

# 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.

### FILAMENT RATINGS

Heating: direct by battery; parallel supply.

Filament voltage. . . . .  $V_f = 2.0 \text{ V}$

Filament current. . . . .  $I_f = 0.1 \text{ A}$

### CAPACITANCES

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

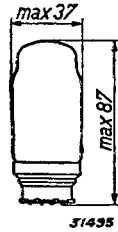


Fig. 1 Dimensions in mm.

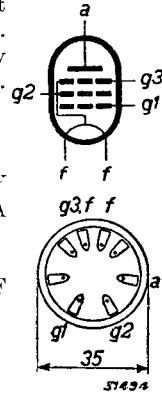


Fig. 2 Arrangement of electrodes and base connections.

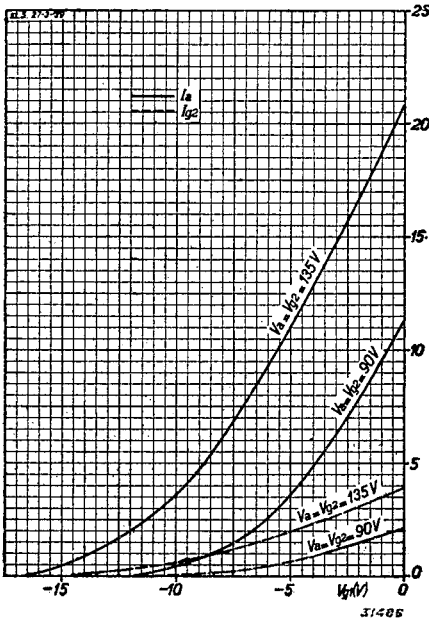


Fig. 3 Anode and screen-grid current as functions of the grid bias, with  $V_a = V_{g3} = 135$  and  $90 \text{ V}$ .

**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 . . . . .	$R_u$	= 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) . . . . .	$I_{a0}$	= $2 \times 1$ mA	$2 \times 2$ mA
Anode current at max. modulation . . . . .	$I_{a \max}$	= $2 \times 3.6$ mA	$2 \times 6.25$ mA
Screen-grid current (without signal) . . . . .	$I_{g20}$	= $2 \times 0.1$ mA	$2 \times 0.35$ mA
Screen-grid current at max. modulation . . . . .	$I_{g2 \max}$	= $2 \times 1.0$ mA	$2 \times 2.4$ mA
Load resistor between anodes . . . . .	$R_{uu}$	= 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 . . . . .	( $I_{g1} = + 0.3 \mu A$ ) $V_{g1}$	= max. -0.2 V
External resistance between grid and cathode . . . . .	$R_{g1k}$	= max. 1 M ohm

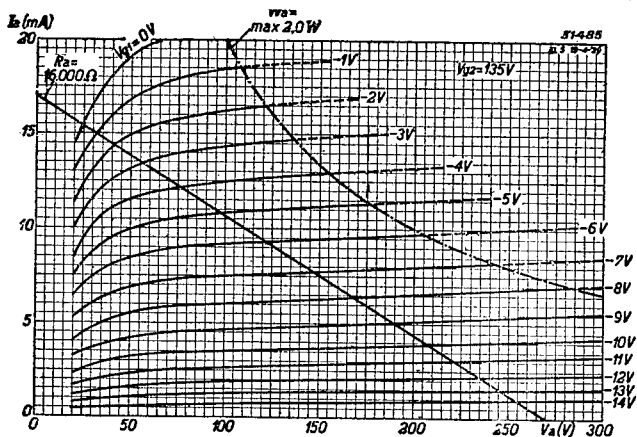


Fig. 4  
Anode current as a function of the anode voltage, with grid bias as parameter, for a screen voltage of 135 V.

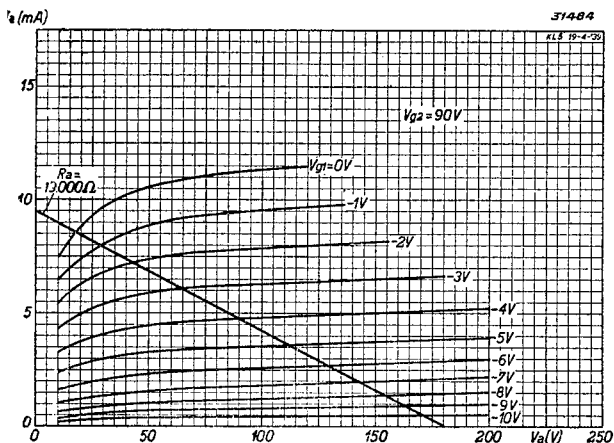


Fig. 5  
Anode current as a function of the anode voltage, with grid bias as parameter, for a screen voltage of 90 V.

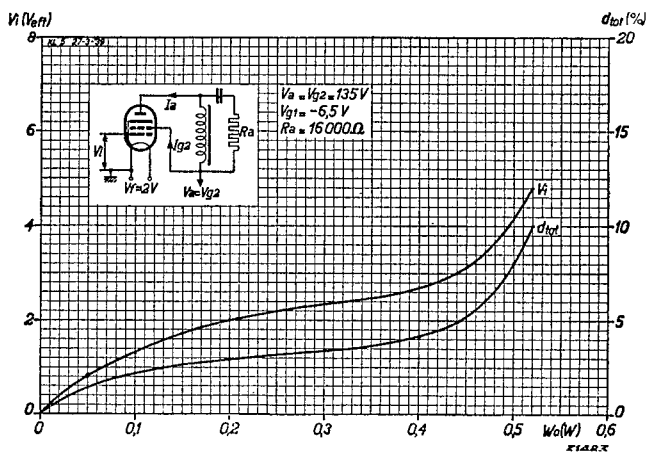


Fig. 6  
Alternating grid voltage  $V_i$  and total distortion  $d_{tot}$  of the KL 5 as functions of the output power ( $V_a = V_{g_2} = 135$  V).

Fig. 7  
Alternating grid voltage  $V_i$ , total distortion  $d_{tot}$ , combined anode current  $I_a$  and combined screen-grid current  $I_{g2}$  as functions of the output power, for two KL 5 valves in a Class B output circuit without grid current ( $V_a = V_{g2} = 135$  V).

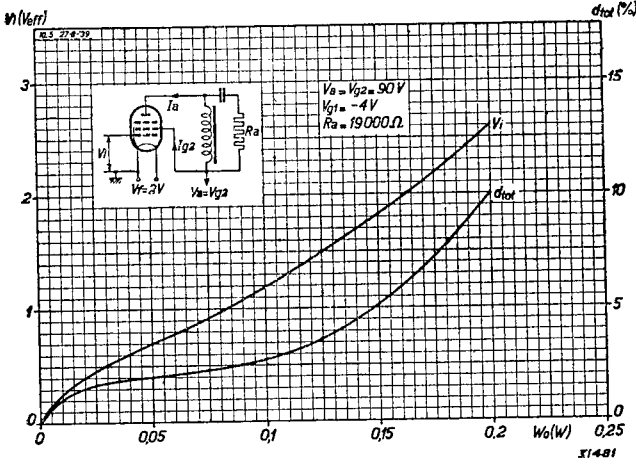
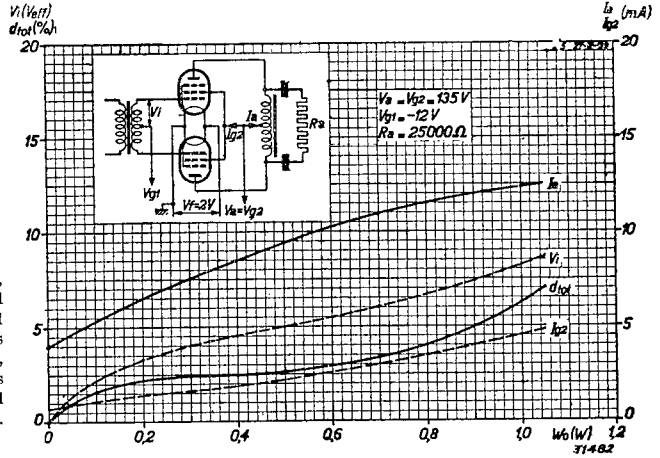


Fig. 8  
Alternating grid voltage  $V_i$  and total distortion  $d_{tot}$  of the KL 5 as functions of the output power.  $V_a = V_{g2} = 90$  V.

Fig. 9  
Alternating grid voltage  $V_i$ , total distortion  $d_{tot}$ , combined anode current  $I_a$  and combined screen-grid current  $I_{g2}$  as functions of the output power of two KL 5 valves in a Class B output circuit without grid current.  $V_a = V_{g2} = 90$  V.

