Western Electric

259A Vacuum Tube

Classification—Voltage amplifier, screen-grid tetrode with indirectly heated cathode

Applications

Screen-grid high frequency amplifier.

Audio-frequency amplifier. Where exceptionally low tube noise is required the 259B tube is preferable.

Detector.

Dimensions—Dimensions, outline diagrams of the tube and base, and the arrangement of the electrode connections to the base terminals are shown in Figures 1 and 2.

Base—Medium, five-pin type with bayonet pin. Small metal cap control-grid terminal at the top of the bulb.

Socket—Standard, five-contact type such as the Western Electric 141A socket.

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Mounting Positions—The 259A tube may be mounted in any position.

Average Direct Interelectrode Capacitances—

Control grid to plate	0.004	μμf.
Control grid to heater, cathode and screen-grid	5.8	μμf.
Plate to heater, cathode and screen-grid	14	μμf.

Heater Rating

Heater voltage	2.0 volts, a.c. or d.c.
Nominal heater current	1.60 amperes

The heater element of this tube is designed to operate on a voltage basis and should be operated at as near the rated voltage as practicable.

Cathode Connection—Preferably direct to the heater. If voltage must be applied between the heater and cathode, it should be kept as low as possible and should never exceed 90 volts.

Characteristics—Plate current and screen-grid current characteristics of a typical 259A tube are given as functions of plate voltage in Figures 3 and 4 for screen-grid voltages of 75 and 90 volts, respectively. The same quantities are shown as functions of control-grid voltage in Figures 5 and 6. Transconductance characteristics for a plate voltage of 180 volts are shown in Figure 7. For other plate voltages between 135 and 250 volts, the transconductance of a typical tube for values higher than 100 micromhos does not differ by more than ± 3% from its value at 180 volts. The amplification factor and plate resistance characteristics corresponding to Figure 5 are given in Figures 8, 9, 10, and 11.

Typical Operating Conditions

Plate Voltage / Volts	Screen-Grid Voltage / Volts	Control-Grid Voltage / Volts	Plate Current / Milli-amperes	Screen-Grid Current / Milli-amperes	Amplification Factor	Plate Resistance / Ohms	Transconductance / Micromhos
135	75	−1.5	5.3	1.4	400	300,000	1,330
180	75	−1.5	5.5	1.2	550	400,000	1,380
*180	90	−1.5	7.5	1.7	480	320,000	1,500
*250	75	−1.5	5.7	1.1	610	430,000	1,420

*Maximum operating conditions.

Circuit Requirements—In order to make use of the high gain per stage which is obtainable with the 259A tube, special precautions must be taken in high-frequency, multi-stage amplifiers to eliminate feed-back in the associated circuit. In order to do so effectively, it is usually necessary to use shielding between successive stages, a close fitting shield around each tube, and a resistance or choke coil in the screen-grid lead of each tube. When such an impedance is used in the screen-grid lead, a low impedance condenser should be connected from the screen-grid to the cathode. Impedances common to two or more plate or grid circuits should be avoided.

The screen-grid voltage should be obtained either directly from a low resistance source or from a voltage divider. The use of a series resistance to reduce a high voltage supply to the desired value is not recommended because screen-grid currents differ widely in different tubes and vary during life in individual tubes.

Microphonic Noise—With a plate voltage of 180 volts, a screen-grid voltage of 75 volts, a control-grid bias of −1.5 volts, and a load resistance of 100,000 ohms, the mean microphonic noise output level of the 259A tube measured in a laboratory reference test set is 20 db below 1 volt. The range of levels of individual tubes extends from 2 to 36 db below 1 volt. Since microphonic noise output depends on the type and intensity of the mechanical disturbance which produces it, the values given here are useful chiefly for comparison with the levels of other tubes which have been tested in the same way.

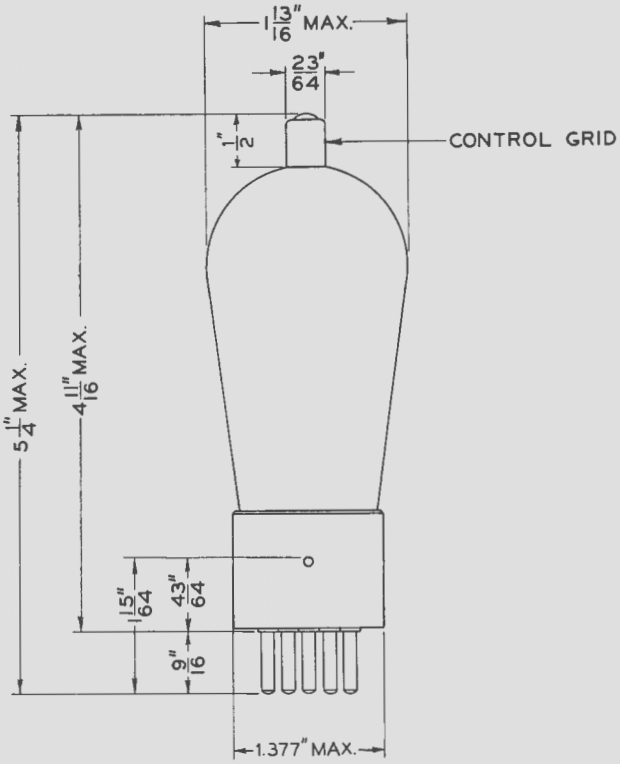

FIG. 1

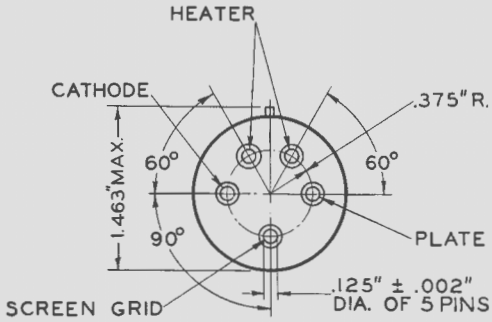

FIG. 2

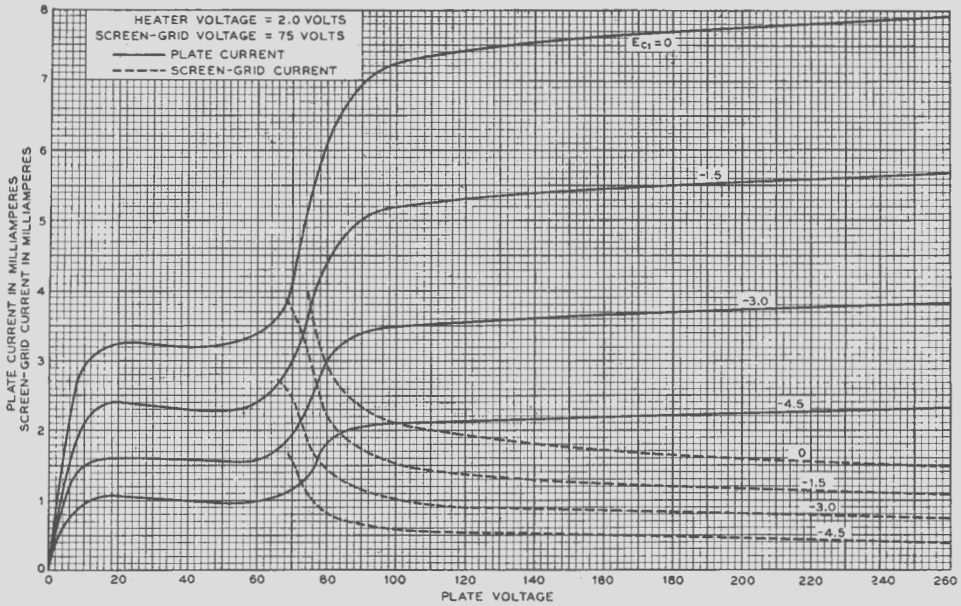
HEATER VOLTAGE = 2.0 VOLTS
SCREEN-GRID VOLTAGE = 75 VOLTS
PLATE CURRENT
SCREEN-GRID CURRENT
PLATE CURRENT IN MILLIAMPERES
SCREEN-GRID CURRENT IN MILLIAMPERES
PLATE VOLTAGE
$E_{C1} = 0$
-1.5
-3.0
-4.5
0
-1.5
-3.0
-4.5

FIG. 3

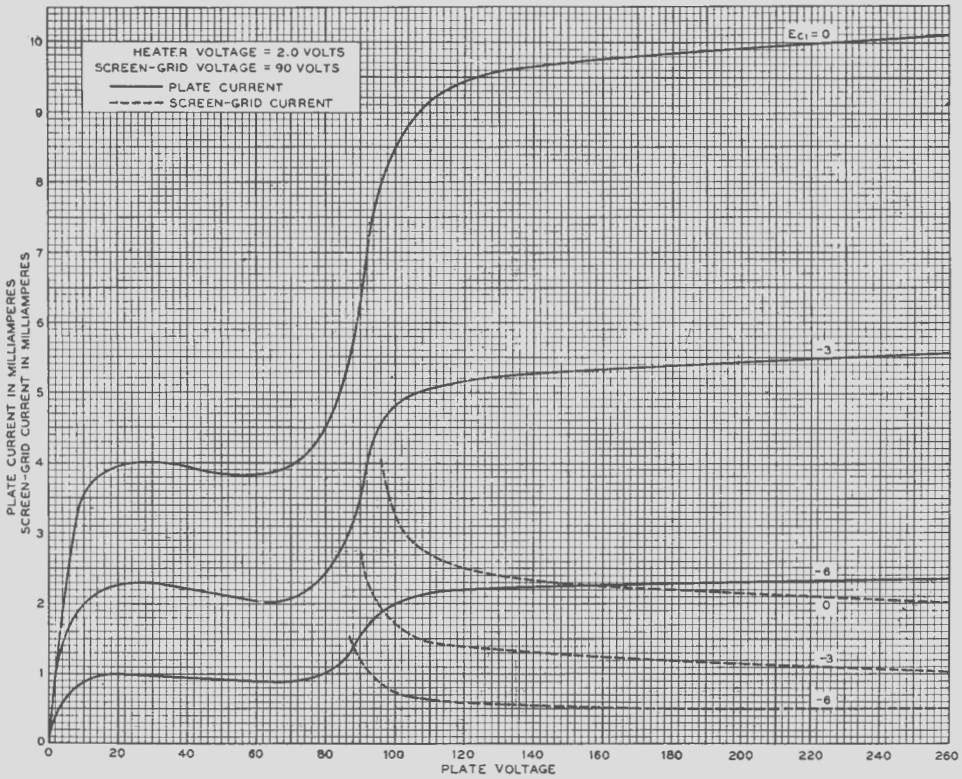
HEATER VOLTAGE = 2.0 VOLTS
SCREEN-GRID VOLTAGE = 90 VOLTS
PLATE CURRENT
SCREEN-GRID CURRENT
PLATE CURRENT IN MILLIAMPERES
SCREEN-GRID CURRENT IN MILLIAMPERES
PLATE VOLTAGE
$E_{C1} = 0$
-3
-6
0
-3
-6

FIG. 4

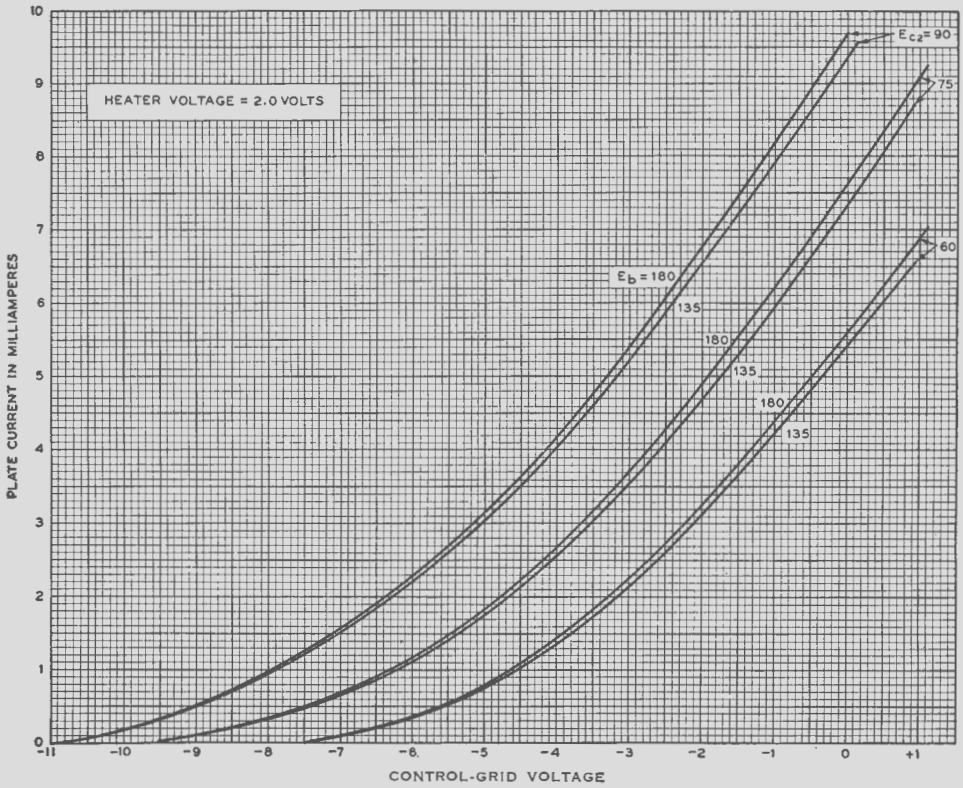
HEATER VOLTAGE = 2.0 VOLTS
PLATE CURRENT IN MILLIAMPERES
CONTROL-GRID VOLTAGE
E_{c2} = 90
75
60
E_b = 180
135
180
135
180
135
0
1
2
3
4
5
6
7
8
9
10
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
+1

FIG. 5

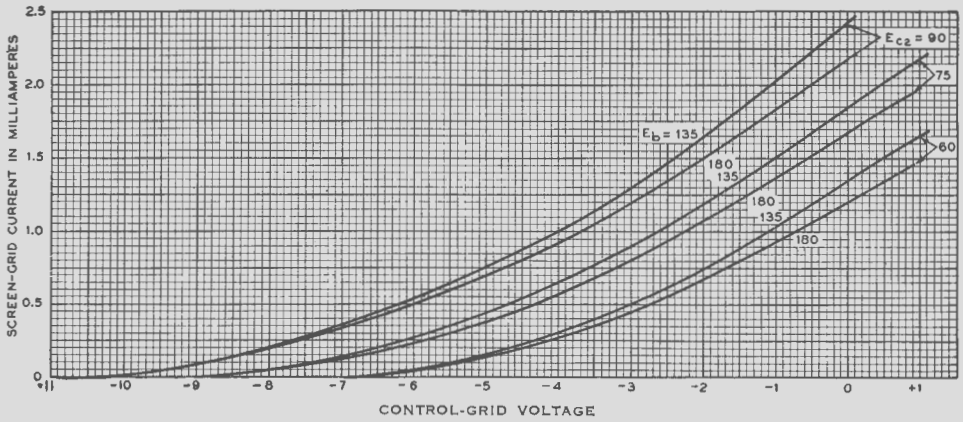
SCREEN-GRID CURRENT IN MILLIAMPERES
CONTROL-GRID VOLTAGE
E_{c2} = 90
75
60
E_b = 135
180
135
180
135
180
0
0.5
1.0
1.5
2.0
2.5
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
+1

FIG. 6

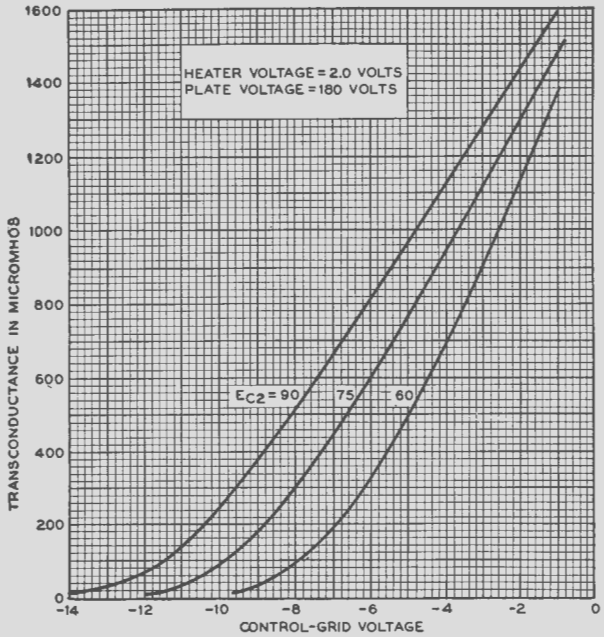

FIG. 7

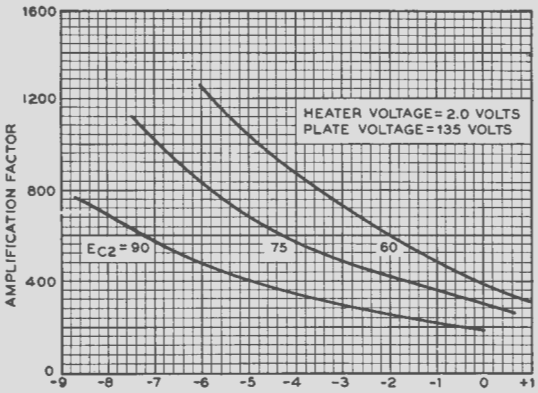

FIG. 8

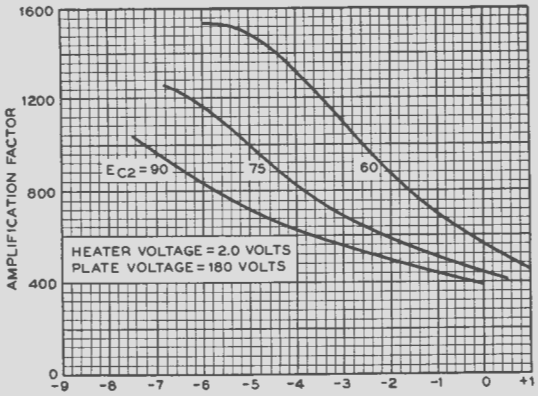

FIG. 10

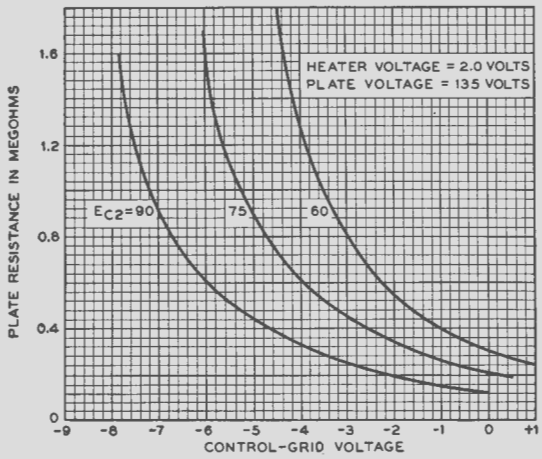

FIG. 9

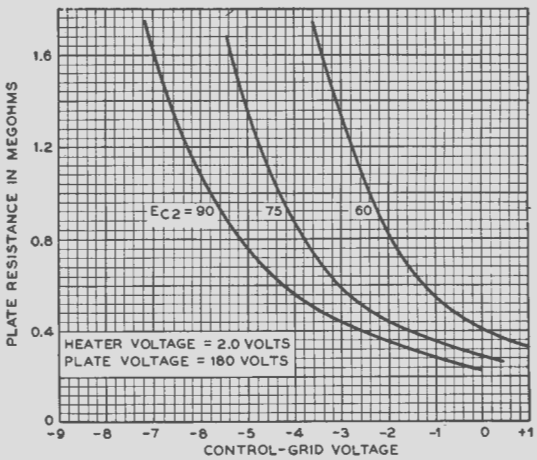

FIG. 11

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