VALVE FOR PORTABLE TRANSCEIVERS

CHARACTERISTICS

Heater voltage \( V_f \) = 6.3 V
Heater current \( I_f \) = 0.2 A
Anode voltage \( V_a \) = 200 V
Screen-grid voltage \( V_{gs} \) = 100 V
Anode current \( I_a \) = 4.5 mA
Screen-grid current \( I_{gs} \) = 1.5 mA
Grid bias \( V_{gs} \) = -2 V
Slope \( S \) = 2.4 mA/V
AC resistance \( R_l \) = 0.9 MΩ
Equivalent noise resistance \( R_{neq} \) = 4.8 kΩ
Input impedance \( R_{g1} \) = 15 kΩ
Output impedance \( R_a \) = 80 kΩ

SPECIAL ADVANTAGES

1. Small size, permitting compact apparatus
2. Valves can easily be replaced, without opening the set
3. Usable in every stage of a transceiver
4. Light weight
5. Robust construction
6. Operates on wavelengths down to 3 metres

DESCRIPTION

The E3 F is an indirectly heated pentode with radial contacts and a hand grip, as described in prospectus B 1 - 1. For special purposes, the valve can be supplied without the hand grip and its type indication is then E13F. In the receiving circuits of a transceiver, the E3 F and E13 F may be employed as RF, IF or AF amplifier, as frequency changer with separate oscillator, as oscillator (triode-connected) as detector (diode- or triode-connected), and as output valve. In a transmitter they may function as oscillator, modulator or output valve. Universal valves indeed!

When used as RF or IF amplifiers, the
valves may have their screens fed from a potential divider or through a series resistance. Gain may be controlled by variation of the negative potential of either the first or the third grid. With a fixed screen-grid potential of 100 V, the control-grid voltage must be increased from -2 to -13 V, in order to reduce amplification in the ratio of 100:1.

With suppressor-grid control, the potential applied to this electrode requires to be varied from 0 to -15.6 V for a similar reduction in gain. When the screen is series-fed from the 200 V mains via a 67 kΩ resistance, variation of the first grid potential from -2 to -25 V or of the third grid potential from 0 to -28 V is needed. When the valve serves as a frequency changer the screen may similarly be fed either from a potential divider or through a series resistance; in the former case the conversion conductance is 670 μA/V at minimum bias; and in the latter, with \( R_{gs} = 300 \, \text{kΩ} \), and a 200 V supply, it is about 750 μA/V. At a high-tension voltage of 200 V, and when used in an AF circuit the valve will supply a gain of 125 times at 1% distortion; the anode resistance should be 300 kΩ, the screen resistance 1.2 MΩ and the self-bias resistance 4 kΩ. As output pentode used with 200 V on anode and screen the E3F or E13F supplies 700 mW at 10% distortion.

Two valves arranged in class C push-pull, operating in a 3-metre transmitter, give an output of 1.5 W, the efficiency amounting to 42%. With combined anode and screen modulation, such a stage supplies 1.4 W, the efficiency then being 39%.

Measured cold, the capacities between each electrode and all others connected to the cathode are as follows:

\[
\begin{align*}
C_a &= 5.4 \, \text{pF} \pm 0.5 \, \text{pF}, \\
C_{gs} &= 6.2 \, \text{pF} \pm 0.5 \, \text{pF}, \\
C_{gs} &= 6.1 \, \text{pF} \pm 0.5 \, \text{pF}.
\end{align*}
\]

If necessary, the input and output capacities may be adjusted to a specific value, by removing a small area of the metallisation.

Variation of equivalent noise resistance, anode current, screen current, slope and AC resistance, with control-grid negative bias; when the E3F or E13F is used, with series-fed screen, as RF or IF amplifier.

Arrangement of electrodes; connections and maximum dimensions in millimetres.