

EF 22 R.F. variable MU pentode

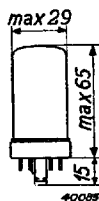


Fig. 1

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.

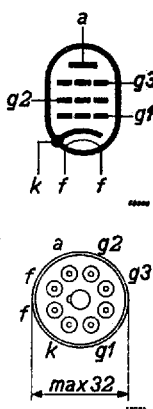


Fig. 2.

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

$C_{ag1} < 0.002$ pF

$C_a = 6.1$ pF

$C_{g1} = 5.5$ pF

$C_{gf} < 0.004$ pF

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

| | | |
|---------------------------------------|---------------|--|
| Anode voltage | $V_a =$ | 250 V |
| Suppressor grid voltage | $V_{gs} =$ | 0 V |
| Screen grid resistance | $R_{g2} =$ | 90,000 Ohms |
| Cathode resistance | $R_k =$ | 325 Ohms |
| Grid bias | $V_{g1} =$ | -2.5 V ¹⁾ -46 V ²⁾ -58 V ³⁾ |
| Screen voltage | $V_{g2} =$ | 100 V — 250 V |
| Anode current | $I_a =$ | 6 mA — — |
| Screen grid current | $I_{g2} =$ | 1.7 mA — — |
| Mutual conductance | $S =$ | 2200 μ A/V 22 μ A/V 4.5 μ A/V |
| Internal resistance | $R_i =$ | 1.2 MOhm > 10 MOhm > 10 MOhm |
| Gain factor in respect of screen grid | $\mu_{gg1} =$ | 17 — — |
| Equivalent noise resistance. | $R_{aeq} =$ | 6200 Ohms — — |

¹⁾ Valve not controlled.

²⁾ Mutual conductance controlled to 1/100.

³⁾ Extreme limit of control.

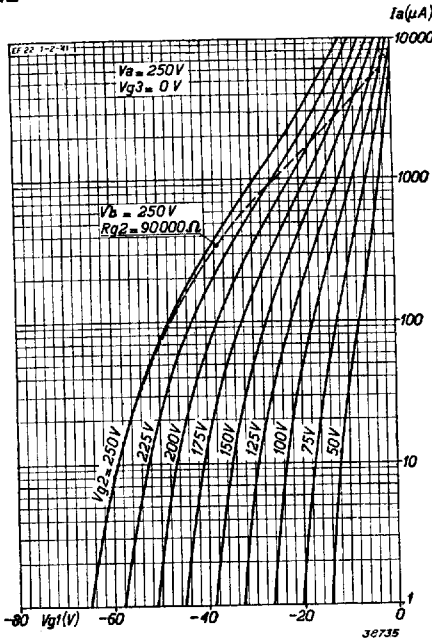


Fig. 3
Anode current as a function of grid bias at $V_a = 250$ V and $V_{g_3} = 0$ V with screen voltage as parameter.

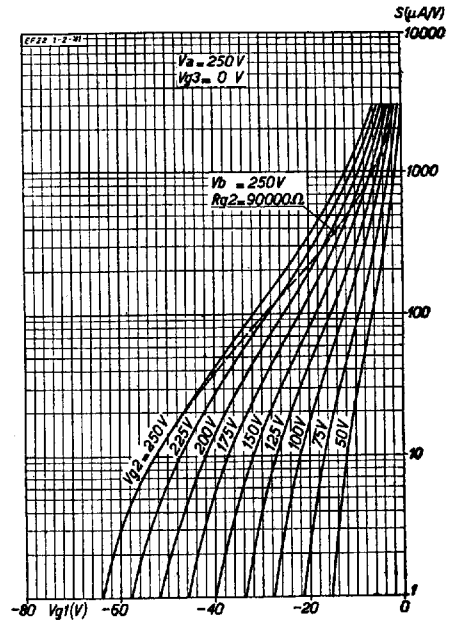


Fig. 4
Mutual conductance as a function of grid bias at $V_a = 250$ V and $V_{g_3} = 0$ V, with screen grid voltage as parameter.

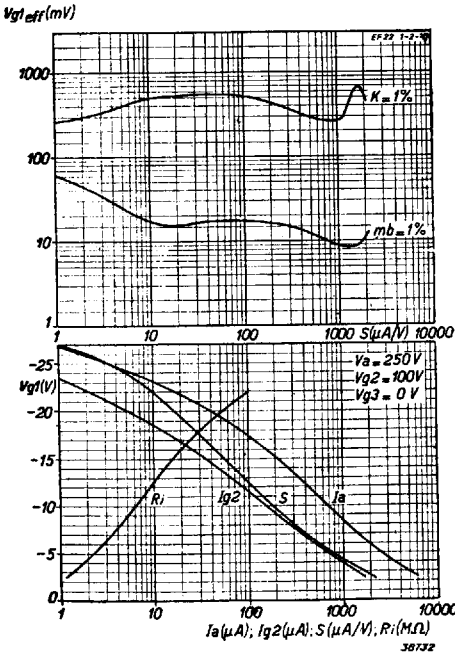


Fig. 5
At $V_a = 250$ V, $V_{g_2} = 100$ V (fixed screen voltage) and $V_{g_3} = 0$ V.
Upper diagram; Highest permissible effective value of R.F. alternating voltage with 1 % cross modulation ($K = 1$ %) and of alternating voltage with 1 % modulation hum ($mb = 1$ %), in each case in respect to the interfering signal at the control grid, as a function of mutual conductance
Lower diagram; Anode current I_a , screen current I_{g_2} , mutual conductance S and internal resistance R_i as a function of grid bias V_{g_1} .

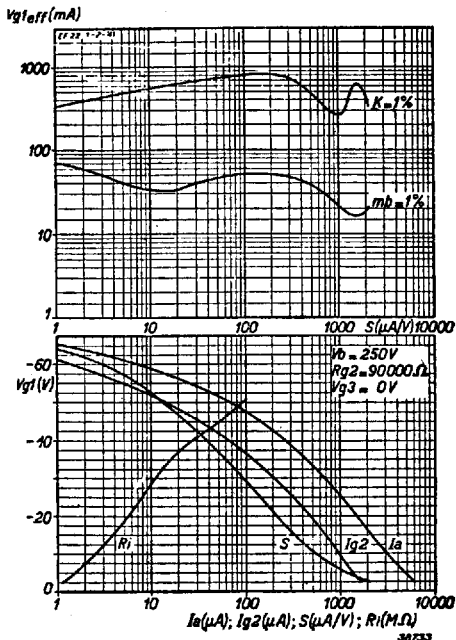


Fig. 6

At $V_b = 250$ V, $R_{g_2} = 90,000$ Ohms (screen fed across a resistance) and $V_{g_3} = 0$ 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 I_a , screen grid current I_{g_2} , mutual conductance S and internal resistance R_i as a function of the grid bias V_{g_1} .

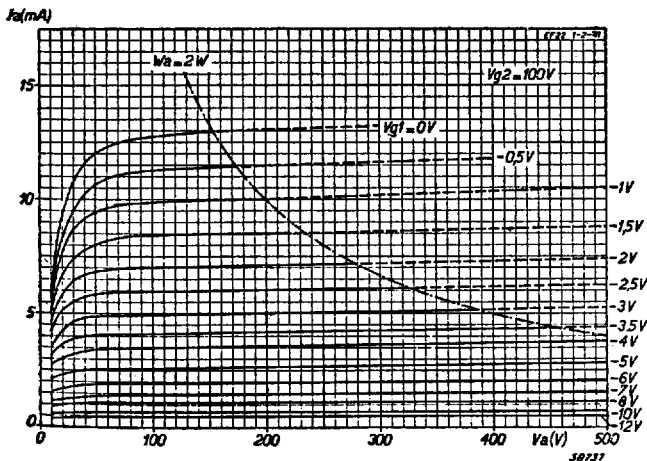


Fig. 7

Anode current as a function of anode voltage at $V_{g_2} = 100$ 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. R_a (Mohm) | Screen grid res. R_{g2} (Mohm) | Anode current I_a (mA) | Screen grid current I_{g2} (mA) | Cath. res. R_k (Ohms) | Control volts on grid 1 $-V_R$ (V) | Gain. $\frac{V_{o\text{eff}}}{V_{g\text{ieff}}}$ | Required alternating grid voltage and total distortion at an alternating output voltage of: | | | | | | | | |
|--------------|-------------------------|----------------------------------|--------------------------|-----------------------------------|-------------------------|------------------------------------|--|---|----------------------|------------------------|---------------------------------|------------------------|----------------------|----------------------------------|--|--|
| | | | | | | | | $V_{o\text{eff}} = 3 \text{ V}$ | | | $V_{o\text{eff}} = 5 \text{ V}$ | | | $V_{o\text{eff}} = 10 \text{ V}$ | | |
| | | | | | | | | $V_{g\text{ieff}}$ (V) | d_{tot} (%) | $V_{g\text{ieff}}$ (V) | d_{tot} (%) | $V_{g\text{ieff}}$ (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 ($I_{g1} = + 0.3 \mu A$) | 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 |

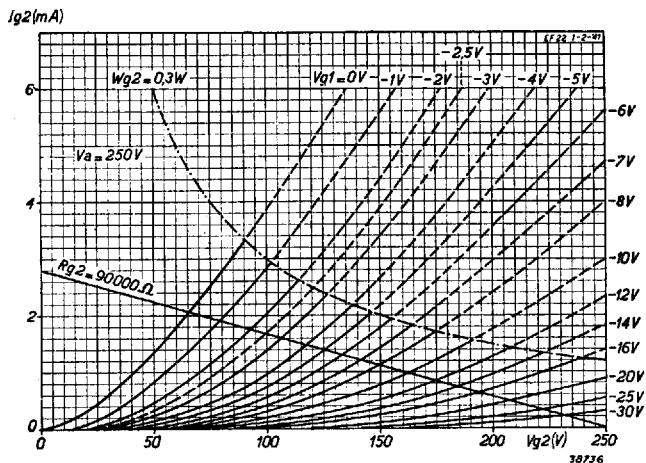


Fig. 8
Screen current as a function of screen voltage at $V_a = 250$ V, with grid bias as parameter. The diagram also includes the load line for a screen grid resistance $R_{g2} = 90,000$ Ohms.