

# Cunningham RADIO TUBES

## CX-345

### POWER AMPLIFIER



The '45 is a power amplifier tube for supplying large undistorted output to a loudspeaker. It is for use as an audio-frequency output tube in a-c receivers using 2.5-volt heater and filament type tubes.

#### CHARACTERISTICS

FILAMENT VOLTAGE (A. C. or D. C.)	2.5	Volts
FILAMENT CURRENT	1.5	Amperes
PLATE VOLTAGE	180 250 275 max.	Volts
GRID VOLTAGE*	-34.5 -50 -56	Volts
PLATE CURRENT	27 34 36	Milliamperes
PLATE RESISTANCE	1900 1750 1670	Ohms
AMPLIFICATION FACTOR	3.5 3.5 3.5	
MUTUAL CONDUCTANCE	1850 2000 2100	Micromhos
LOAD RESISTANCE	3500 3900 4600	Ohms
UNDISTORTED POWER OUTPUT	780 1600 2000	Milliwatts
GRID-PLATE CAPACITANCE	8	$\mu$ f.
GRID-FILAMENT CAPACITANCE	5	$\mu$ f.
PLATE-FILAMENT CAPACITANCE	3	$\mu$ f.
MAXIMUM OVERALL LENGTH		5 $\frac{5}{8}$ "
MAXIMUM DIAMETER		2 $\frac{3}{16}$ "
BULB (See page 42, Fig. 10)		S-17
BASE		Medium 4-Pin

\* Referred to mid-point of a-c operated filament. Self-bias is advisable in all cases and is required if a grid resistor (max. value of 1.0 megohm) is used.

#### INSTALLATION

The base pins of the '45 fit the standard four-contact socket which should be mounted preferably to hold the tube in a vertical position. If it is necessary to place the tube in a horizontal position, the socket should be mounted with the filament pin holes vertically one above the other. This precaution locates the filament plane vertical for most satisfactory performance. For socket connections, see page 39, Fig. 1. Provision should be made for free circulation of air around the tube since the bulb becomes quite hot during operation.

The coated filament of the '45 is designed to operate from the a-c line through a step-down transformer although it may be operated from a d-c source. In either case, the voltage applied to the filament terminals should be the rated value of 2.5 volts under conditions of load and normal line voltage.

#### APPLICATION

As a power amplifier, the '45 should be operated as indicated under CHARACTERISTICS. When a.c. is used on the filament, the plate and grid returns should be brought to (1) a mid-tapped resistor of from 20 to 40 ohms across the filament winding, or (2) to the mid-tap of the filament winding itself.

Grid bias for the '45 should be obtained by use of the voltage drop in a resistor connected in the negative plate-return lead. This scheme is known as the self-biasing method. The proper value of the resistor for a single '45 is 1550 ohms

for a plate voltage of 275 volts; 1475 ohms for a plate voltage of 250 volts; and 1275 ohms for a plate voltage of 180 volts.

If more output is desired than can be obtained from a single '45, two '45's may be operated either in parallel or push-pull connection. See page 13. When two '45's are operated together in the same amplifier stage, the values of the self-biasing resistors will be approximately one-half the values given above for a single tube.

An output device should be used to transfer power to the winding of the reproducing unit.

