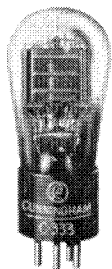


# Cunningham RADIO TUBES

C-333



## POWER AMPLIFIER PENTODE

The '33 is a power amplifier pentode for use in the output stage of battery-operated receivers. The low filament current required by the '33 makes this tube particularly applicable for use in combination with the '30, '32, and/or '34 in radio sets where economy of battery consumption is important.

The '33 is capable of producing greater power output than three-electrode power amplifiers of the same plate current drain. Furthermore, this tube has the design feature of greater amplification than is possible in a three-electrode amplifier without serious sacrifice in power output.

The power-handling ability of the '33 is made possible by the addition of both a suppressor and a screen between the grid and plate. The suppressor is placed next to the plate and is connected inside the tube to the filament. This design practically eliminates the secondary emission effects which limit the power output from four-electrode screen grid tubes. See page 5.

## CHARACTERISTICS

FILAMENT VOLTAGE (D. C.) .....	2.0	Volts
FILAMENT CURRENT .....	0.260	Ampere
PLATE VOLTAGE .....	135 <i>max.</i>	Volts
SCREEN VOLTAGE .....	135 <i>max.</i>	Volts
GRID VOLTAGE .....	-13.5	Volts
PLATE CURRENT .....	14.5	Milliamperes
SCREEN CURRENT .....	3	Milliamperes
PLATE RESISTANCE .....	50000	Ohms
AMPLIFICATION FACTOR .....	70	
MUTUAL CONDUCTANCE .....	1450	Micromhos
LOAD RESISTANCE .....	7000	Ohms
POWER OUTPUT .....	700	Milliwatts
EFFECTIVE GRID-PLATE CAPACITANCE .....	0.9	$\mu$ f.
INPUT CAPACITANCE .....	8.9	$\mu$ f.
OUTPUT CAPACITANCE .....	11.1	$\mu$ f.
MAXIMUM OVERALL LENGTH .....		4 $\frac{1}{16}$ "
MAXIMUM DIAMETER .....		1 $\frac{3}{16}$ "
BULB (See page 42, Fig. 8) .....		S-14
BASE .....		Medium 5-Pin

## INSTALLATION

The base pins of the '33 fit the standard five-contact socket. The socket should be installed so that the tube will operate in a vertical position. In some cases, cushioning of the socket may be found desirable. For socket connections, see page 39, Fig. 6.

For filament operation, refer to INSTALLATION for type '32.

## APPLICATION

For the power amplifier stage of radio receivers, the '33 is recommended either singly or in push-pull combination. More than one audio stage preceding the '33 is undesirable because of the possibility of microphonic disturbances resulting from the high level of amplification.

# THE CUNNINGHAM RADIO TUBE MANUAL

If a single '33 is operated self-biased, the self-biasing resistor should be approximately 770 ohms. This resistor should be shunted by a condenser of 4 to 20  $\mu$ f. to avoid degeneration effects at low audio frequencies. The use of two '33's in push-pull eliminates the necessity of by-passing the resistor. The self-biasing resistor required for the push-pull stage is approximately 385 ohms.

Any conventional type of **input coupling** may be used, provided that the resistance added to the circuit by this device is not too high. Transformer or impedance coupling devices are preferable. When the input circuit of the '33 is resistance-coupled to the preceding stage, self-bias should be employed. The grid resistor should not exceed a value of more than 1.0 megohm under self-bias conditions; without self-bias, maximum value is 0.5 megohm.

An **output transformer** should be used to couple this tube to the winding of the reproducing unit. The optimum load resistance for the output device is 7000 ohms. For best results, the impedance in the plate circuit of the '33 should be as uniform as possible over the entire audio-frequency range.

