EL 51 Pentode

The EL 51 is a 45 W pentode for use in large amplifier equipment. Two of these valves in a balanced circuit with an anode and screen potential of 750 V will deliver an output of 140 W. A 68 W electric lamp must be connected in series with the screen grids to prevent the screen-grid being overloaded. The fact that the screen carries the same potential as the anode affords many possibilities in connection with the application of this valve, since the screen can be fed directly from the high-tension line, without necessitating the use of a potential divider carrying a high current.
The grid input for maximum modulation is quite small on account of the high mutual conductance; the heater consumption is, nevertheless, relatively low, being 12 W.

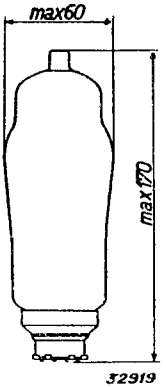


Fig. 1
Dimensions in mm.

HEATER RATINGS

Heating: indirect by A.C. or D.C.; parallel supply.

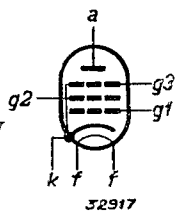
Heater voltage	V_f	= 6.3 V
Heater current	I_f	= 1.9 A

CAPACITANCES

Anode-grid	C_{ag1}	< 1.5 $\mu\mu$F

STATIC RATINGS

Anode voltage	V_a	=	500	750	V
Screen-grid voltage	V_{g2}	=	500	750	V
Grid bias	V_{g1}	=	—20	—37.5	V
Anode current	I_a	=	87	60	mA
Screen-grid current	I_{g2}	=	13	10	mA
Mutual conductance	S	=	11	8	mA/V
Amplification factor; screen with respect to control grid	μ_{g2g1}	=	16,500	16,500	—
Internal resistance	R_i	=	33,000	50,000	ohms



OPERATING DATA

The EL 51 used in class B output stage with fixed grid bias (two valves)

Anode voltage	V_a	=		750	V
Screen-grid voltage	V_{g2}	=		750	V [1]
Grid bias	V_{g1}	=		—40	V
Load resistor between anodes	R_{aa}	=		6,000	ohms
Alternating input voltage	V_i	=	0	28.5	V_{eff}
Anode current	I_a	=	2×40	2×145	mA
Screen-grid current	I_{g2}	=	2×7.5	2×30	mA
Power output	W_o	=	0	140	W
Total distortion	d_{tot}	=	—	5	%

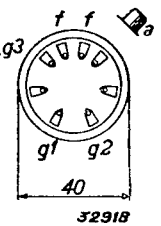


Fig. 2
Arrangement of electrodes and base connections.

[1]) A resistor of 1,000 ohms should be included in series with the common screen-grid lead, or, better still, a special electric lamp (550 V, 68 W).

The EL 51 used in class AB output stage with auto. grid bias (two valves)

Anode voltage	V_a =	500		V
Screen-grid voltage	V_{g2} =	500		V
Common cathode resistor	R_k =	100		ohms
Load resistor between anodes	R_{aa} =	4,800		ohms
Alternating input voltage	V_i =	0	19	V_{eff}
Anode current	I_a =	2×87	2×110	mA
Screen-grid current	I_{g2} =	2×13	2×23	mA
Power output	W_o =	0	67.5	W
Total distortion	d_{tot} =	—	5	%

MAXIMUM RATINGS

V_{ao}	= max.	1,500	V	I_k	= max.	200	mA
V_a	= max.	750	V	V_{g1} (I_{g1} = + 0.3 μA)			
W_a	= max.	45	W		= max.	—1.3	V
V_{g2o}	= max.	1,500	V	R_{g1} (fixed bias)	= max.	0.35	M ohm
V_{g2}	= max.	750	V	R_{g1} (auto. bias)	= max.	0.7	M ohm
W_{g2} (V_i = 0)	= max.	7	W	V_{fk}	= max.	50	V
W_{g2} (W_o = max.)	= max.	25	W	R_{fk}	= max.	20,000	ohms

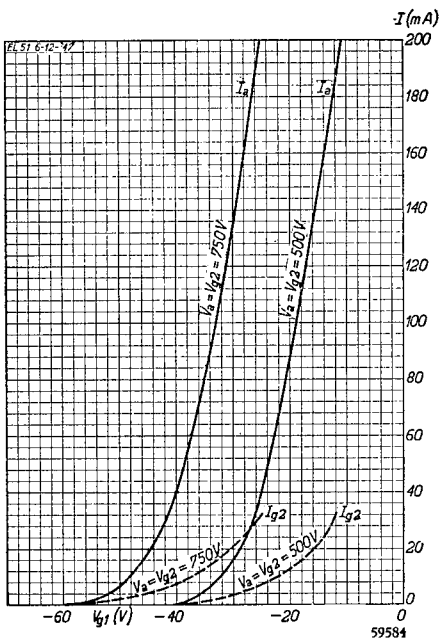


Fig. 3
Anode and screen current of the EL 51 as functions of the grid bias, for various values of anode and screen potential.

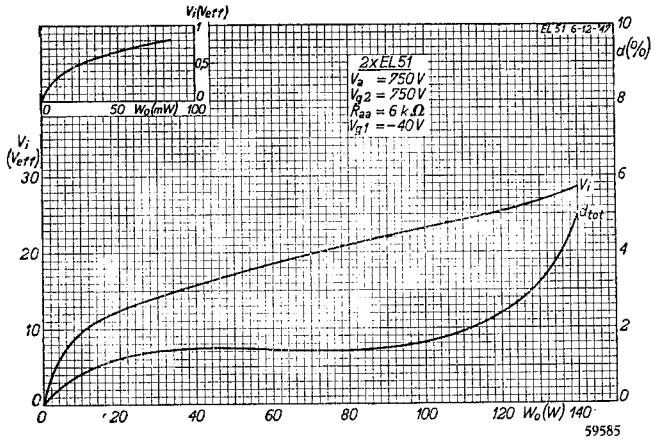


Fig. 4
Total distortion and alternating input voltage as functions of the output power; 2 valves EL 51 used in class B output stage with fixed grid bias, $Va = Vg_2 = 750$ V.

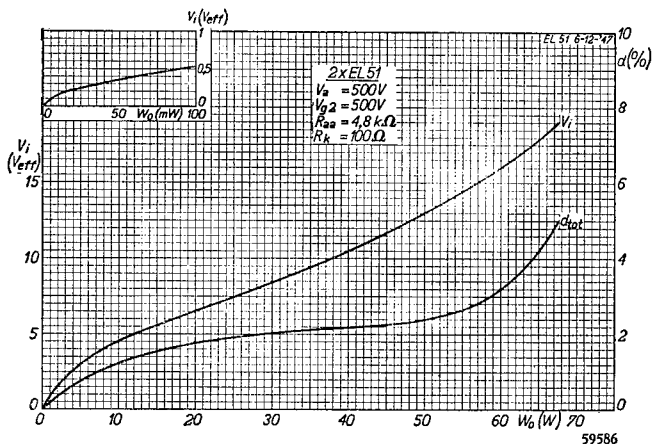


Fig. 5
Total distortion and alternating input voltage as functions of the output power; 2 valves EL 51 used in class AB output stage with auto. grid bias, $Va = Vg_2 = 500$ V.