EF 22 R.F. variable MU pentode

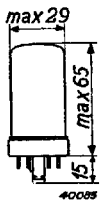

Fig. 1
Dimensions in mm.

The pentode EF 22 is a variable-mu R.F. or I.F. amplifier valve which can also be employed as resistance-capacitance coupled A.F. amplifier. Electrically, this valve is practically identical with the EF 9 in the "red" series: in the EF 22 the screen voltage is also sliding, thus retaining its useful properties with respect to cross modulation etc, even if control is applied. Although the EF 22, in contrast with the EF 8, does not include the extra grid, the equivalent noise resistance is as high as 6,200 Ohms; on this account the EF 22 is admirably suited for use in super-sensitive receivers with R.F. pre-amplification.

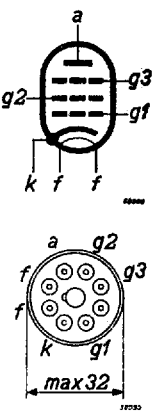

Fig. 2.
Arrangement and sequence of electrode connections.

HEATER RATINGS

Heating: indirect, AC or DC, parallel.

Heater voltage	V_f	= 6.3 V
Heater current	I_f	= 0.2 A

CAPACITANCES

C_{ag_1}	< 0.002 pF
C_a	= 6.1 pF
C_{g_1}	= 5.5 pF
C_{g_1f}	< 0.004 pF

OPERATING DATA: valve used as R.F. or I.F. amplifier

Anode voltage	V_a	=	250 V	
Suppressor grid voltage	V_{g_3}	=	0 V	
Screen grid resistance	R_{g_2}	=	90,000 Ohms	
Cathode resistance	R_k	=	325 Ohms	
Grid bias	V_{g_1}	= —2.5 V[1]	—46 V[2]	—58 V[3]
Screen voltage	V_{g_2}	= 100 V	—	250 V
Anode current	I_a	= 6 mA	—	—
Screen grid current	I_{g_2}	= 1.7 mA	—	—
Mutual conductance	S	= 2200 μA/V	22 μA/V	4.5 μA/V
Internal resistance	R_i	= 1.2 MOhm	>10 MOhm	>10 MOhm
Gain factor in respect of screen grid	$\mu_{g_2g_1}$	= 17	—	—
Equivalent noise resistance	R_{aeq}	= 6200 Ohms	—	—

[1]) Valve not controlled.
[2]) Mutual conductance controlled to 1/100.
[3]) Extreme limit of control.

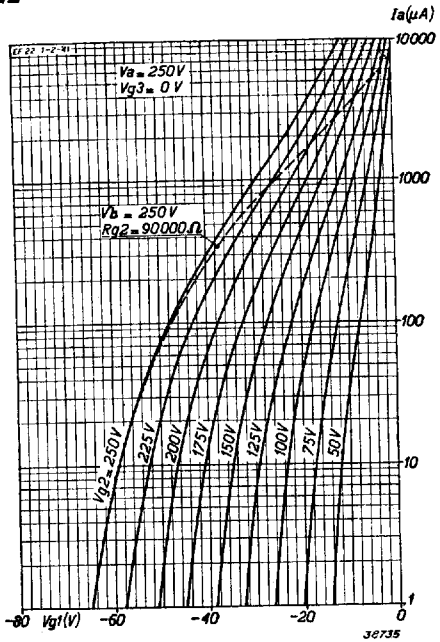

Fig. 3
Anode current as a function of grid bias at $Va = 250$ V and $Vg_3 = 0$ V with screen voltage as parameter.

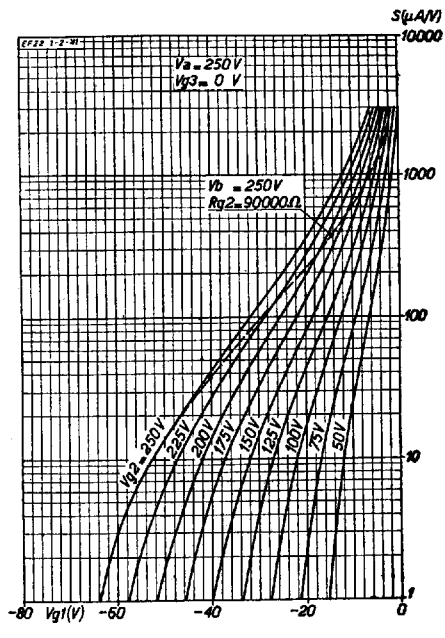

Fig. 4
Mutual conductance as a function of grid bias at $Va = 250$ V and $Vg_3 = 0$ V, with screen grid voltage as parameter.

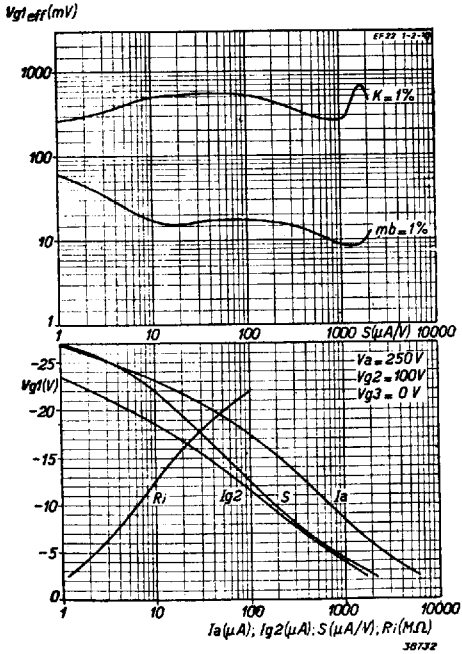

Fig. 5
At $Va = 250$ V, $Vg_2 = 100$ V (fixed screen voltage) and $Vg_3 = 0$ V.
Upper diagram; Highest permissible effective value of R.F. alternating voltage with 1 % cross modulation ($K = 1$ %) and of alternating voltage with 1 % modulation hum ($mb = 1$ %), in each case in respect to the interfering signal at the control grid, as a function of mutual conductance
Lower diagram; Anode current Ia, screen current Ig_2, mutual conductance S and internal resistance Ri as a function of grid bias Vg_1.

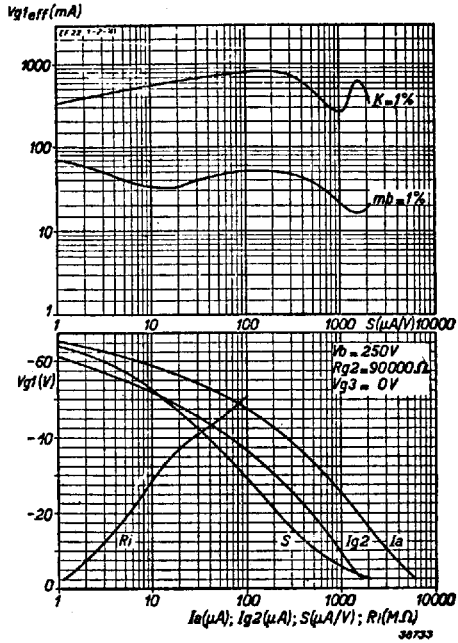

Fig. 6
At $Vb = 250$ V, $Rg_2 = 90{,}000$ Ohms (screen fed across a resistance) and $Vg_3 = 0$ V.
Upper diagram; Highest permissible effective R.F. alternating voltage with 1 % cross modulation ($K = 1$ %) and of alternating voltage with 1 % modulation hum ($mb = 1$ %), in each case in respect to the interfering signal at the control grid, as a function of mutual conductance.
Lower diagram; Anode current Ia, screen grid current Ig_2, mutual conductance S and internal resistance Ri as a function of the grid bias Vg_1.

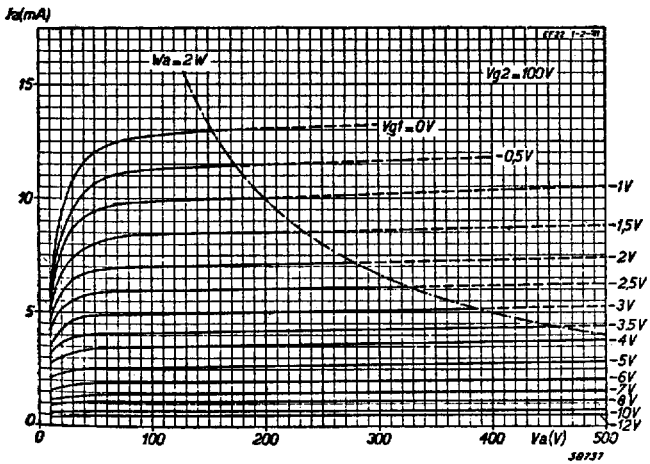

Fig. 7
Anode current as a function of anode voltage at $Vg_2 = 100$ V, with grid bias as parameter.

OPERATING DATA: valve used as resistance-capacitance coupled amplifier with gain control by means of the control grid.

Supply volts	Anode res.	Screen grid res.	Anode current	Screen grid current	Cath. res.	Control volts on grid 1	Gain.	Required alternating grid voltage and total distortion at an alternating output voltage of:					
								V_{oeff} = 3 V		V_{oeff} = 5 V		V_{oeff} = 10 V	
V_b (V)	R_a (Mohm)	R_{g2} (Mohm)	I_a (mA)	I_{g2} (mA)	R_k (Ohms)	$-VR$ (V)	$\frac{V_{oeff}}{V_{g1eff}}$	V_{g1eff} (V)	d_{tot} (%)	V_{g1eff} (V)	d_{tot} (%)	V_{g1eff} (V)	d_{tot} (%)
250	0.2	0.8	0.87	0.26	1750	0	106	0.028	0.8	0.047	2.4	0.094	2.7
250	0.2	0.8	0.69	0.21	1750	— 5	40	0.075	0.8	0.125	2.4	0.25	2.7
250	0.2	0.8	0.55	0.17	1750	—10	23	0.13	1.1	0.22	1.9	0.43	3.7
250	0.2	0.8	0.37	0.11	1750	—18	11.6	0.27	1.5	0.42	2.4	0.86	4.8
250	0.2	0.8	0.17	0.05	1750	—25	6.7	0.45	2.7	0.75	4.4	1.46	8.8
250	0.1	0.4	1.6	0.45	1000	0	85	0.035	0.8	0.059	1.3	0.118	2.5
250	0.1	0.4	1.22	0.36	1000	—5	36	0.083	0.8	0.14	1.4	0.28	2.7
250	0.1	0.4	0.92	0.28	1000	—10	20	0.15	1.2	0.25	2.1	0.49	4.1
250	0.1	0.4	0.57	0.18	1000	—18	9.2	0.33	1.8	0.55	3.1	1.08	6.1
250	0.1	0.4	0.36	0.11	1000	—25	5.5	0.55	2.8	0.91	4.8	1.83	9.5

MAXIMUM RATINGS

Anode voltage in cold condition	V_{ao}	= max.	550 V
Anode voltage	V_a	= max.	300 V
Anode dissipation	W_a	= max.	2 W
Screen grid voltage in cold condition	V_{g2o}	= max.	550 V
Screen grid voltage at $I_a < 3$ mA	V_{g2}	= max.	300 V
Screen grid voltage at $I_a = 6$ mA	V_{g2}	= max.	125 V
Screen grid dissipation	W_{g2}	= max.	0.3 W
Cathode current	I_k	= max.	10 mA
Grid current commences at ($I_{g1} = +0.3$ μA)	V_{g1}	= max.	—1.3 V
Max. external resistance, grid-cathode	R_{g1k}	= max.	3 MOhms
Max. external resistance, heater-cathode	R_{fk}	= max.	20,000 Ohms
Max. voltage between heater and cathode	V_{fk}	= max.	50 V

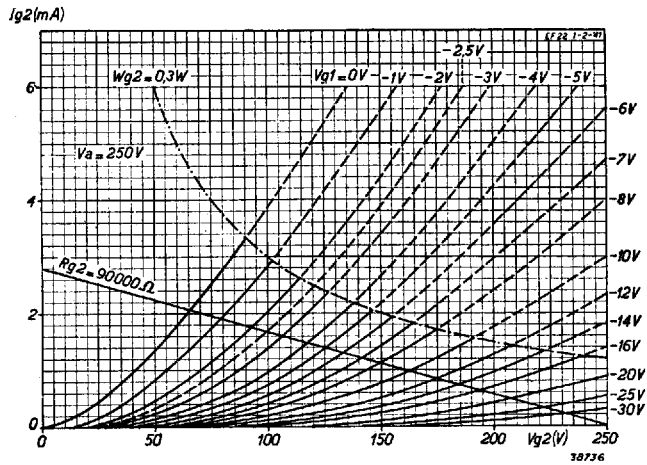

Fig. 8
Screen current as a function of screen voltage at $Va = 250$ V, with grid bias as parameter. The diagram also includes the load line for a screen grid resistance $Rg_2 = 90{,}000$ Ohms.