

Cunningham RADIO TUBES

BULLETIN

Type C-327

GENERAL PURPOSE— DETECTOR AND AMPLIFIER



The C-327 is a general purpose tube designed primarily as an amplifier and for either grid leak or bias detection. The tube employs a uni-potential cathode indirectly heated by means of a heater filament to permit filament operation from an A. C. supply of 2.5 volts at a current of 1.75 amperes.

BULB

The bulb provided for the C-327 is the standard S-14 bulb having a maximum diameter of $1 \frac{13}{16}$ ".

The maximum overall length of the bulb from the bottom of the base pins to the top of the bulb is $4 \frac{11}{16}$ ".

BASE

A five prong base is used for plate, grid and two heater connections with the fifth prong being used for the cathode connection. The position of the pins is shown in figure 7.

CATHODE-HEATER

The cathode is made of a short cylinder of small diameter on which is coated the emissive material. The heater or filament is placed inside the cathode. No connection is made between these two elements inside the tube.

Where several sockets are connected in parallel, it is recommended that the heater leads from the supply to each socket be of twisted wire of equal lengths so as to insure uniform heater voltages.

ELEMENTS

A cylindrical structure is employed with the grid placed next to the cathode and a plate placed around the grid.

OPERATING CONDITIONS

Plate Volts	Detection		Amplification
	Grid Leak (Megs)	Grid Bias (Volts)	Grid Bias (Volts)
45	2	-5.0	
90		-10.0	-6.0
135		-15.0	-9.0
180		-20.0	-13.5

The higher plate voltages are recommended only where the signal input to a particular stage might be large enough to cause overloading or a flow of grid current.

AVERAGE CHARACTERISTICS

Plate Voltage	90	135	180
Grid Voltage	-6.0	-9.0	-13.5
C Bias Resistor	2200	2000	2700 ohms
Amplification Factor	9.0	9.0	9.0
Plate Resistance	11000	9000	9000 ohms
Mutual Conductance	820	1000	1000 micromhos
Plate Current	2.7	4.5	5.0 milliamperes
Undistorted Output	30.	80.	165. milliwatts

USE—AS AN AMPLIFIER

The C-327 due to its low AC ripple voltage in the plate circuit is well suited for radio and audio frequency amplification. The average grid plate capacity is 3.3 micro-microfarads. When used as a radio frequency amplifier this feedback capacity must be compensated for by means of neutralization or introduction of resistance in series with the grid.

The operation of the C-327 as an amplifier is essentially the same as for the CX-301A. Grid and plate return leads are connected to the cathode and in addition the center tap of the filament transformer is connected directly to the cathode. In some instances it might be desirable, in order to minimize hum to use a potentiometer return instead of the transformer center tap.

It is recommended that the grid bias be obtained from the plate current voltage drop in a resistor between cathode and the minus B connection, as this connection tends to stabilize variations in operation characteristics resulting from variation in operating voltages.

USE—AS A DETECTOR

The C-327 is an excellent grid-leak detector and for small signal input a two meg. grid-leak and a .00025 mfd. grid condenser will be satisfactory. The excellent detector sensitivity obtained with this tube may be realized by referring to figure 5 which shows the relation between the modulated R. F. input and A. F. output for small signal inputs.

The C-327 is well adapted for use as a bias detector and can be used to advantage as such in circuits where the R. F. amplification is large enough to swing the detector grid over the maximum per-

missable grid voltage range. Figure 6 shows the audio voltage available as a high output bias detector. It is obvious from an inspection of the curves how the increased plate and grid voltages permit a larger audio output.

Referring to the table of the various operating voltages as a bias detector, it is seen that the best value of bias to be used for a given plate voltage with this tube is approximately $1/9$ th of the plate voltage.

It is recommended that the bias to operate the C-327 as a bias detector be obtained from the plate current drop in a resistor between cathode and the minus B connection. The value of this bias resistance is not critical and satisfactory results may be obtained with a resistor of 20,000 to 100,000 ohms resistance. The higher value will allow larger signal input without overloading while, with low output coupling impedance, lower values are preferable.

A plate load of approximately 100,000 ohms impedance will be satisfactory and can generally be obtained from shunting a 100,000 ohm resistance across a high impedance choke.

CURVES & DIAGRAMS—(Pages 47, 48 and 49)

Figure 1 shows the variation of filament current with filament voltage.

Figure 2 shows the variation of plate current with plate voltage for various values of bias voltage.

Figure 3 shows the variation of plate current with grid voltage for various values of plate voltage.

Figure 4 shows the variation of amplification factor, plate resistance and mutual conductance with grid voltage for various values of plate voltage.

Figure 5 shows the detector action as a grid leak detector with plate voltage of 45 volts, 2 meg grid leak and for 22% modulation.

Figure 6 shows the detector action of the C-327 operating as a bias detector under various voltage conditions, with a plate load of 200,000 ohms and 22% modulation. The star marked on each curve indicates the point at which grid current begins to flow.

Figure 7 shows the base pins and socket connections.

Figure 8 shows a suggested circuit arrangement using the C-327 both as an amplifier and detector.

C-327 AVERAGE CHARACTERISTICS

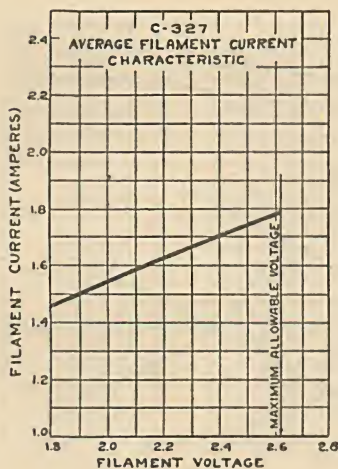


FIG. 1

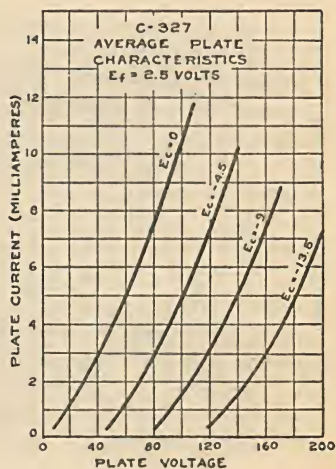


FIG. 2

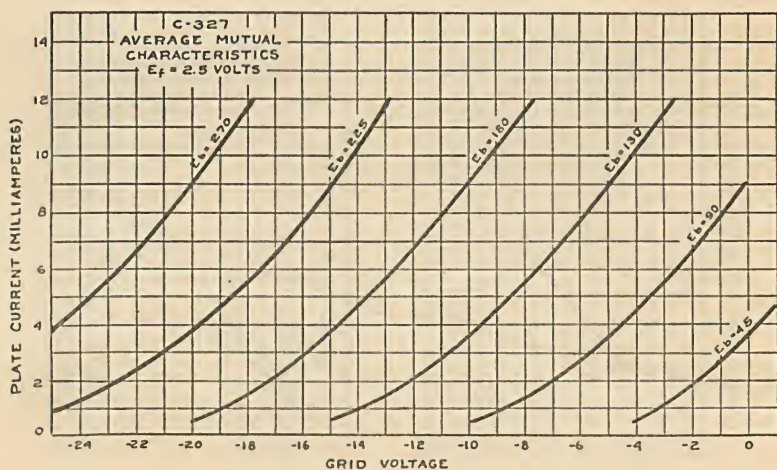


FIG. 3

C-327 AVERAGE CHARACTERISTICS

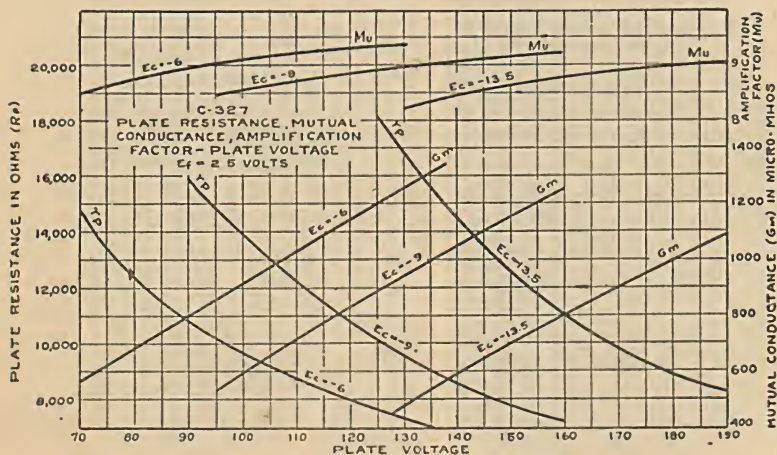


FIG. 4

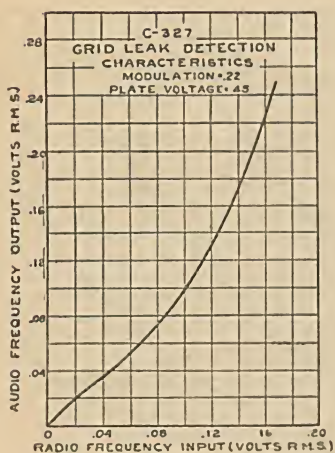


FIG. 5

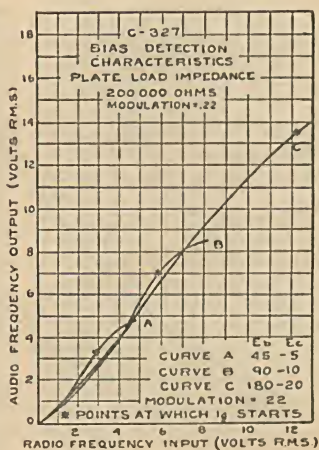


FIG. 6

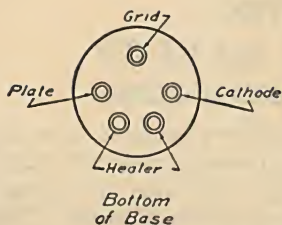


FIG. 7

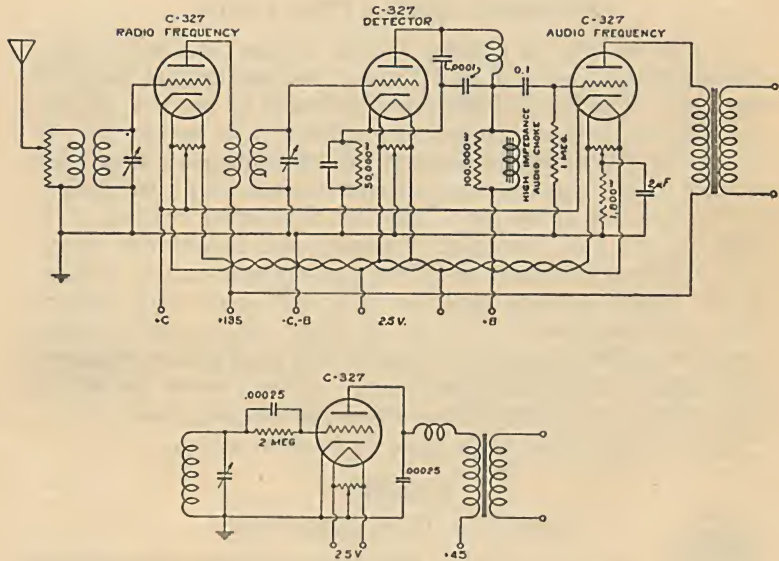


FIG 8