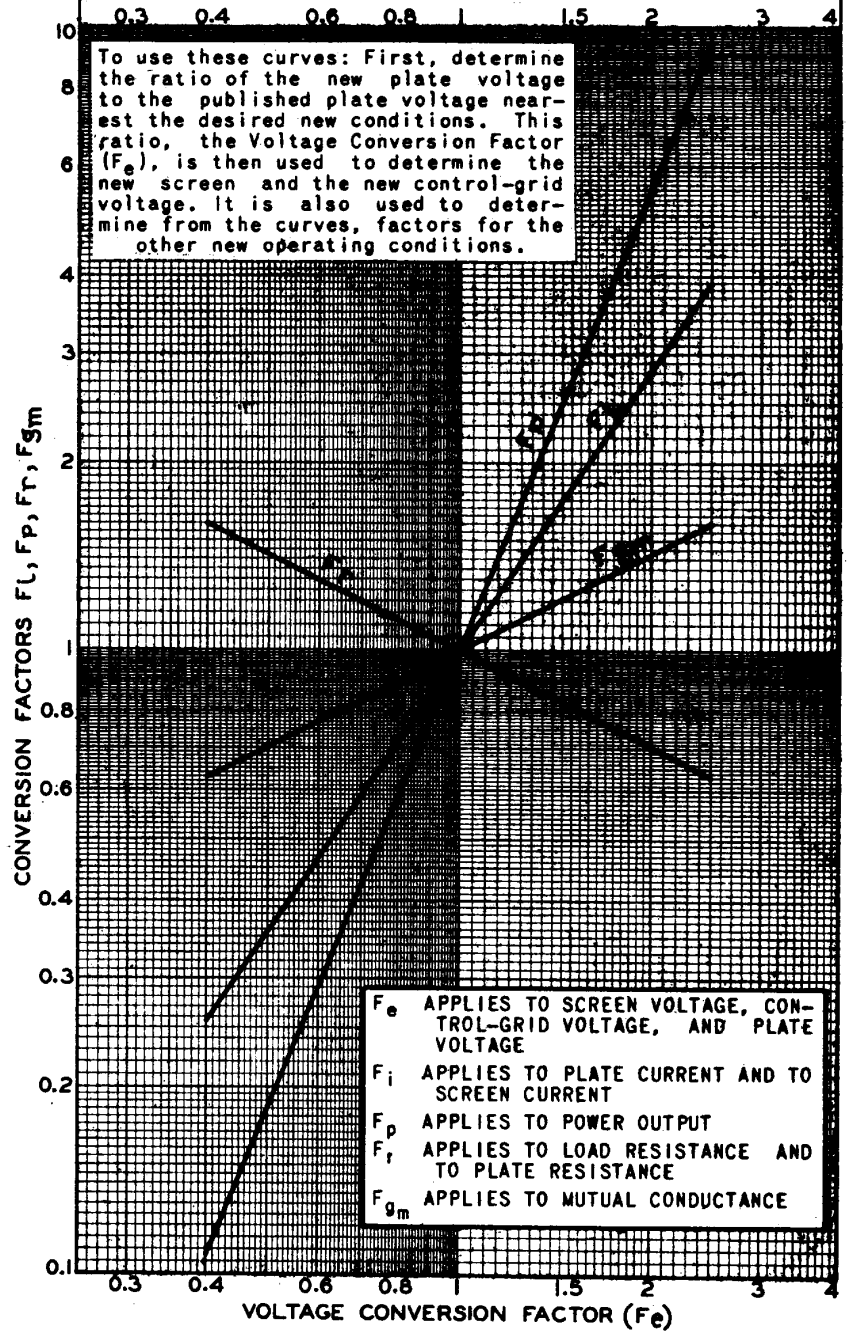
Cunningham Radiotron

CONVERSION FACTORS

FOR POWER AMPLIFIER TRIODES AND PENTODES

These curves are especially useful for calculating with fair accuracy from published operating conditions, other operating conditions to meet special plate voltage requirements.



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RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

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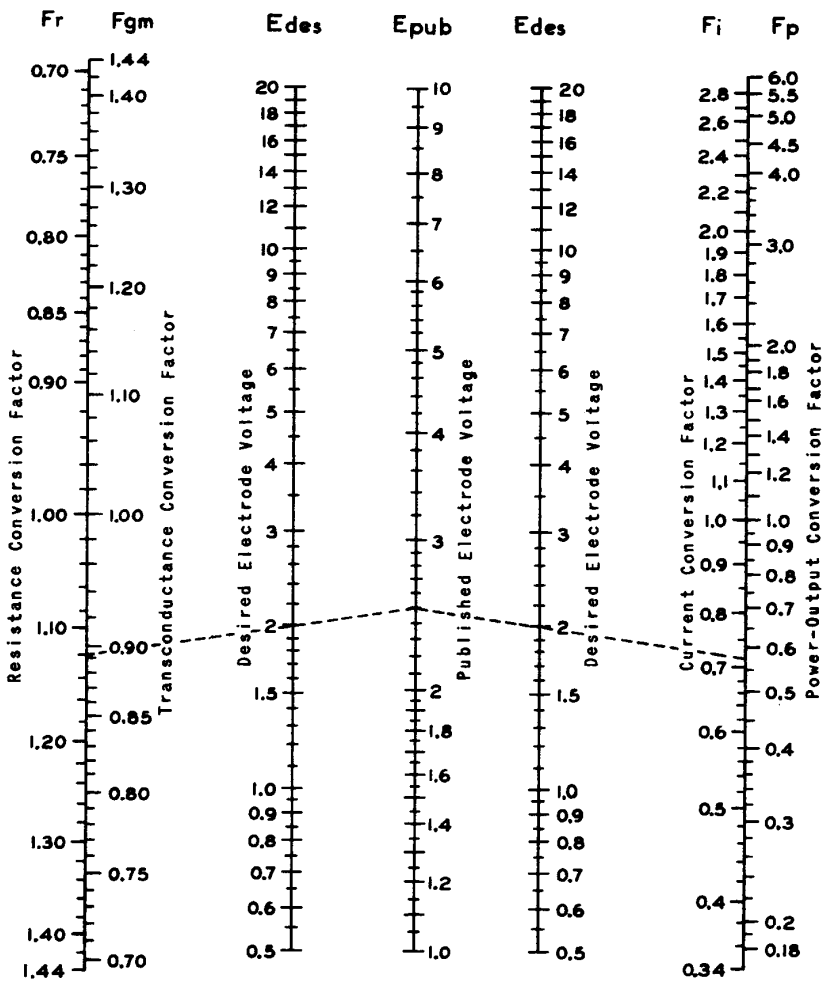
CONVERSION FACTORS



CONVERSION FACTOR NOMOGRAPH

The Conversion Factor Nomograph shown above may be used to determine the approximate characteristics of an electron tube when all the electrode voltages are changed in the same proportion from the published or measured values.

The conversion factors obtained from the nomograph are applicable to triodes, tetrodes, pentodes, and beam power tubes when the plate voltage, grid-No.1 voltage, and grid-No.2 voltage are changed simultaneously by the same factor. They may be used for any class of tube operation (class A, AB_1, AB_2, B, or C).

The nomograph may be used to determine the proper value for each conversion factor for a specified relationship (F_e)

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between published or measured values (E_{pub}) and desired values (E_{des}) of operating voltage. The dashed lines on the nomograph indicate the correct procedure for determining each of these conversion factors when it is desired to reduce the operating electrode voltage from 250 to 200 volts.

EXAMPLE

Published characteristics for a typical pentode are listed below for a plate voltage of 250 volts. If it is desired to determine the characteristics of this tube for a plate voltage of 200 volts, the voltage conversion factor, F_e, is equal to 200/250 or 0.8. The values for the other conversion factors are obtained from the nomograph. By use of these factors characteristics values at a plate voltage of 200 volts are obtained.

	Published Value	*Conversion Factor*	*Desired Value*	
Plate Voltage	250	0.8	200	volts
Grid-No.2 Voltage	250	0.8	200	volts
Grid-No.1 Voltage	-15	0.8	-12	volts
Plate Current	30	0.72	21.6	ma
Grid-No.2 Current	6	0.72	4.3	ma
Plate Resistance (Approx.). . .	0.13	1.12	0.15	megohm
Transconductance.	2000	0.89	1780	μmhos
Load Resistance	10000	1.12	11200	ohms
Total Harmonic Distortion . . .	10	unchanged	10	%
Max.-Signal Power Output. . . .	2.5	0.57	1.42	watts

LIMITATIONS

Because this method for conversion of characteristics is necessarily an approximation, progressively greater errors will be introduced as the voltage conversion factor ($F_e = E_{des}/E_{pub}$) departs from unity. In general, it may be assumed that results obtained will be approximately correct when the value of F_e is between 0.7 and 1.5. When F_e is extended beyond these limits (down to 0.5 or up to 2.0), the accuracy becomes considerably reduced and the results obtained can serve only as a rough approximation.

It should be noted that this method does not take into account the effects of contact potential or secondary emission in electron tubes. Contact potential, however, may safely be neglected for most applications because its effects are noticeable only at very low grid-No.1 voltages. Secondary emission may occur in conventional tetrodes at low plate voltages. For such tubes, therefore, the use of conversion factors should be limited to regions of the plate characteristic in which the plate voltage is greater than the grid-No.2 voltage. For beam power tubes, the regions of both low plate currents and low plate voltages should also be avoided.