DF 22 variable-mu R.F. Pentode

The DF 22, a directly heated variable-mu R.F. pentode, has a filament voltage of 1.4 V and takes a current of 50 mA. This is double the current required by the DF 21, but on the other hand, the mutual conductance of this valve at $V_{g1} = -1.5$ V is 1.1 mA/V, as compared with a maximum of 0.7 mA/V in the case of the DF 21.
Due to the variable-pitch grid of the DF 22, the characteristics of this valve are also very much better than those of the DF 21 as regards cross modulation. The minimum point in the cross modulation curve (K = 1 %) lies at a mutual conductance of 200 μA/V, at which point the permissible alternating voltage of the interfering signal, at 30 % modulation, is 55—60 mV (effective). With the DF 21 the minimum occurs at 20 μA/V, with an allowable alternating voltage, for 1 % cross modulation, of about 20 mV.

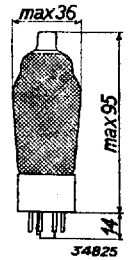
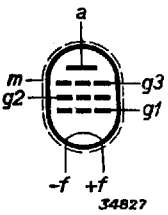


Fig. 1.
Dimensions in mm

FILAMENT RATINGS

Filament supply: direct, from a battery, with rectified A.C., or D.C. Series or parallel supply.

Filament voltage	V_f	= 1.4 V
Filament current	I_f	= 0.050 A



CAPACITANCES

Anode-control grid	C_{ag1}	< 0.005 pF
Control grid-all other electrodes	C_{g1}	= 5.0 pF
Anode-all other electrodes	C_a	= 6.8 pF

OPERATING DATA: valve employed as R.F. and I.F. amplifier

Anode voltage	V_a	=	90 V	
Screen grid voltage	V_{g2}	=	90 V	
Suppressor grid voltage	V_{g3}	=	0 V	
Grid bias	V_{g1}	=	−1.5 V[1])	−6 V[2])
Anode current	I_a	=	1.4 mA	—
Screen current	I_{g2}	=	0.3 mA	—
Mutual conductance	S	=	1100 μ A/V	11 μA/V
Internal resistance	R_i	=	1.5 M Ohms	> 10 M Ohms
Gain factor in respect of screen grid	μ_{g2g1}	=	25	—

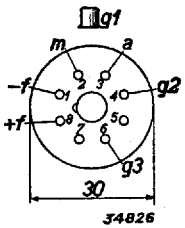


Fig. 2
Arrangement and sequence of contacts.

Anode and supply voltage	V_a =	V_b	=	120 V
Screen grid resistance		R_{g2}	=	0.1 M Ohms
Suppressor grid voltage		V_{g3}	=	0 V
Grid bias		V_{g1}	=	−1.5 V[1]) −8 V[2])
Anode current		I_a	=	1.4 mA —
Screen grid voltage		V_{g2}	=	90 V 120 V
Screen grid current		I_{g2}	=	0.3 mA —
Mutual conductance		S	=	1100 μA/V 11 μA/V
Internal resistance		R_i	=	2.5 M Ohms > 10 M Ohms
Gain factor in respect of screen		μ_{g2g1}	=	25 —

[1]) Valve not controlled. [2]) Mutual conductance controlled to 1/100.

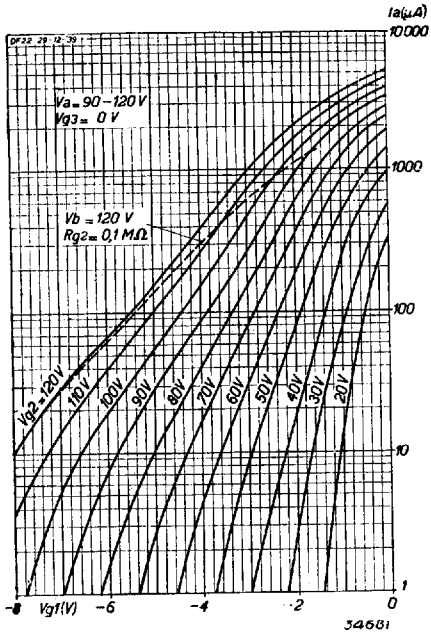


Fig. 3
Anode current as a function of grid bias, at Va = 90—120 V, with Vg_2 as parameter. The broken line refers to a valve with control, the screen being fed from the 120 V source through a resistance of 0.1 M Ohm.

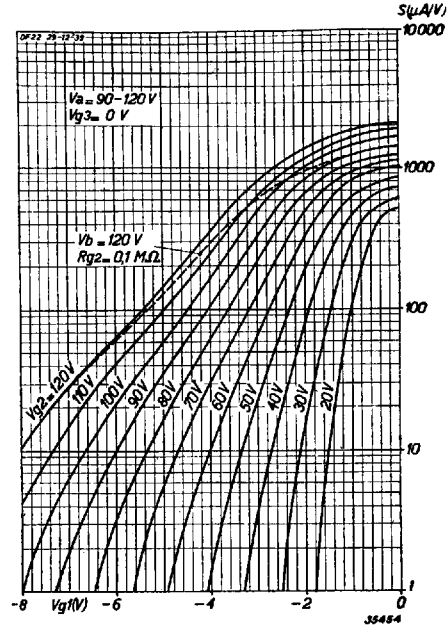


Fig. 4
Mutual conductance as a function of grid bias, at Va = 90 — 120 V, with Vg_2 as parameter. The broken line refers to valve with control, the screen being fed from the 120 V source through a resistance of 0.1 M Ohm.

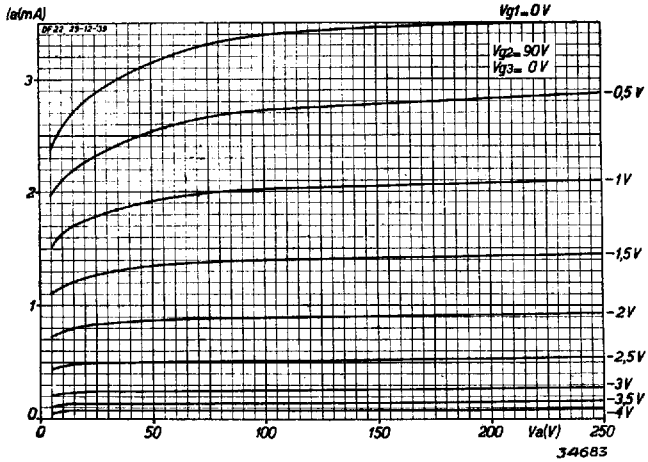


Fig. 5
Anode current as a function of anode voltage, at Vg_2 = 90 V, with Vg_1 as parameter.

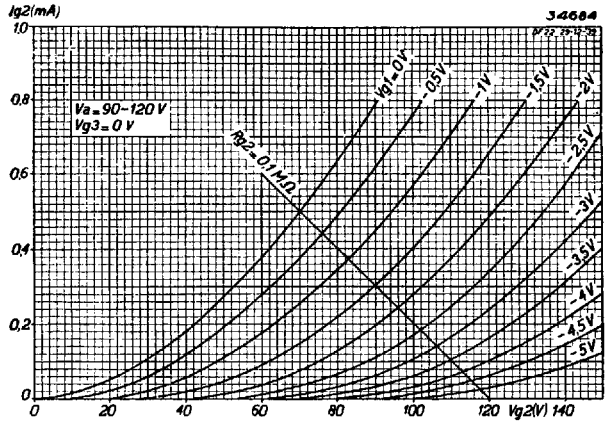


Fig. 6
Screen grid current as a function of screen voltage at $Va = 90 - 120$ V, with Vg_1 as parameter.

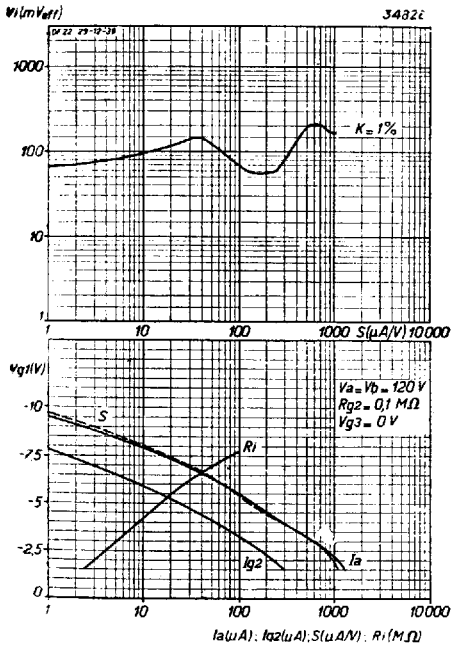


Fig. 7
Upper diagram; Effective value of alternating grid voltage as a function of mutual conductance, with 1 % cross modulation, at $Va = Vb = 120$ V.
Lower diagram; Mutual conductance S, anode current Ia, screen current Ig_2 and internal resistance Ri as a function of grid bias, at $Va = Vb = 120$ V.

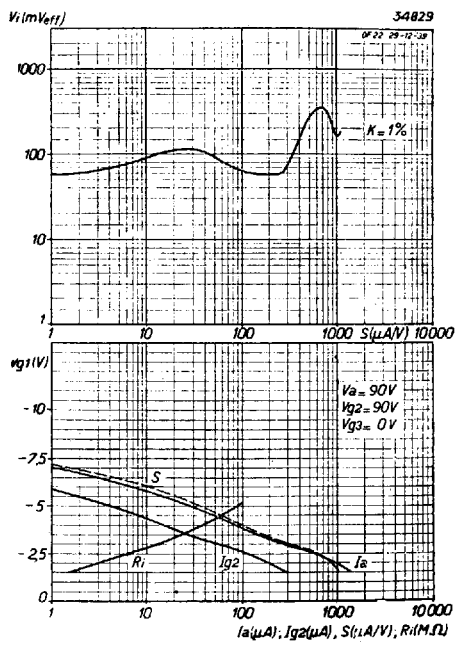


Fig. 8
Upper diagram; Effective value of alternating grid voltage as a function of mutual conductance, with 1 % cross modulation, at $Va = Vg_2 = 90$ V.
Lower diagram; Mutual conductance S, anode current Ia, screen current Ig_2 and internal resistance Ri as a function of grid bias, at $Va = Vg_2 = 90$ V.

MAXIMUM RATINGS

Anode voltage	V_a	= max. 135 V
Anode dissipation	W_a	= max. 0.2 W
Screen grid voltage	V_{g2}	= max. 135 V
Screen grid dissipation	W_{g2}	= max. 0.1 W
Cathode current	I_k	= max. 3 mA
Grid current commences at (I_{g1} = +0.3 μA)	V_{g1}	= max. —0.2 V
Max. external resistance between grid 1 and filament	R_{g1f}	= max. 3 M Ohms
Minimum limit for filament voltage	V_f	= min. 1.1 V
Maximum limit for filament voltage	V_f	= max. 1.5 V

The valve can be used for R.F. or I.F. amplification, but, although the screen voltage may certainly be 135 V, the maximum permissible screen dissipation is 0.1 W. If a 120 V H.T.battery is to be used, it is advisable to feed the screen through a resistance of 100,000 Ohms: this will reduce the voltage to 90 V, if no control is applied to the valve. This method of feeding by means of a resistance is simpler than direct feeding by plugging into the 90 V battery-tapping and has the additional advantage that it provides a sliding screen voltage, which is better from the point of view of cross modulation than a fixed potential.
Standard precautions must also be taken in the filament circuit (see p. 82).