# UBL 1 Double diode output pentode

The UBL 1 is a double diode output pentode of high mutual conductance (at $V_a = 200$ V, $S = 8.5$ mA/V). A common cathode serves both units of the valve, in which the diodes are mounted below the pentode, both at the same level; the two diodes are therefore equal in value and for practical purposes it is immaterial which of them is employed for detection. The connection of the grid of the pentode is situated at the top of the valve to avoid any possible interaction between the diode and the pentode sections. With a view to possible hum, the A.F. sensitivity at the detector diode should not be more than about 24 mV, with the volume control at maximum strength. If negative feed-back is employed the gain factor between the detector diode and the grid of the output valve may if necessary exceed 15, but only provided that negative feed-back is such that the sensitivity value given above is not exceeded.

The screen grid voltage may be the same as the anode voltage, with consequent simplification of the circuit; there is then no screen grid resistance to be short-circuited in cases where a 220 V receiver is to be switched over for 100 and 127 V mains. Special care has been taken in connection with the optimum output to be obtained from this valve on a low working voltage, this being about 1 W with 7 % distortion, at an anode and screen grid voltage of 100 V.

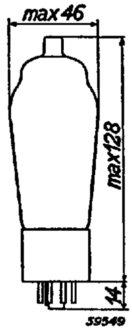


Fig. 1
Dimensions in mm

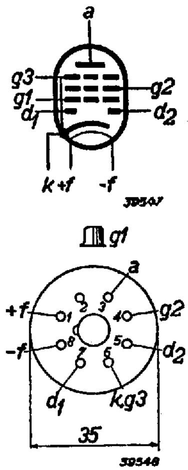


Fig. 2
Arrangement of electrodes and contacts

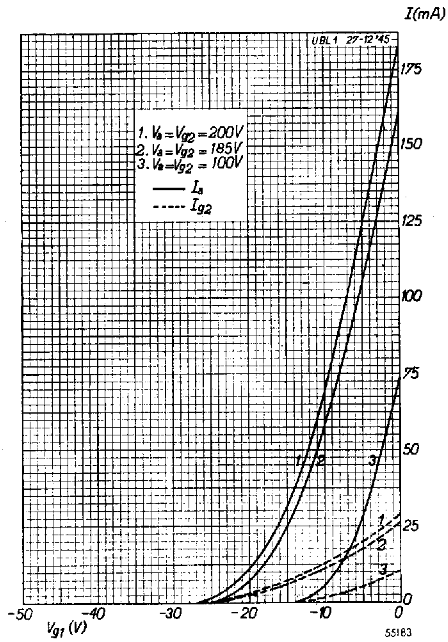


Fig. 3
Anode and screen grid current as a function of the grid bias at $Va = Vg_2 = 200$ V, 185 V and 100 V.

## HEATER RATINGS

Heater feed: indirect by AC or DC: series supply.

| | | |
|---|---|---|
| Heater voltage . . . | $V_f$ | = 55 V |
| Heater current . . . | $I_f$ | = 0.100 A |

## CAPACITIES

| | | |
|---|---|---|
| Pentode section: | $C_{ag_1}$ | < 0.8 pF |
| Diode section: | $C_{d_1k}$ | = 4.8 pF |
| | $C_{d_2k}$ | = 4.6 pF |
| | $C_{d_1d_2}$ | < 0.08 pF |

| | | |
|---|---|---|
| Between diode and pentode | $C_{d_1a}$ | < 0.08 pF |
| | $C_{d_2a}$ | < 0.08 pF |
| | $C_{d_1g_1}$ | < 0.05 pF |
| | $C_{d_2g_1}$ | < 0.05 pF |
| | $C_{(d_1+d_2)g_1}$ | < 0.1 pF |
| | $C_{(d_1+d_2)a}$ | < 0.25 pF |

**OPERATING DATA FOR THE PENTODE SECTION when used as single output valve**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Anode voltage | $V_a$ | = | 100 | 185 | 200 | 200 | V |
| Screen grid voltage | $V_{g2}$ | = | 100 | 185 | 200 | 200 | V |
| Cathode resistance | $R_k$ | = | 145 | 140 | 240 | 175 | Ohms |
| Grid bias | $V_{g1}$ | = | —5 | —10 | —13 | —11.5 | V |
| Anode current | $I_a$ | = | 28.5 | 59 | 45 | 55 | mA |
| Screen grid current | $I_{g2}$ | = | 5.25 | 11.3 | 9 | 11 | mA |
| Mutual conductance | $S$ | = | 7 | 8.8 | 7.5 | 8.5 | mA/V |
| Internal resistance | $R_i$ | = | 25,000 | 23,000 | 28,000 | 20,000 | Ohms |
| Gain factor with respect to screen grid | $\mu_{g2g1}$ | = | 11 | 11 | 11 | 11 | |
| Optimum load resistance | $R_a$ | = | 3000 | 3000 | 4500 | 3500 | Ohms |
| Output power | $W_o$ | = | 1.05 | 5 | 4 | 5.2 | Watts |
| Total distortion | $d_{tot}$ | = | 6.8 | 10 | 10 | 10 | % |
| Alternating grid voltage | $V_i$ | = | 3.3 | 7 | 6.4 | 7 | $V_{eff}$ |
| Sensitivity $V_i$ ($W_o$ = 50 mW) | | = | 0.6 | 0.5 | 0.5 | 0.5 | $V_{eff}$ |

**MAXIMUM RATINGS (Pentode section)**

| | | | |
|---|---|---|---|
| $V_a$ ($I_a = 0$) | = max. 550 V | $W_{g2}$ ($W_o$ = max.) | = max. 4.0 W |
| $V_a$ | = max. 250 V | $I_k$ | = max. 70 mA |
| $W_a$ | = max. 11 W | $V_{g1}$ ($I_{g1} = +0.3\ \mu A$) | = max. —1.3 V |
| $V_{g2}$ ($I_{g2} = 0$) | = max. 550 V | $R_{g1k}$ | = max. 1 MOhm |
| $V_{g2}$ | = max. 250 V | $R_{fk}$ | = max. 20,000 Ohms |
| $W_{g2}$ ($V_i = 0$) | = max. 2.5 W | $V_{fk}$ | = max. 150 V |

Diode section:

| | | | |
|---|---|---|---|
| $V_{d1} = V_{d2}$ | = max. 200 V | $V_{d1}$ ($I_{d1} = +0.3\ \mu A$) | = max. —1.3 V |
| $I_{d1} = I_{d2}$ | = max. 0.8 mA | $V_{d2}$ ($I_{d2} = +0.3\ \mu A$) | = max. —1.3 V |

Grid bias must be obtained by means of a cathode resistance only. So-called semi-automatic bias may be employed only when the cathode current of this valve is in excess of 50 % of the total current passing through the resistance producing this potential.

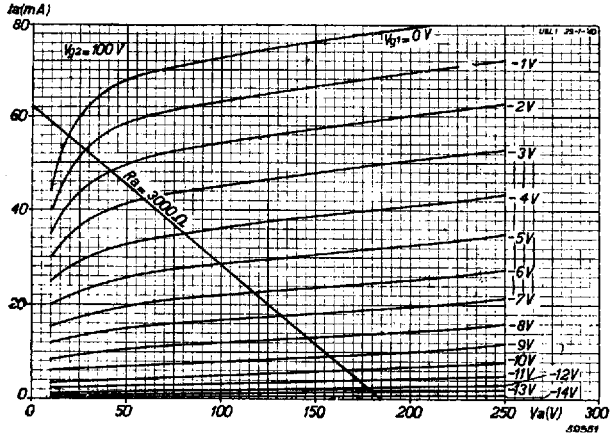


Fig. 4
Anode current as a function of anode voltage at $Vg_2$ = 100 V, with $Vg_1$ as parameter.

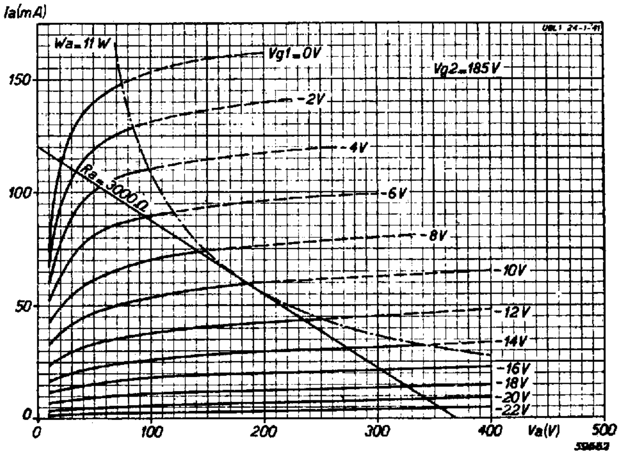


Fig. 5
Anode current as a function of anode voltage at $Vg_2$ = 185 V, with $Vg_1$ as parameter.

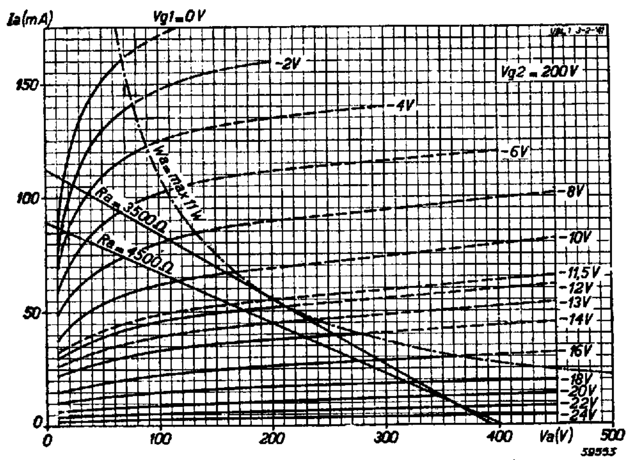


Fig. 6
Anode current as a function of anode voltage at $Vg_2$ = 200 V, with $Vg_1$ as parameter. The load lines for 9 W. (*Ra* = 4500 Ohms) and 11 W (*Ra* = 3500 Ohms) operation are also shown.

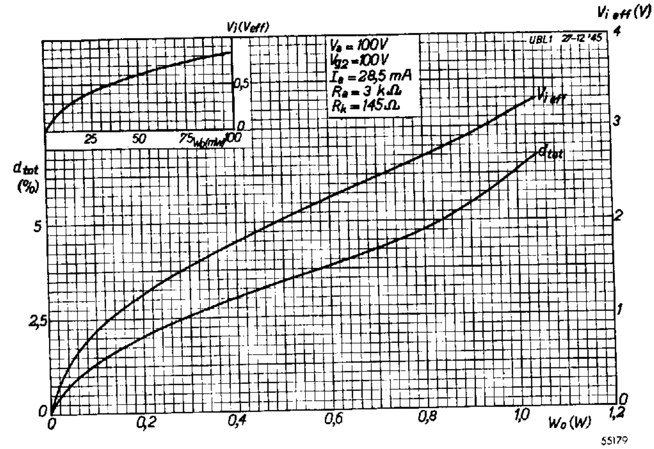


Fig. 7.
Total distortion and alternating grid voltage as a function of output power at
$Va = Vg_2 = 100$ V.

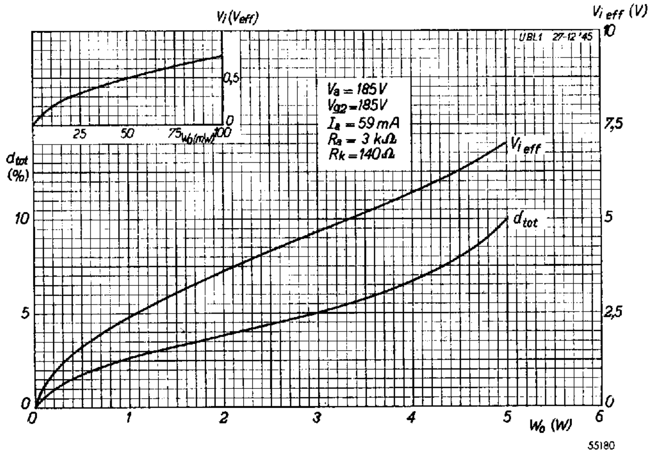


Fig. 8.
Total distortion and alternating grid voltage as a function of output power at
$Va = Vg_2 = 185$ V.

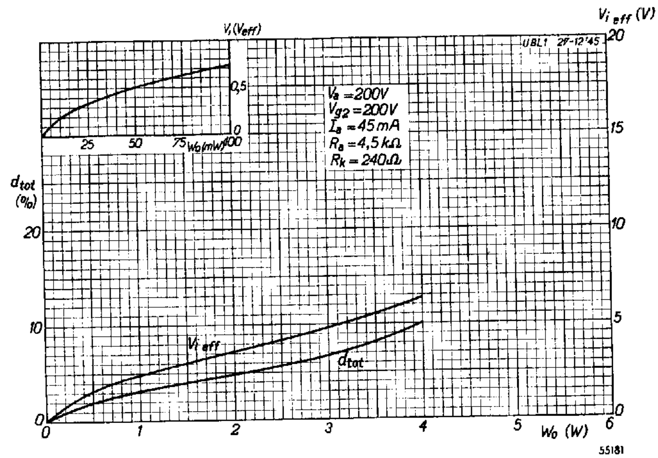


Fig. 9
Total distortion and alternating grid voltage as a function of output power at
$Va = Vg_2 = 200$ V, for 9 W operation

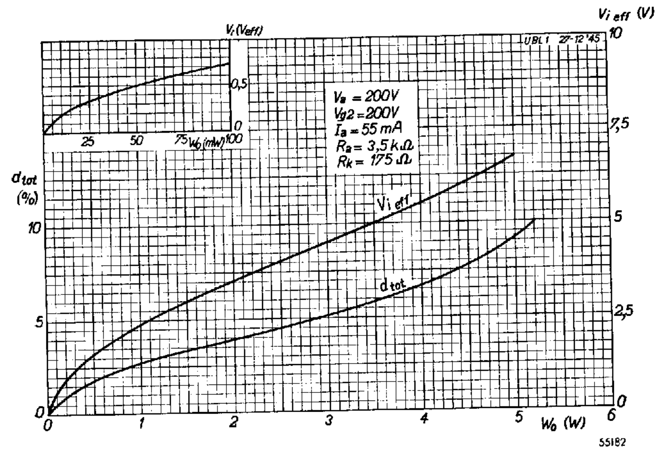


Fig. 10
Total distortion and alternating grid voltage as a function of output power at $Va = Vg_2 = 200$ V, for 11 W operation.