

# 4689 Pentode

This is an indirectly-heated steep-slope 18 W output valve using a maximum anode potential of 375 V. Two of these valves in a balanced circuit will deliver a combined output of nearly 29 W and, due to the high mutual conductance, an output stage of this type will operate on a very moderate grid input; any ordinary A.F. amplifier valve is therefore sufficient to excite fully the output stage. In view of the high mutual conductance, it is advisable to employ automatic grid bias; the published data relate to a constant screen potential of 275 V. Should a potential divider be used for the feed in order to reduce the screen voltage to 250 V, the screen voltage will fall on an increasing input signal, if the current passing through the potential divider is not sufficiently high; in consequence, the grid swing is reduced and, with it, the output. It is therefore recommended in all cases where such losses of power are undesirable, that the screen voltage be kept constant by means of stabilizer tubes, e.g. type 4687; this also has the advantage that the main voltage will not decrease as much as it is likely to do without stabilization.

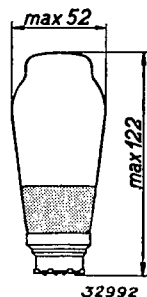


Fig. 1  
Dimensions in mm.

## HEATER RATINGS

Heating: indirect by A.C. or D.C.; parallel supply.  
 Heater voltage . . . . .  $V_f = 6.3$  V  
 Heater current . . . . .  $I_f = 1.35$  V

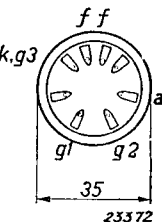
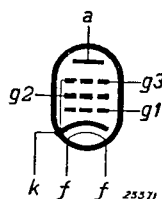


Fig. 2  
Arrangement of electrodes and base connections.

## CAPACITANCES

Anode-grid  
 $C_{ag1} < 0.8 \mu\mu\text{F}$

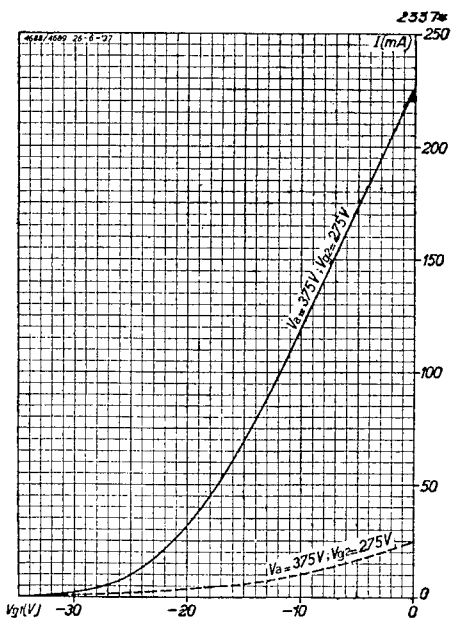


Fig. 3  
Anode and screen-grid current of the 4689 as functions of the grid bias.  $V_a = 375$  V,  $V_{g_2} = 275$  V.

OPERATING DATA

		Class AB output with auto. grid bias (2 valves)
Anode voltage . . . . .	$V_a =$	375 V
Screen-grid voltage . . . . .	$V_{g2} =$	275 V
Common cathode resistor . . . . .	$R_k =$	165 ohms
Anode current (without signal) . . . . .	$I_{a0} =$	$2 \times 48$ mA
Anode current at max. modulation . . . . .	$I_{a \text{ max}} =$	$2 \times 62$ mA
Screen-grid current (without signal) . . . . .	$I_{g20} =$	$2 \times 5$ mA
Screen-grid current at max. modulation . . . . .	$I_{g2 \text{ max}} =$	$2 \times 9$ mA
Load resistor (between anodes) . . . . .	$R_{aa} =$	6,500 ohms
Output power . . . . .	$W_o =$	28.5 W
Alternating grid voltage (per grid) . . . . .	$V_i =$	16 $V_{\text{eff}}$
Distortion at maximum output . . . . .	$d_{\text{tot}} =$	2.25 %

MAXIMUM RATINGS per valve

- $V_{a0} = \text{max. } 600 \text{ V}$
- $V_a = \text{max. } 375 \text{ V}$
- $W_a = \text{max. } 18 \text{ W}$
- $V_{g20} = \text{max. } 600 \text{ V}$
- $V_{g2} = \text{max. } 275 \text{ V}$
- $W_{g2} (V_i = 0) = \text{max. } 2 \text{ W}$
- $W_{g2} (W_o = \text{max.}) = \text{max. } 3.5 \text{ W}$
- $I_k = \text{max. } 90 \text{ mA}$
- $V_{g1} (I_{g1} = + 0.3 \mu\text{A}) = \text{max. } -1.3 \text{ V}$
- $R_{g1k} = \text{max. } 0.7 \text{ M ohm}$
- $R_{fk} = \text{max. } 5,000 \text{ ohms}$
- $V_{fb} = \text{max. } 50 \text{ V}$

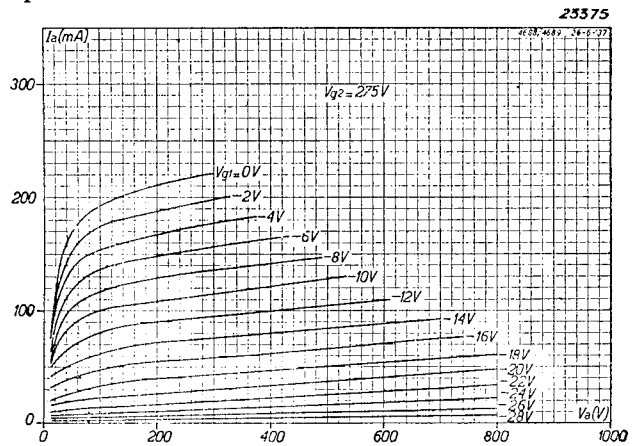


Fig. 4  
Anode current of the 4689 as a function of the anode voltage for different values of grid bias.  $V_{g2} = 275 \text{ V}$ .

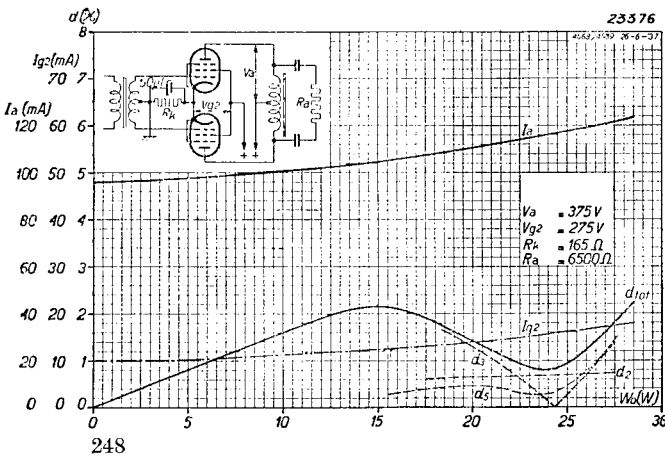


Fig. 5  
Total distortion, total anode and screen-grid current as functions of the output power; two valves 4689 in a Class B output circuit with automatic grid bias.