KL 5 Output pentode

This is a directly-heated output valve for 2 V battery receivers, delivering a reasonably high output on a very low current consumption; with 135 V on the anode, passing a current of 8.5 mA, the output is 0.52 W with 10 % distortion.
In this valve an improvement has been introduced in the form of mica dampers on the filament, which greatly reduce any tendency towards microphony; in this respect, too, therefore, the KL 5 is an extremely reliable valve. Two of these valves in a balanced circuit will deliver an output which for battery receivers is quite high, with relatively little distortion. The low filament consumption in such circuits is another important feature; with an anode potential of 135 V, two KL 5 valves will give slightly more than 1 W, with about 7 % distortion, the combined filament current being only 0.2 A. The sensitivity is such that the valve can be fully excited with any normal A.F. valve, or with a pentode functioning as grid detector.

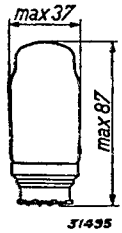

Fig. 1
Dimensions in mm.

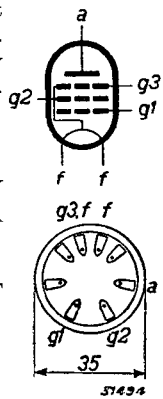

Fig. 2
Arrangement of electrodes and base connections.

FILAMENT RATINGS

Heating: direct by battery; parallel supply.
Filament voltage . . . . . $V_f = 2.0$ V
Filament current . . . . . $I_f = 0.1$ A

CAPACITANCES

Anode-grid . . . . . $C_{ag1} < 0.6$ $\mu\mu$F

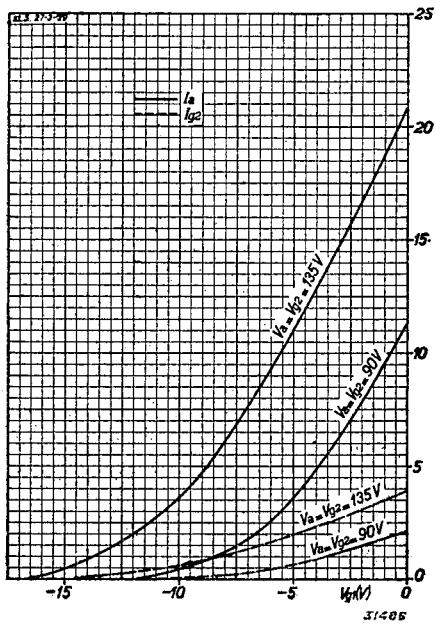

Fig. 3
Anode and screen-grid current as functions of the grid bias, with $Va = Vg_2 = 135$ and 90 V.

OPERATING DATA: KL 5 used as a single output valve

Anode voltage	V_a	= 90 V	135 V
Screen-grid voltage	V_{g2}	= 90 V	135 V
Grid bias	V_{g1}	= —4 V	—6.5 V
Anode current	I_a	= 4.8 mA	8.5 mA
Screen-grid current	I_{g2}	= 0.9 mA	1.5 mA
Mutual conductance	S	= 1.4 mA/V	1.7 mA/V
Internal resistance	R_i	= 180,000 ohms	135,000 ohms
Load resistor	R_a	= 19,000 ohms	16,000 ohms
Output power (10 % distortion)	W_o	= 0.2 W	0.53 W
Alternating grid voltage (10 % distortion)	V_i	= 2.6 V_{eff}	4.8 V_{eff}
Sensitivity (W_o = 50 mW)	V_i	= 0.7 V_{eff}	0.8 V_{eff}

OPERATING DATA: KL 5 used in a balanced output stage (2 valves)

Anode voltage	V_a	= 90 V	135 V
Screen-grid voltage	V_{g2}	= 90 V	135 V
Grid bias	V_{g1}	= —8.5 V	—12 V
Anode current (without signal)	I_{ao}	= 2 × 1 mA	2 × 2 mA
Anode current at max. modulation	$I_{a\,max}$	= 2 × 3.6 mA	2 × 6.25 mA
Screen-grid current (without signal)	I_{g2o}	= 2 × 0.1 mA	2 × 0.35 mA
Screen-grid current at max. modulation	$I_{g2\,max}$	= 2 × 1.0 mA	2 × 2.4 mA
Load resistor between anodes	R_{aa}	= 25,000 ohms	25,000 ohms
Output power at max. modulation	W_o	= 3.5 W	1.05 W
Alternating grid voltage at maximum modulation	V_i	= 6.5 V_{eff}	8.7 V_{eff}
Total distortion at maximum modulation	d_{tot}	= 3.8 %	7 %

MAXIMUM RATINGS

Anode voltage	V_a	= max. 200 V
Anode dissipation	W_a	= max. 2.0 W
Screen-grid voltage	V_{g2}	= max. 200 V
Screen-grid dissipation (V_i = 0 V)	W_{g2}	= max. 0.5 W
Screen-grid dissipation (W_o = max.)	W_{g2}	= max. 1.0 W
Cathode current	I_k	= max. 12 mA
Grid voltage at grid current start (I_{g1} = + 0.3 μA)	V_{g1}	= max. —0.2 V
External resistance between grid and cathode	R_{g1k}	= max. 1 M ohm

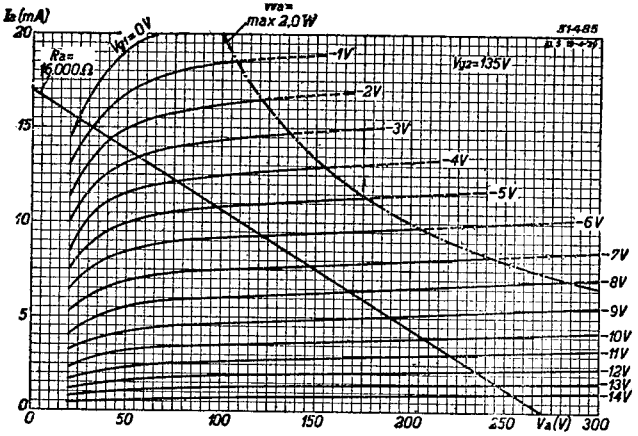

Fig. 4
Anode current as a function of the anode voltage, with grid bias as parameter, for a screen voltage of 135 V.

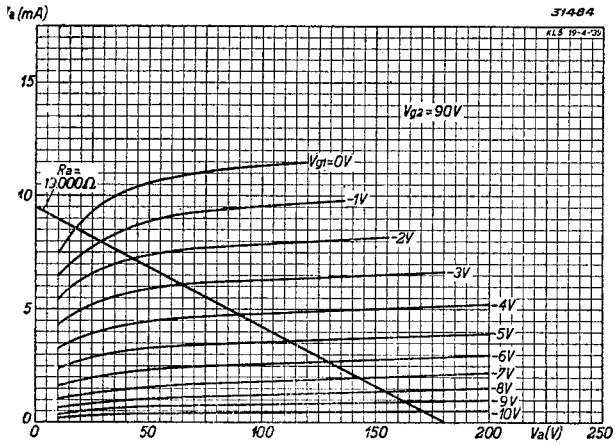

Fig. 5
Anode current as a function of the anode voltage, with grid bias as parameter, for a screen voltage of 90 V.

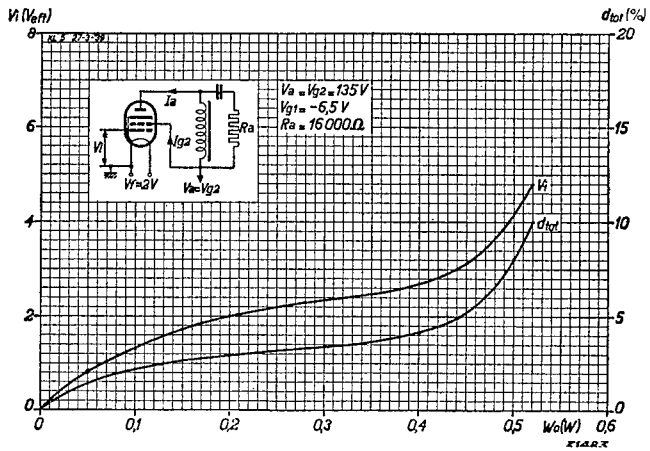

Fig. 6
Alternating grid voltage Vi and total distortion d_{tot} of the KL 5 as functions of the output power ($Va = Vg_2 = 135$ V).

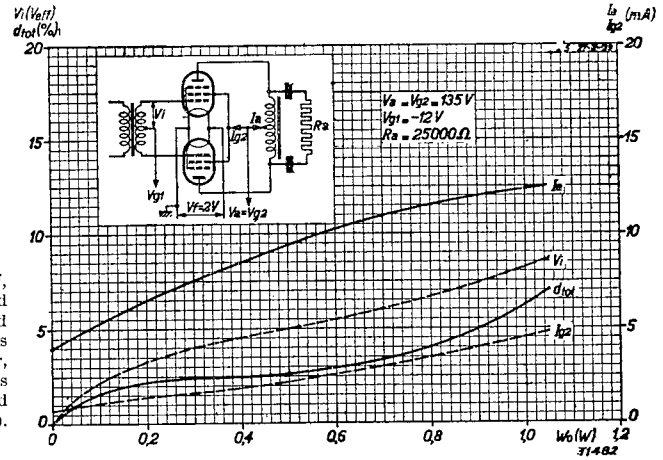

Fig. 7
Alternating grid voltage Vi, total distortion $dtot$, combined anode current Ia and combined screen-grid current Ig_2 as functions of the output power, for two KL 5 valves in a Class B output circuit without grid current ($Va = Vg_2 = 135$ V).

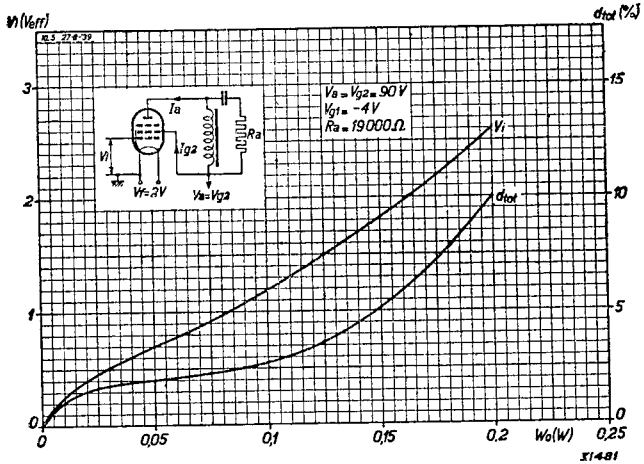

Fig. 8
Alternating grid voltage Vi and total distortion $dtot$ of the KL 5 as functions of the output power. $Va = Vg_2 = 90$ V.

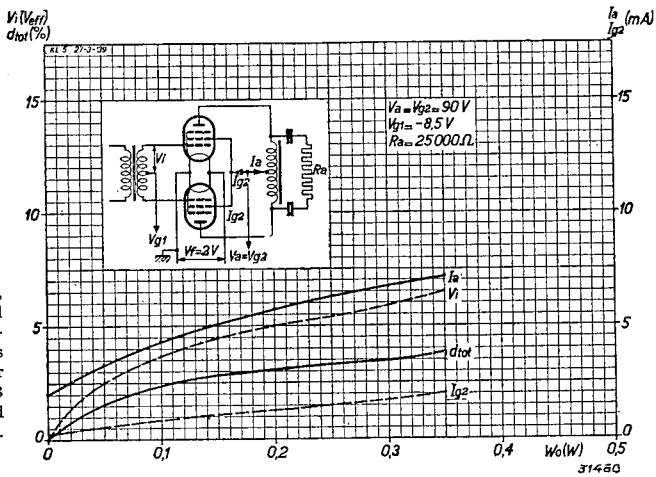

Fig. 9
Alternating grid voltage Vi, total distortion $dtot$, combined anode current Ia and combined screen-grid current Ig_2 as functions of the output power of two KL 5 valves in a Class B output circuit without grid current. $Va = Vg_2 = 90$ V.