

*Pun*ningham RADIO TUBES

C-299, CX-299 and CX-220 3.3 VOLT FILAMENT TUBES

The C-299, CX-299 and CX-220 are a group of tubes designed for operation on dry cells. These tubes have thoriated tungsten filaments rated at 3.3 volts, 0.63 amperes and although intended for operation on three No. 6 dry cells, may be used with two lead cells or three Edison cells if necessary.

C-299 and CX-299 DRY CELL GENERAL PURPOSE TUBES

The C-299 and CX-299 are general purpose tubes designed for use as detectors or amplifiers. These tubes are identically the same except for the bases. The CX-299 has a small standard base and the C-299 has a special type base.



With any method of battery supply used, a filament rheostat should be provided to maintain constant voltage across the filament, as the life is greatly shortened by excessive voltage. When one tube is used the rheostat should be about 60 ohms, and when three tubes are operated in parallel from three dry cells in series, the rheostat should be about 20 ohms.

Circuit Recommendations

AS A DETECTOR

When these tubes are used as detectors with grid leak and condenser, the plate voltage should preferably be not more than 45 volts. The grid condenser should be about .00025 mf. and the grid leak should have a resistance of 2-9 megohms, the latter value giving greater sensitivity on very weak signals but with somewhat inferior fidelity. The grid return should be connected to the positive side of the filament.

AS AN AMPLIFIER

When these tubes are used as amplifiers a grid bias should be

used whenever the plate voltage is over 45 volts. The following values of grid bias for various plate voltages are recommended:

Plate Voltage	Grid Bias
67.5	-3.0 volts
90.0	-4.5 volts

RATING

Filament Voltage	3.0-3.3 volts
Filament Current	0.060-0.063 amperes
Plate Voltage (maximum)	90 volts

AVERAGE CHARACTERISTICS

Plate Voltage	90 volts
Grid Bias Voltage	-4.5 volts
Amplification Factor	6.6
Mutual Conductance	15500 micromhos
Plate Resistance	425 ohms
Plate Current	2.5 milliamperes
Undistorted Power Output	7 milliwatts
Grid-Plate Capacitance	3.3 mmf.

DIMENSIONS

	C-299	CX-299
Maximum Overall Length	3½"	4⅛"
Maximum Overall Diameter	1⅛"	1⅜"
Base	Small C	Small CX

AVERAGE CHARACTERISTIC CURVES

(Pages 11 and 12)

Filament and Emission Characteristics—Fig. 1 shows the change of filament current with various filament voltages.

Grid Characteristics—Fig. 2 shows the relation between grid current and grid voltage.

Plate Characteristics—Fig. 3 shows a family of plate voltage-plate current curves at various grid bias voltages.

Mutual Characteristics—Fig. 5 shows a family of grid voltage-plate current curves for various plate voltages.

Dynamic Characteristics—Fig. 4 shows the effect of grid voltage upon the amplification factor, mutual conductance and plate resistance.

DIMENSIONS

Maximum Overall Length	4 $\frac{1}{8}$ "
Maximum Overall Diameter	1 $\frac{3}{16}$ "
Base	Small CX

AVERAGE CHARACTERISTIC CURVES

(Pages 13 and 14)

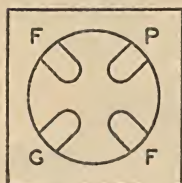
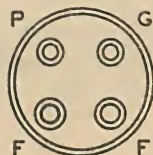
Filament Characteristic—Fig. 6 shows the change of filament current with various filament voltages.

Plate Characteristics—Fig. 8 shows the relation between the plate current and plate voltage at various bias voltages.

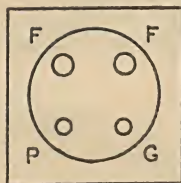
Mutual Characteristics—Fig. 7 shows a family of grid voltage-plate current curves at various plate voltages.

Dynamic Characteristics—Fig. 9 shows the effect of grid voltage upon the amplification factor, mutual conductance and plate resistance.

Output Characteristic—Fig. 10 shows the undistorted power output obtainable at various load resistances.



C-299



CX-299
and
CX-220

BASE AND SOCKET CONNECTIONS

C-299 AND CX-299 AVERAGE CHARACTERISTICS

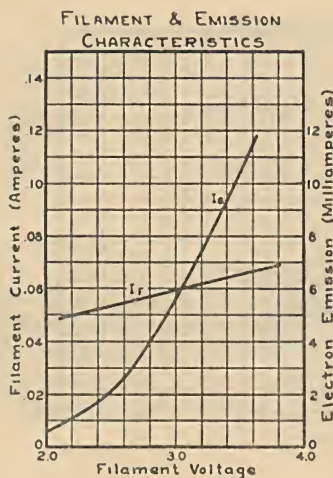


Fig. 1

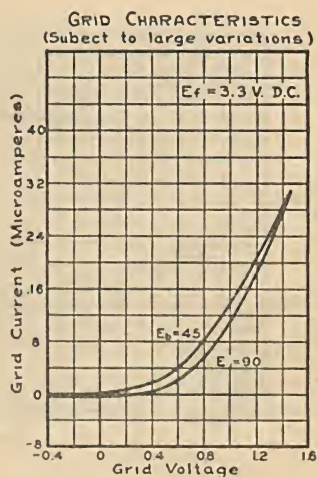


Fig. 2

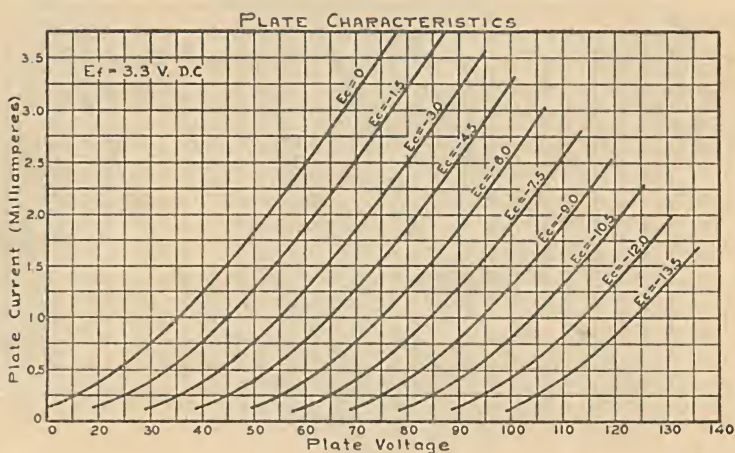


Fig. 3

C-299 AND CX-299 AVERAGE CHARACTERISTICS

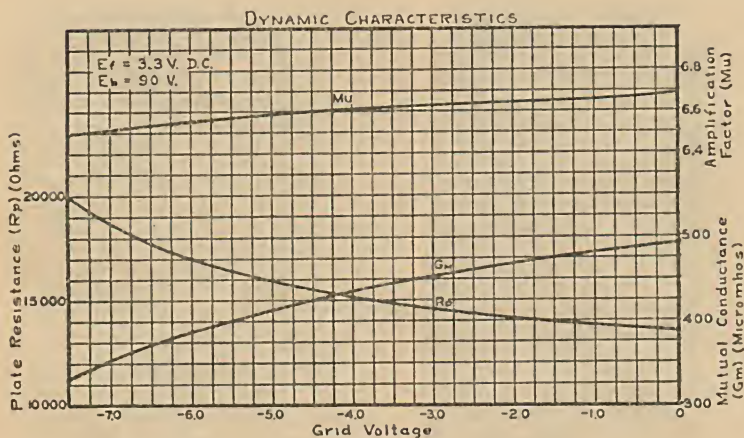


Fig. 4

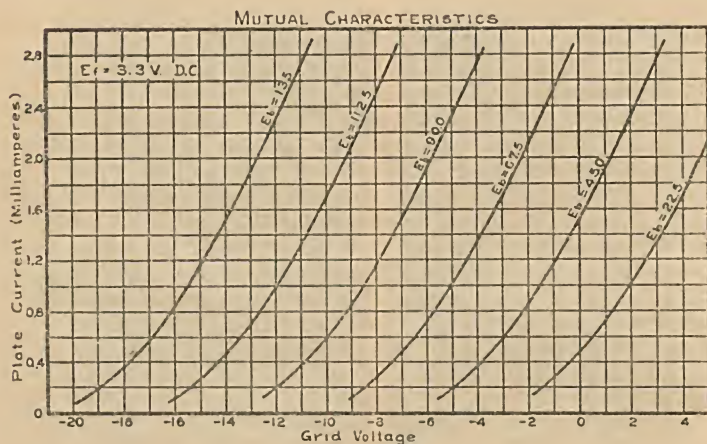


Fig. 5