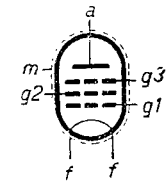
KF 4 R.F. pentode



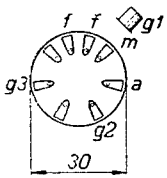


Fig. 2
Arrangement of base connections and electrodes.

The R.F. pentode KF 4 has no control characteristic; it can be employed for R.F. or I.F. amplification, anode-bend or grid detection, and as resistance-coupled A.F. amplifier.

When used for the last-mentioned function it should follow the indirectly-heated double-diode KB 2 for driving a Class A output stage using the pentode KL 4 or, with the necessary driver transformer, a Class B stage comprising two valves of the latter type.

The KF 4 gives excellent results on short waves; this is mainly due to the use of the P-type base with which it is fitted, and a separate contact for the suppressor grid connection. In the design of this valve output capacitances have been kept as low as possible.

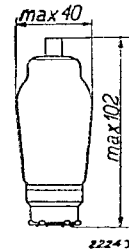


Fig. 1
Dimensions in mm.

FILAMENT RATINGS

Heating: direct by battery; parallel supply.

Filament voltage. . . . . $V_f = 2.0$ V

Filament current. . . . . $I_f = 0.065$ A

CAPACITANCES

$C_{ag_1} < 0.008$ $\mu\mu$F

$C_{g_1} = 6.0$ $\mu\mu$F

$C_a = 5.0$ $\mu\mu$F

MAXIMUM RATINGS

V_a	= max. 135 V
W_a	= max. 0.5 W
V_{g2}	= max. 135 V
W_{g2}	= max. 0.25 W
I_k	= max. 5 mA
V_{g1} ($I_{g1} = +0.3\ \mu$A)	= max. —0.2 V
R_{g1k}	= max. 3 M ohms

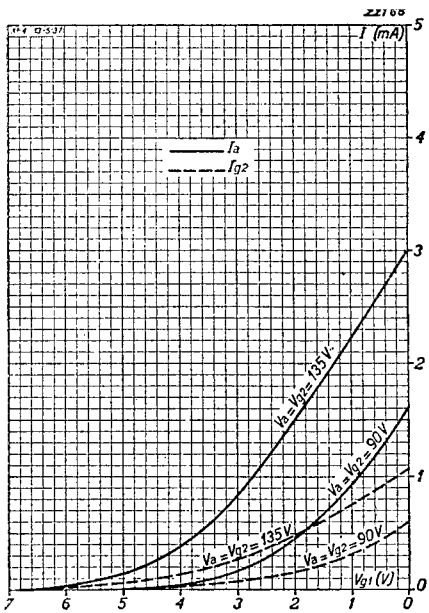


Fig. 3
Anode and screen-grid current as functions of the grid bias.

STATIC DATA

Anode voltage	V_a	= 90 V	135 V
Screen-grid voltage	V_{g2}	= 90 V	135 V
Suppressor-grid voltage	V_{g3}	= 0	0 V
Grid bias	V_{g1}	= —0.5 V	—0.5 V
Anode current	I_a	= 1.2 mA	2.6 mA
Screen-grid current	I_{g2}	= 0.4 mA	1.0 mA
Amplification factor	μ	= 800	700
Mutual conductance	S	= 0.7 mA/V	0.8 mA/V
Internal resistance	R_i	= 0.9 M ohms	0.8 M ohms

TABLE I

KF 4 used as grid detector with resistance coupling (connected as pentode); grid leak of following valve = 1 megohm.

Battery voltage	Coupling resistor	Anode current	Screen-series resistor	Screen-grid current	Detector amplification; modulation depth 30 %		Alternating output voltage; modulation depth 30 %	
					Altern. output voltage	Stage gain	Altern. output voltage	Altern. grid voltage
Vb (V)	Ra (M ohm)	Ia (mA)	Rg_2 (M ohm)	Ig_2 (mA)	Vo (Veff)		Vo (Veff)	Vi (Veff)
135	0.32	0.37	0.64	0.15	2	6.6	4.8	0.64
90	0.32	0.24	0.5	0.11	2	4.8	2.6	0.56
135	0.10	1.05	0.5	0.16	2	7.3	6.4	1.0
90	0.04	2.1	0.032	1.05	2	4.4	5.1	1.6
135	0.10	0.71	0.10	0.41	2	4.9	4.5	1.0
90	0.04	1.5	0.016	0.75	2	3.9	3.8	1.1

TABLE II

KF 4 used as grid detector with reaction and resistance coupling (connected as triode).

Battery voltage	Coupling resistor	Anode current	Detector amplification at m = 0.3		Alternating output voltage at m = 0.3			Alternating output voltage at m = 0.1		
			Altern. output volts	Stage gain	Altern. output volts	Altern. grid volts	Distortion	Altern. output volts	Altern. grid volts	Distortion
Vb (V)	Ra (Ohms)	Ia (mA)	Vo (Veff)		Vo (Veff)	Vi (Veff)	%	Vo (Veff)	Vi (Veff)	%
135	20,000	2.6	0.5	1.9	2.2 [1])	1.1	2	0.85	1.5	0.9
135	40,000	1.8	0.5	2.2	2.2 [1])	1.0	3.6	0.86	1.5	2
90	20,000	1.5	0.5	1.6	1.4 [2])	0.95	5 [3])	—	—	—
90	40,000	1.1	0.5	2.0	1.4 [2])	0.8	4	—	—	—

[1]) Max. excitation of the stage KC 3 + KDD 1 at Va = 135 V is reached at an alternating grid voltage of 2.2V(*eff*)

[2]) Max. excitation of the stage KC 3 + KDD 1 at Va = 90 V is reached at an alternating grid voltage of 1.4 V(*eff*).

[3]) Maximum alternating output voltage.

TABLE III

KF 4 used as A.F. amplifier (connected as pentode). Grid leak of following valve 1 megohm.

Battery voltage	Coupling resistor	Anode current	Screen series resistor	Screen-grid current	Grid bias	With an alternating output voltage of 10 Veff:		With an alternating output voltage of 14 Veff:	
						Gain factor	Distortion	Gain factor	Distortion
Vb (V)	Ra (M ohm)	Ia (mA)	Rg_2 (M ohm)	Ig_2 (mA)	Vg_1 (V)		d (%)		d (%)
135	0.32	0.30	0.64	0.11	—1.5	72	0.5	72	0.7
90	0.32	0.18	0.4	0.10	—1.5	52	1.5	52	1.8
135	0.20	0.41	0.4	0.15	—1.5	62	0.8	62	1.0
90	0.20	0.24	0.25	0.10	—1.5	48	1.2	48	1.9
135	0.10	0.64	0.2	0.23	—1.5	47	0.9	47	1.6
90	0.10	0.50	0.05	0.20	—1.5	37	0.9	37	1.8

TABLE IV

KF 4 used as A.F amplifier (connected as triode). Grid leak of the following valve 1 megohm.

Battery voltage	Coupling resistor	Anode current	Grid bias	With an alternating output voltage of 7 Veff: [1])			With an alternating output voltage of 10 Veff: [2])		
				Altern. grid volts	Stage gain	Distortion	Altern. grid volts	Stage gain	Distortion
Vb (V)	Ra (M ohm)	Ia (mA)	Vg_1 (V)	Vi (Veff)		d (%)	Vi (Veff)		d (%)
135	0.32	0.25	—1.5	0.39	18	0.8	0.56	18	0.8
135	0.32	0.15	—3.0	0.43	16.2	1.5	0.62	16.2	2.8
90	0.32	0.13	—1.5	0.43	16.2	2	—	—	—
90	0.32	0.05	—3.0	0.62	11.5	10	—	—	—
135	0.20	0.35	—1.5	0.39	18	0.8	0.56	18	0.8
135	0.20	0.21	—3.0	0.45	16	1.7	0.63	16	3.0
90	0.20	0.17	—1.5	0.43	16.2	2	—	—	—
90	0.20	0.07	—3.0	0.65	10.5	13	—	—	—
135	0.10	0.56	—1.5	0.42	16.6	0.8	0.60	16.6	1.0
135	0.10	0.33	—3.0	0.48	14.5	2.4	0.70	14.5	4.0
90	0.10	0.28	—1.5	0.48	14.5	1.5	—	—	—
90	0.10	0.09	—3.0	0.76	9.5	18	—	—	—

[1]) Max. excitation of the KL 2 at $Va = Vg_2 =$ 90 V is reached at an alternating input of 7 Veff.
Max. excitation of the KL 4 at $Va = Vg_2 =$ 90 V is reached at an alternating input of 2 Veff.
[2]) Max. excitation of the KL 2 at $Va = Vg_2 =$ 135 V is reached at an alternating input of 10 Veff.
Max. excitation of the KL 4 at $Va = Vg_2 =$ 135 V is reached at an alternating input of 3.5 Veff.

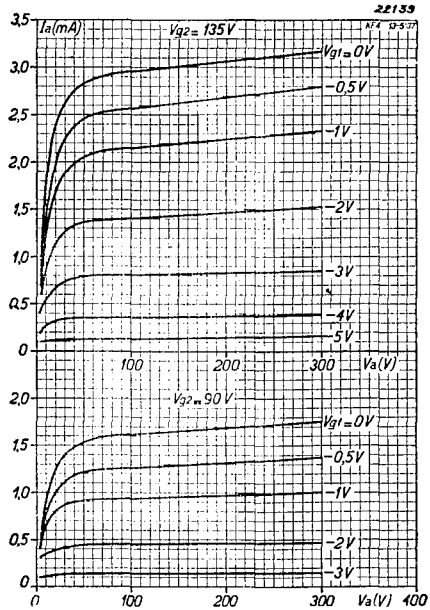


Fig. 4
Anode current as a function of the anode voltage, with grid bias as parameter, at V_{g_2} = 90 V and 135 V.

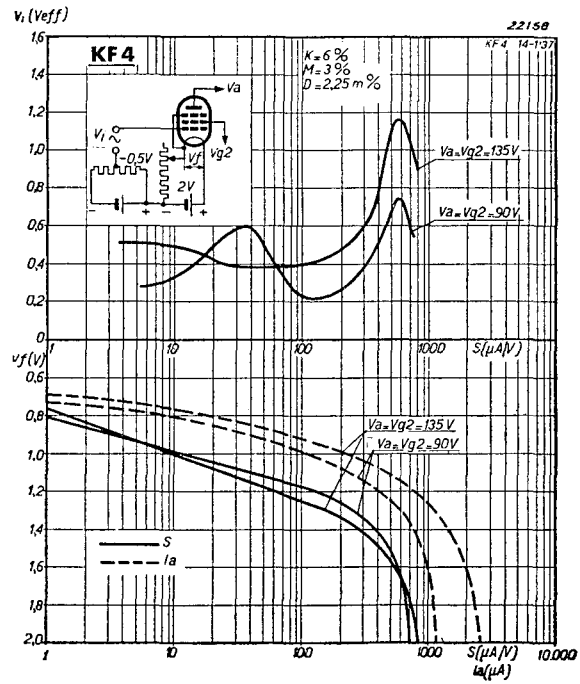


Fig. 5
Upper diagram. Maximum permissible effective value of the alternating grid voltage with 6 % cross-modulation (0.5 % 3rd harmonic), as a function of the mutual conductance controlled by varying the filament voltage.
Lower diagram. Mutual conductance and anode current as functions of the filament voltage.