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.

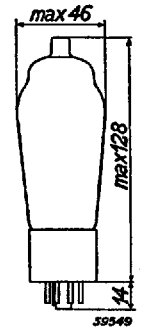
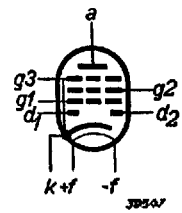


Fig. 1
Dimensions in mm



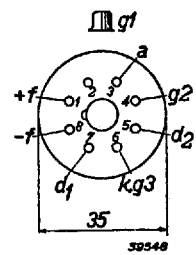


Fig. 2
Arrangement of electrodes and contacts

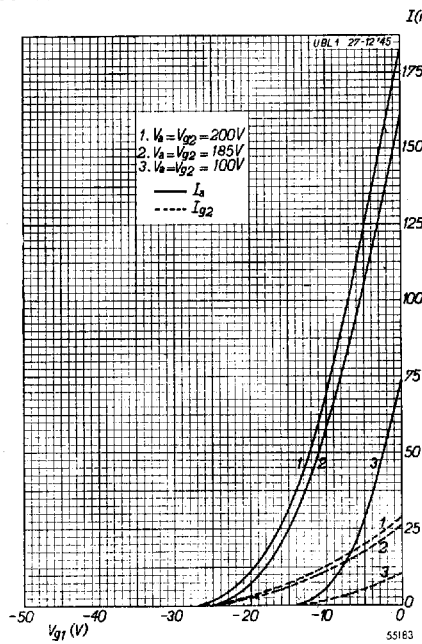


Fig. 3
Anode and screen grid current as a function of the grid bias at $Va = Vg_2 = 200$ V, 185 V and 100 V.

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_{g_2}	=	100	185	200	200	V
Cathode resistance	R_k	=	145	140	240	175	Ohms
Grid bias	V_{g_1}	=	—5	—10	—13	—11.5	V
Anode current	I_a	=	28.5	59	45	55	mA
Screen grid current	I_{g_2}	=	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	$\mu_{g_2g_1}$	=	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	$W_{g_2}\,(W_o$ = max.)	= max. 4.0 W
V_a	= max. 250 V	I_k	= max. 70 mA
W_a	= max. 11 W	$V_{g_1}\,(I_{g_1} = + 0.3\ \mu A)$	= max. —1.3 V
$V_{g_2}\,(I_{g_2} = 0)$	= max. 550 V	R_{g_1k}	= max. 1 MOhm
V_{g_2}	= max. 250 V	R_{fk}	= max. 20,000 Ohms
$W_{g_2}\,(V_i = 0)$	= max. 2.5 W	V_{fk}	= max. 150 V

Diode section:

$V_{d_1} = V_{d_2}$	= max. 200 V	$V_{d_1}\,(I_{d_1} = + 0.3\ \mu A)$	= max. —1.3 V
$I_{d_1} = I_{d_2}$	= max. 0.8 mA	$V_{d_2}\,(I_{d_2} = + 0.3\ \mu A)$	= 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.

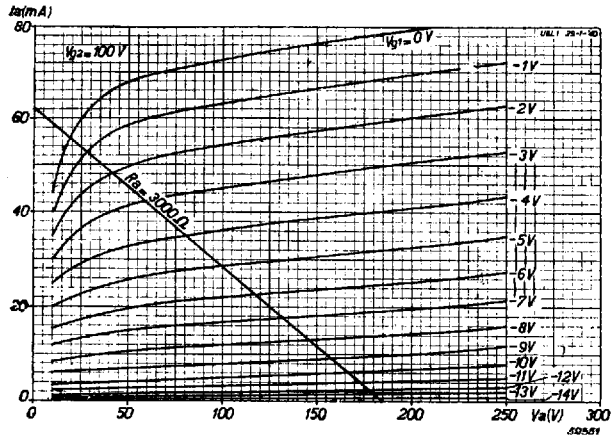


Fig. 4
Anode current as a function of anode voltage at Vg_2 = 100 V, with Vg_1 as parameter.

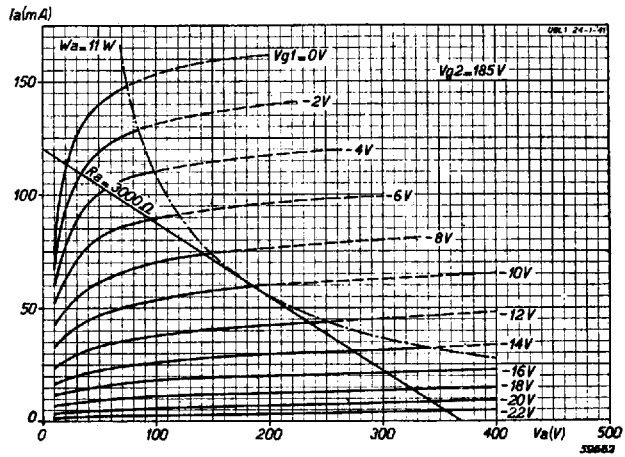


Fig. 5
Anode current as a function of anode voltage at Vg_2 = 185 V, with Vg_1 as parameter.

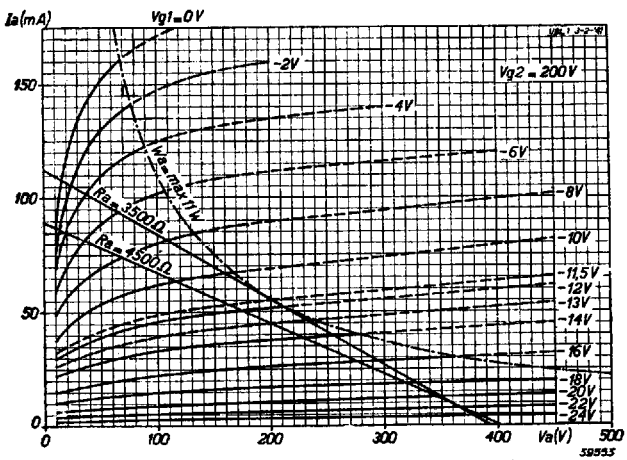


Fig. 6
Anode current as a function of anode voltage at Vg_2 = 200 V, with Vg_1 as parameter. The load lines for 9 W. (Ra = 4500 Ohms) and 11 W (Ra = 3500 Ohms) operation are also shown.

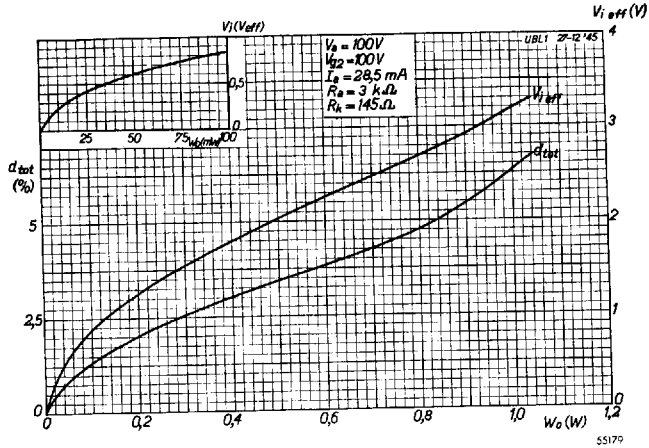


Fig. 7.
Total distortion and alternating grid voltage as a function of output power at
$Va = Vg_2 = 100$ V.

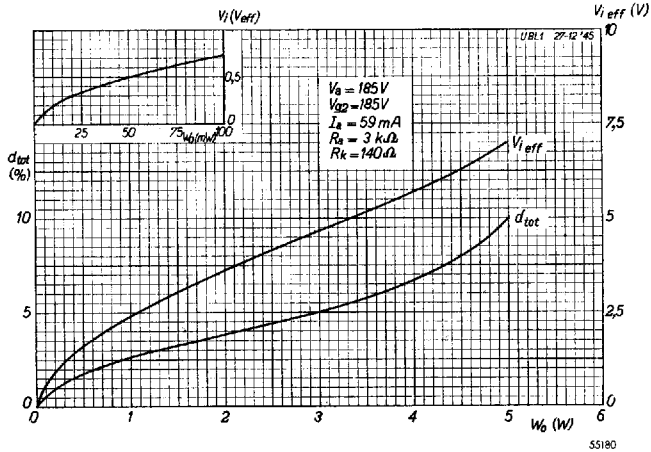


Fig. 8.
Total distortion and alternating grid voltage as a function of output power at
$Va = Vg_2 = 185$ V.

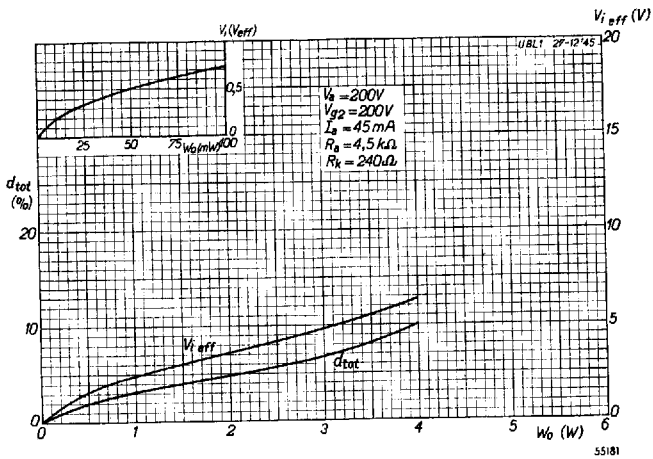


Fig. 9
Total distortion and alternating grid voltage as a function of output power at
$Va = Vg_2 = 200$ V, for 9 W operation

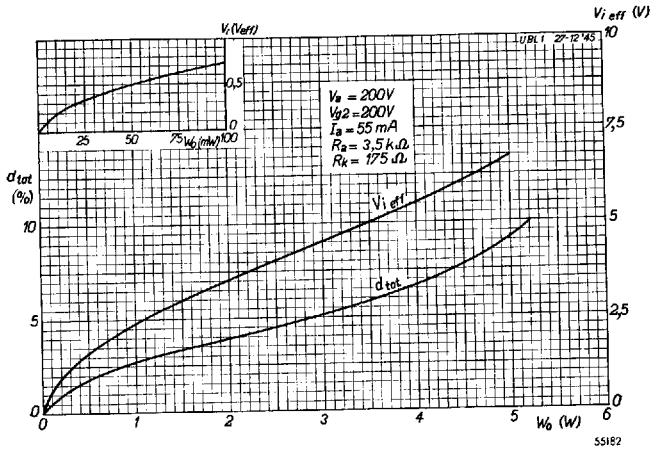


Fig. 10
Total distortion and alternating grid voltage as a function of output power at $Va = Vg_2 = 200$ V, for 11 W operation.