EBL 1 Double-diode output pentode

The EBL 1 is a combination of double-diode and steep-slope, 9 W output pentode, in one envelope and sharing a common cathode. The characteristics of the pentode unit place this valve among the high-mutual-conductance pentodes and it may be used in the construction of very low-priced receivers, for instance of the super-heterodyne type, having a limited number of valves and which, without a stage of A.F. amplification, will nevertheless give a reasonably high output.

The two diodes are mounted below the pentode section opposite to the cathode, in such a way that the two anodes, which are not completely semi-cylindrical, are located at the same height on the mount; the diodes are therefore electrically identical. A screen separates the diode section from the pentode unit and, to prevent the grid of the latter from being affected in any way by the diodes, the grid connection is brought out at the top of the envelope.

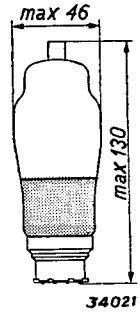
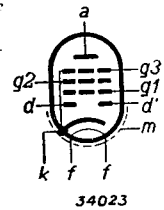


Fig. 1
Dimensions in mm



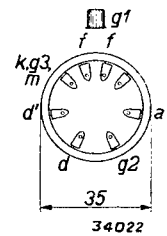


Fig. 2
Arrangement of electrodes and base connections.

HEATER RATINGS

Heating: indirect, A.C. or D.C., parallel supply.

Heater voltage	V_f	= 6.3 V
Heater current	I_f	= 1.18 A

CAPACITANCES

C_{ag_1}	< 0.8 $\mu\mu$F	$C_{d_2g_1}$	< 0.08 $\mu\mu$F
C_{d_1a}	< 0.2 $\mu\mu$F	C_{d_1k}	= 3.5 $\mu\mu$F
C_{d_2a}	< 0.2 $\mu\mu$F	C_{d_2k}	= 3.5 $\mu\mu$F
$C_{d_1g_1}$	< 0.08 $\mu\mu$F	$C_{d_1d_2}$	< 0.25 $\mu\mu$F

OPERATING DATA

Anode voltage	V_a	= 250 V
Screen-grid voltage	V_{g_2}	= 250 V
Cathode resistor	R_k	= 150 ohms
Grid bias	V_{g_1}	= —6 V
Anode current	I_a	= 36 mA
Screen current	I_{g_2}	= 4 mA
Mutual conductance at the working point	S	= 9 mA/V
Internal resistance	R_i	= 50,000 ohms
Load resistor	R_a	= 7,000 ohms
Output with 10 % distortion	W_o	= 4.5 W
Alternating grid voltage for W_o = 4.5 W	V_i	= 4.2 V_{eff}
Sensitivity (W_o = 50 mW)	V_i	= 0.35 V_{eff}

MAXIMUM RATINGS

Pentode section:

V_{ao}	= max. 550 V	W_{g2} (V_i = 0)	= max. 1.2 W
V_o	= max. 250 V	W_{g2} (W_o = max.)	= max. 2.5 W
W_a	= max. 9 W	V_{g1} (I_{g1} = + 0.3 μA)	= max. —1.3 V
I_k	= max. 55 mA	R_{g1k}	= max. 1 M ohm
V_{g2o}	= max. 550 V	R_{fk}	= max. 5,000 ohms
V_{g2}	= max. 260 V	V_{fk}	= max. 50 V [1])

Diode section:

Voltage on diode (peak value) $V_d = V_{d'}$ = max. 200 V

Diode current $I_d = I_{d'}$ = max. 0.8 mA

(direct current through the grid leak)

Voltage on diode at diode current start (I_d = + 0,3 μA) V_d = max. —1.3 V

Voltage on diode at diode current start ($I_{d'}$ = + 0.3 μA) $V_{d'}$ = max. —1.3 V

[1]) Direct voltage or effective value of alternating voltage.

The curves relating to the increase in the direct voltage (Δ V) across the grid leak, as a function of the unmodulated R.F. voltage, as well as for the A.F. voltage (V_{LF}) across the grid leak as plotted against the 30 % modulated R.F. voltage on one of the diodes (0.5 M ohm grid leak) are the same as for the EB 4.

Grid bias must be obtained by means of a cathode resistor only; semi-automatic bias may be employed provided that the cathode current is more than 50 % of the total current passing through the biasing resistor. Leads to the valve connections should be as short as possible and it is essential to include a resistor of about 1000 ohms in the control-grid lead.

A stage of audio-frequency amplification between one of the diodes as detector and the output valve may possibly give rise to hum and oscillation, for which reason the gain between that diode and the pentode should not exceed a factor of 15; this may be obtained by using the EBC 3 as pre-amplifier with slight negative feed-back.

The characteristics of the EL 3 relating to output power, having regard to the voltage drop across the output transformer, apply also to the EBL 1.

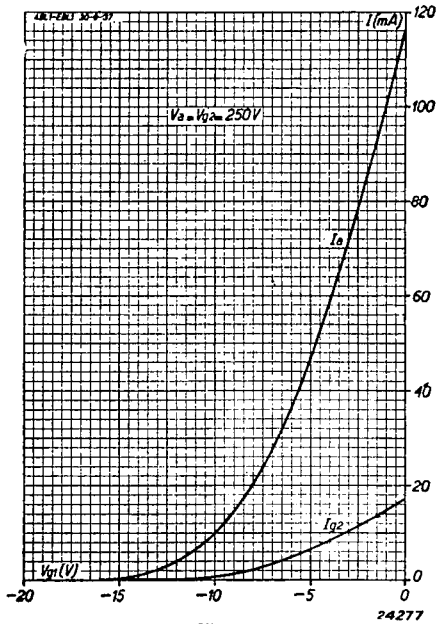


Fig. 3
Anode current and screen-grid current as a function of the grid bias at $Va = Vg_2 = 250$ V.

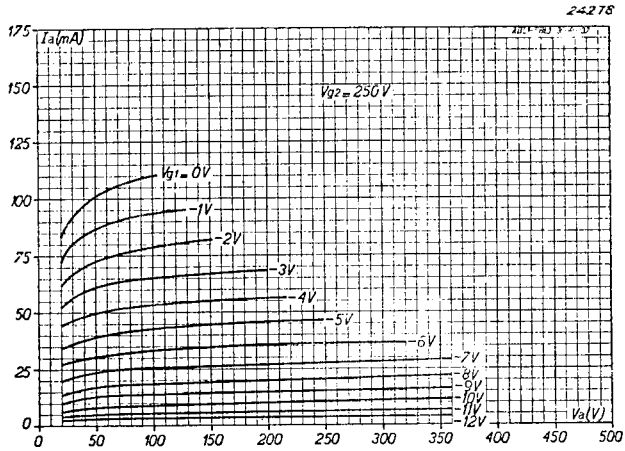


Fig. 4
Anode current as a function of the anode voltage at Vg_2 = 250 V and at different values of grid bias.

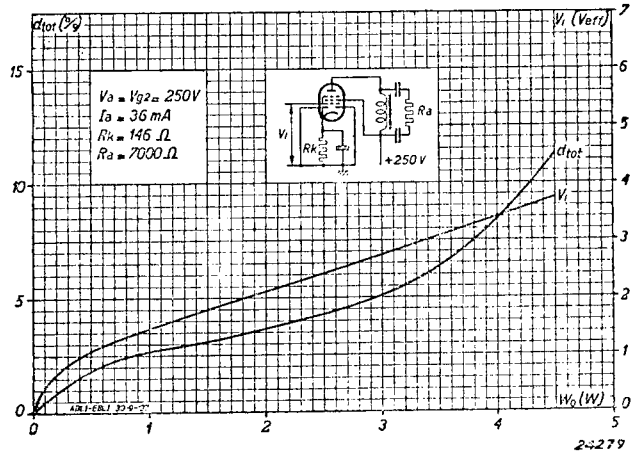


Fig. 5
Alternating grid voltage (Vi) and total distortion *dtot* as a function of the output power of the EBL1 used as a Class A output valve