# DAF 91 Diode - A.F. pentode battery valve

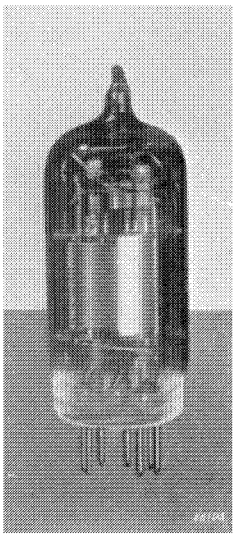

Fig. 1
The DAF 91 (approximately full size).

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.
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 |

# DAF 91

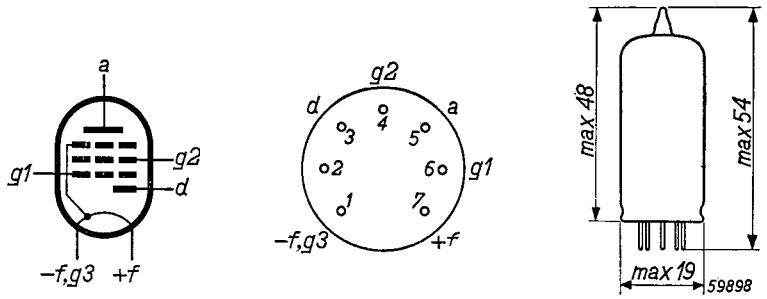


Fig. 2
Electrode arrangement, electrode connections and max. dimensions (in mm) of the DAF 91.

## 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 | $\mu_{g2g1}$ | = | 13.5 | 13.5 |

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

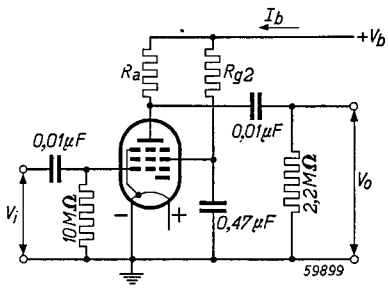


Fig. 3
The DAF 91 used as A.F. amplifier.

| $V_b$ (V) | $R_a$ (MΩ) | $R_{g2}$ (MΩ) | $I_b$ (mA) | $\frac{V_o}{V_i}$ | 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) | $\frac{V_o}{V_i}$ | Distortion (%) at $V_o = 5 V_{RMS}$ |
|---|---|---|---|---|---|---|
| 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 | $V_{g1}(I_{g1} = +0.3\ \mu A)$ | = 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 | $V_d(I_d = +0.3\ \mu A)$ | = max. −0.4 V |

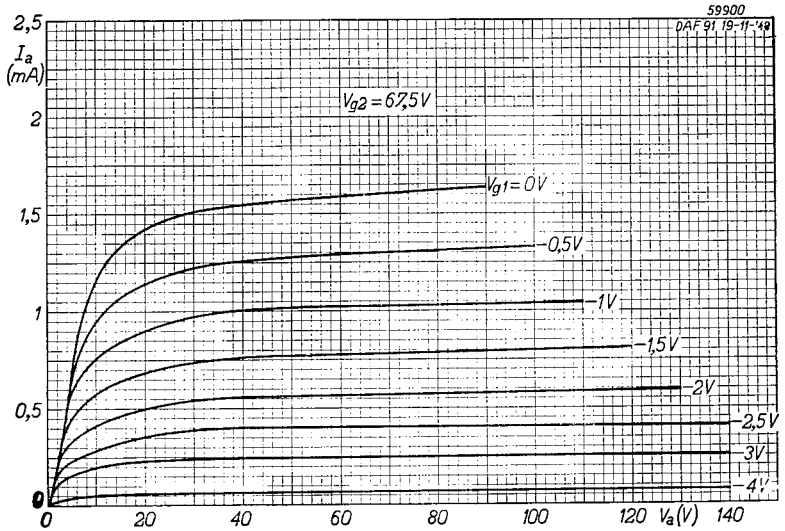


Fig. 4
$I_a/V_a$ characteristics for a screen grid voltage ($V_{g2}$) of 67.5 V.

[1]) With grid current biasing 22 MΩ.

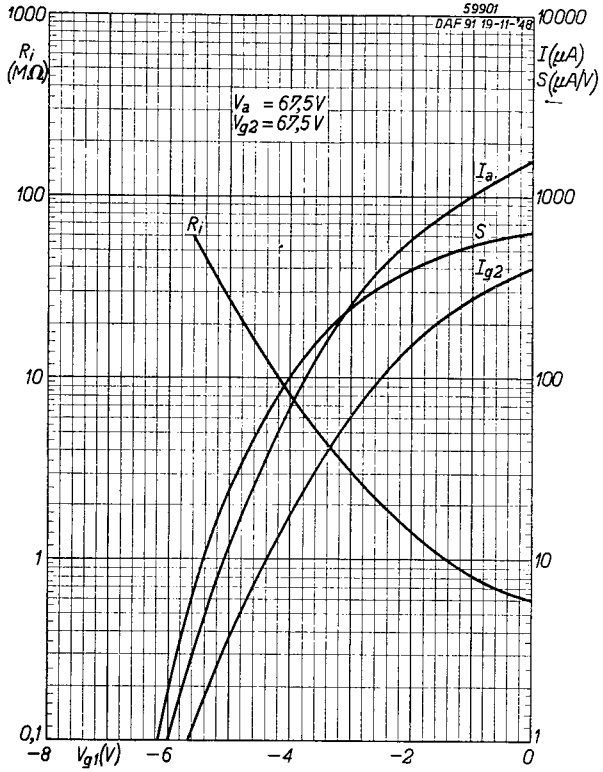


Fig. 5
Anode current ($I_a$), screen grid current ($I_{g2}$), mutual conductance ($S$) and internal resistance ($R_i$) as functions of the grid bias ($V_{g1}$) with anode and screen grid voltages ($V_a$ and $V_{g2}$) of 67.5 V.

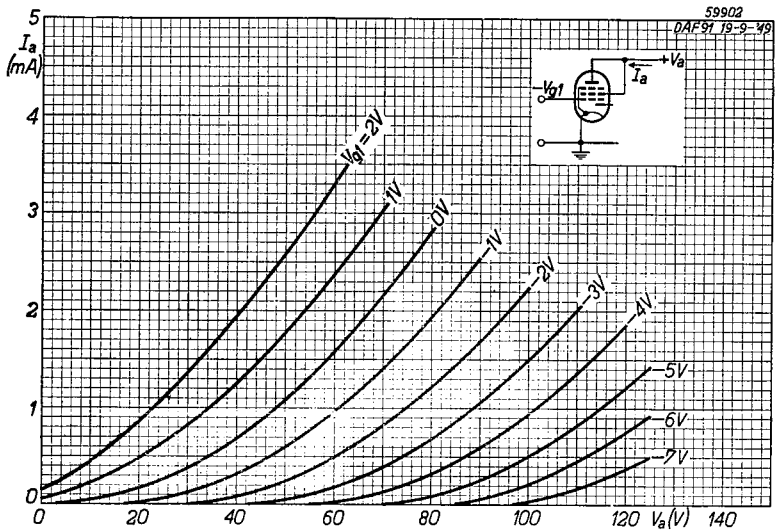


Fig. 6
$I_a/V_a$ characteristics of the DAF 91 connected as a triode