DAF 91   Diode - A.F. pentode battery valve
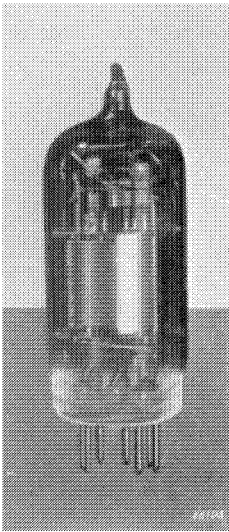
The DAF 91 is a diode-pentode battery valve. The pentode section is suitable for A.F. amplification, the diode being then used for detection or A.G.C.

The voltage amplification obtainable from the pentode section is approximately 45 at 45 V, 60 at 67.5 V, or 75 at 90 V.

When connected as a triode, the voltage amplification of the valve is 11.

The nominal filament voltage is 1.4 V with a filament current of 50 mA.

When the filament is connected in series with other valves, the filament voltage should be reduced to 1.3 V; this will ensure that no overloading takes place in the event of voltage fluctuations. If necessary, a resistor may be connected in parallel with the filament, to provide a shunt for the cathode current from other valves.

The properties of the valve from the point of view of microphony may be defined by stating that it is not usually necessary to take measures to prevent microphony when the input signal for the DAF 91 is not less than 40 mV when the output valve delivers 50 mW to a 5% efficient loudspeaker.

Fig. 1
The DAF 91 (approximately full size).

The significance of this value is fully explained in the chapters dealing with the EAF 42 and EBC 41.

TECHNICAL DATA OF THE DIODE-A.F. PENTODE DAF 91

Filament data

Heating: direct from battery, rectified A.C., or D.C.; series or parallel feed

In parallel with other valves

Filament voltage	V_f	=	1.4 V
Filament current	I_f	=	50 mA

In series with other valves

Filament voltage	V_f	=	1.3 V

Capacitances (valve cold)

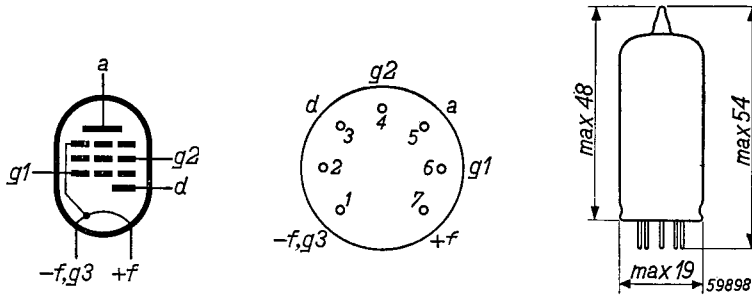|			
Input capacitance	C_{g1}	=	2.0 pF
Output capacitance	C_a	=	2.8 pF
Between anode and control grid	C_{ag1}	<	0.4 pF
Between diode-anode and filament	C_d	=	1.5 pF

Fig. 2
Electrode arrangement, electrode connections and max. dimensions (in mm) of the DAF 91.

Typical characteristics

Anode voltage	V_a	=	67.5	90	V
Screen grid voltage	V_{g2}	=	67.5	90	V
Control grid voltage	V_{g1}	=	0	0	V
Anode current	I_a	=	1.6	2.7	mA
Screen grid current	I_{g2}	=	0.4	0.65	mA
Mutual conductance	S	=	625	720	μA/V
Internal resistance	R_i	=	0.6	0.5	MΩ
Amplification factor: second grid with respect to first grid	μ_{g2g1}	=	13.5	13.5	

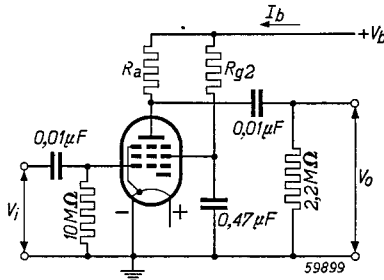## Operating characteristics of the pentode section used as A.F. amplifier

Fig. 3
The DAF 91 used as A.F. amplifier.

V_b (V)	R_a (MΩ)	R_{g2} (MΩ)	I_b (mA)	$\dfrac{V_o}{V_i}$	Distortion (%) at $V_o = 5$ V_{RMS}
45	1.0	3.3	0.05	45	2.0
67.5	1.0	3.3	0.075	60	3.0
90	1.0	3.3	0.10	67	5.0
45	1.0	4.7	0.045	44	4.5
67.5	1.0	4.7	0.065	62	2.0
90	1.0	4.7	0.09	75	2.0

Operating characteristics of the pentode section connected as A.F. amplifying triode (screen grid connected to anode)

See Fig. 3 for definitions of symbols.

V_b (V)	R_a (MΩ)	R_{g1} (MΩ)	R_{g1}'[1] (MΩ)	I_b (mA)	$\dfrac{V_o}{V_i}$	Distortion (%) at $V_o=5V_{RMS}$
90	0.22	10	0.68	0.25	11	1.0
90	0.47	10	1.5	0.13	11.6	0.8

[1] R_{g1}' is the grid leak of the next valve.

Limiting values

|		
Anode voltage	V_a	= max. 90 V
Anode dissipation	W_a	= max. 0.25 W
Screen grid voltage	V_{g2}	= max. 90 V
Screen grid dissipation . .	W_{g2}	= max. 0.06 W
Grid current starting point .	$V_{g1}(I_{g1}=+0.3$ μA$)$	= max. —0.4 V
Cathode current	I_k	= max. 4.5 mA
External resistance between control grid and cathode . .	R_{g1}	= max. 3 MΩ [1]
Peak inverse voltage: diode-anode	$V_{d\,inv\,p}$	= max. 100 V
Diode current	I_d	= max. 0.2 mA
Diode peak current	I_{dp}	= max. 1.2 mA
Starting point of diode current	$V_d(I_d=+0.3$ μA$)$	= max. —0.4 V
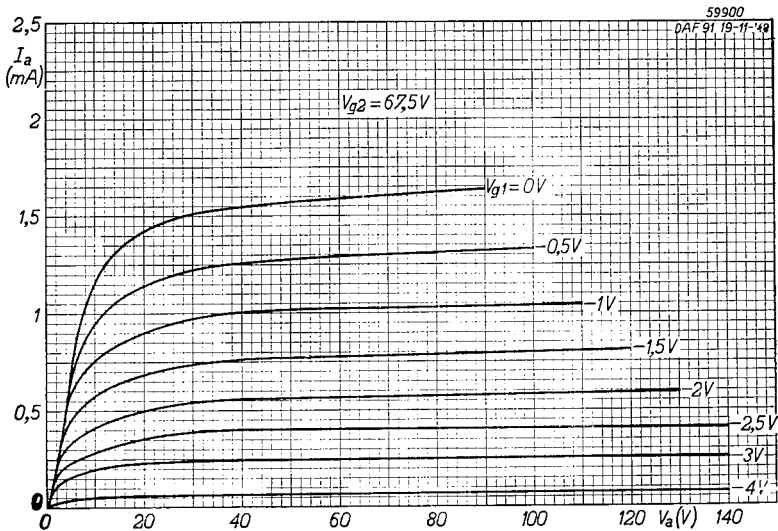
Fig. 4

I_a/V_a characteristics for a screen grid voltage (V_{g2}) of 67.5 V.
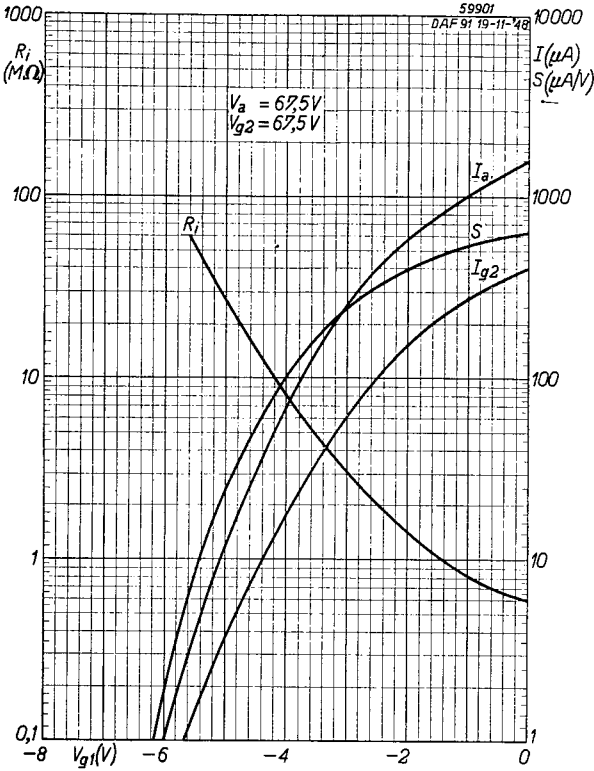
[1] With grid current biasing 22 MΩ.

Fig. 5
Anode current (I_a), screen grid current (I_{g2}), mutual conductance (S) and internal resistance (R_i) as functions of the grid bias (V_{g1}) with anode and screen grid voltages (V_a and V_{g2}) of 67.5 V.
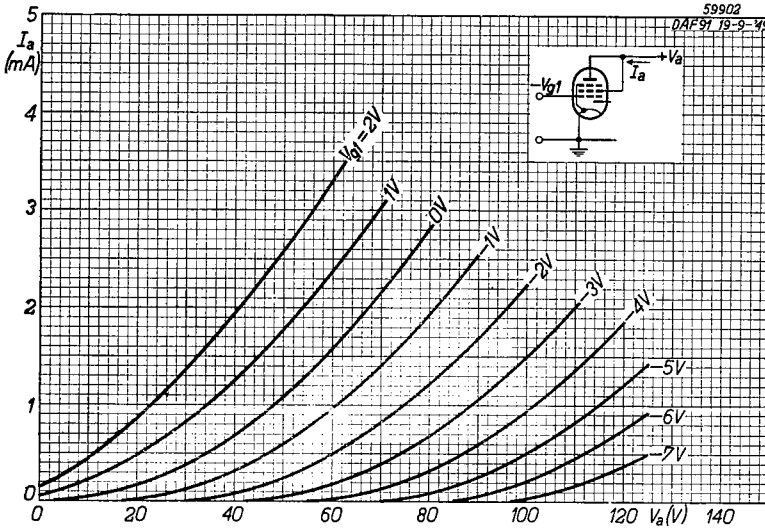

Fig. 6
I_a/V_a characteristics of the DAF 91 connected as a triode