DAF 40 Diode-R.F. pentode battery valve

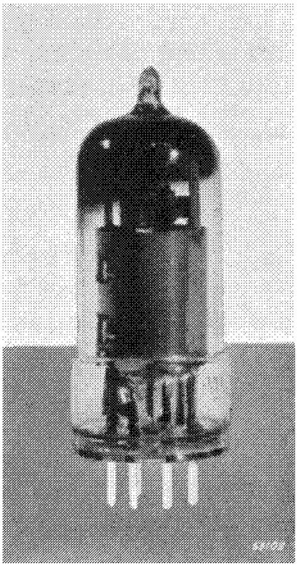

Fig. 1
The DAF 40, approximately actual size.

The DAF 40 is a diode-pentode for battery operation; the pentode section is designed for R.F. and I.F. amplification, the diode section for detection and A.G.C. A battery with a nominal voltage of 1.4 V can be used for the filament, which consumes only 25 mA. Since the valve is suitable for series feeding, it can also be used in mains receivers, as well as for battery receivers employing a vibrator. As the filament current in such sets is usually 50 mA, the filament of the DAF 40 can in such cases be connected in parallel with that of the DAF 41 (A.F. amplifier) to obtain a total filament current of 50 mA. Further, in receivers of this kind, the filament voltage should be limited to 1.3 V, to ensure that the filament will not be overloaded as a result of fluctuations in the mains or accumulator voltage. It may also be necessary to connect a resistor across the two filaments, to prevent an increase in filament current due to the cathode currents of the other valves.

Under normal operating conditions, the maximum permissible anode voltage of the DAF 40 is 135 V, and the maximum screen grid voltage 85 V, but when the output stage is without input signal, the supply voltage is liable to increase considerably, particularly in a set with Class B push-pull output and using a vibrator unit. This should be borne in mind in connection with the working point of the DAF 40, and provision should be made to ensure that the voltages applied to the valve are not excessive in the absence of an input signal.

On the other hand, when the valve is biased to cut-off, anode and screen grid voltages of up to 180 V are permissible; such conditions may occur when powerful signals are received and a large A.G.C. voltage is applied to the DAF 40, the volume control of the receiver in question being turned back.

The slope of the DAF 40 is 0.7 mA/V for an anode current of 0.85 mA, and the internal resistance is 1.7 - 2.6 MΩ (dependent on the anode voltage); the anode-to-grid capacitance is less than 0.0065 pF.

TECHNICAL DATA OF THE DIODE-PENTODE DAF 40

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	=	25 mA

In series with other valves :

Filament voltage . . .	V_f	=	1.3 V

Capacitances (measured on the cold valve)

Input capacitance . . .	C_{g1}	=	2.8 pF
Output capacitance	C_a	=	3.7 pF
Between anode and control grid	C_{ag1}	<	0.0065 pF
Between diode anode and cathode	C_d	=	2.1 pF
Between pentode anode and diode anode	C_{ad}	<	0.1 pF
Between pentode control grid and diode anode	C_{g1d}	<	0.003 pF

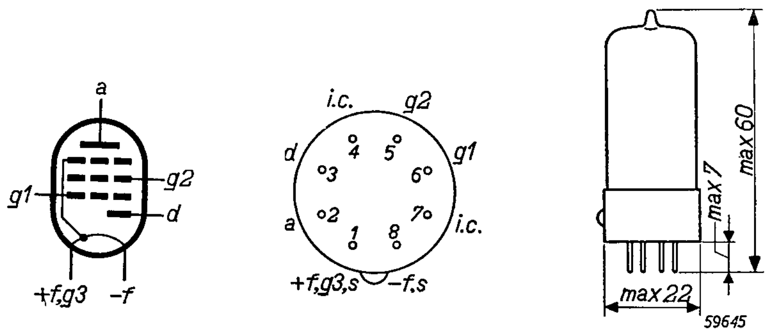

Fig. 2
Electrode arrangement, electrode connections and dimensions in mm of the DAF 40.

DAF 40

Operating characteristics of the valve used as R.F. or I.F. amplifier

Anode and supply voltage	$V_a = V_b$	=	67.5		90		V
Screen grid resistor	R_{g2}	=	0		120		kΩ
Grid bias	V_{g1}	=	0—3.7		0	—5	V
Screen grid voltage	V_{g2}	=	67.5	67.5	67.5	90	V
Anode current	I_a	=	0.85	—	0.85	—	mA
Screen grid current	I_{g2}	=	0.2	—	0.2	—	mA
Mutual conductance	S	=	700	7	700	7	µA/V
Internal resistance	R_i	=	1.7	>10	2.2	>10	MΩ
Amplification factor of grid 2 with respect to grid 1	μ_{g2g1}	=	32	—	32	—	
Equivalent noise resistance	R_{eq}	=	8.7	—	8.7	—	kΩ

Anode and supply voltage	$V_a = V_b$	=	120		V
Screen grid resistor	R_{g2}	=	270		kΩ
Grid bias	V_{g1}	=	0—6.8		V
Screen grid voltage	V_{g2}	=	67.5	120	V
Anode current	I_a	=	0.85	—	mA
Screen grid current	I_{g2}	=	0.2	—	mA
Mutual conductance	S	=	700	7	µA/V
Internal resistance	R_i	=	2.6	>10	MΩ

Limiting values of the pentode section

Anode voltage, valve biased to cut-off	V_{a_o}	= max.	180	V
Anode voltage	V_a	= max.	135	V
Anode dissipation	W_a	= max.	0.2	W
Screen grid voltage, valve biased to cut-off	V_{g2_o}	= max.	180	V
Screen grid voltage	V_{g2}	= max.	85	V
Screen grid dissipation	W_{g2}	= max.	0.02	W
Grid current starting point	$V_{g1}(I_{g1} = +0.3\mu A)$	= max.	—0.2	V
Cathode current	I_k	= max.	1.2	mA
External resistance between control grid and filament	R_{g1}	= max.	10	MΩ

Limiting values of the diode section

Peak inverse voltage	$V_{d\,inv\,p}$	= max.	100	V
Diode current	I_d	= max.	0.2	mA
Peak diode current	I_{dp}	= max.	1.2	mA

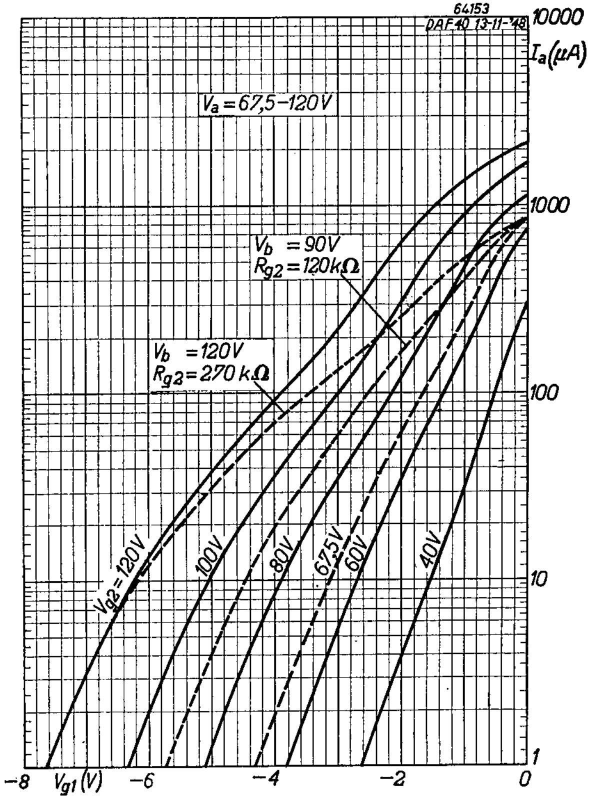

Fig. 3

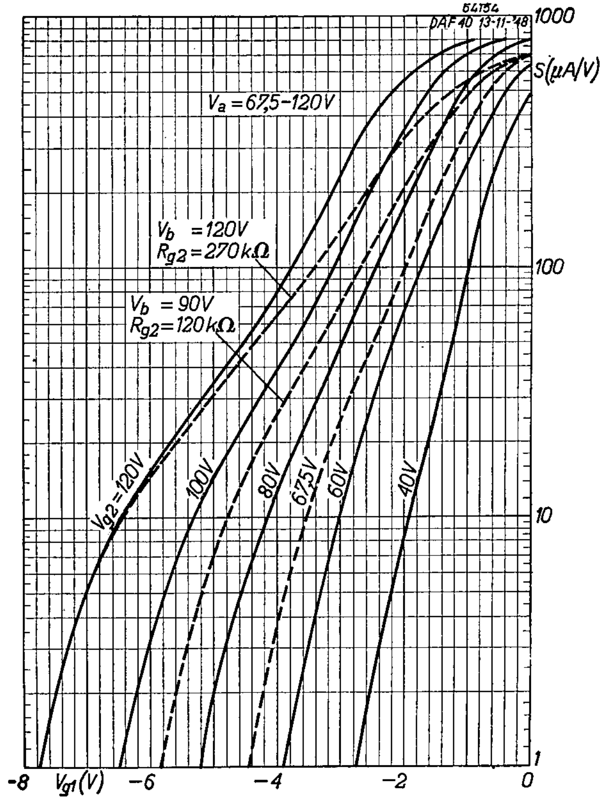

Fig. 4

Anode current (I_a, Fig. 3) and mutual conductance (S, Fig. 4) as functions of the grid bias (V_{g1}), with screen grid voltage (V_{g2}) as parameter. The dotted curves represent the anode current (Fig. 3) and mutual conductance (Fig. 4) at supply voltages of 120 and 90 V.

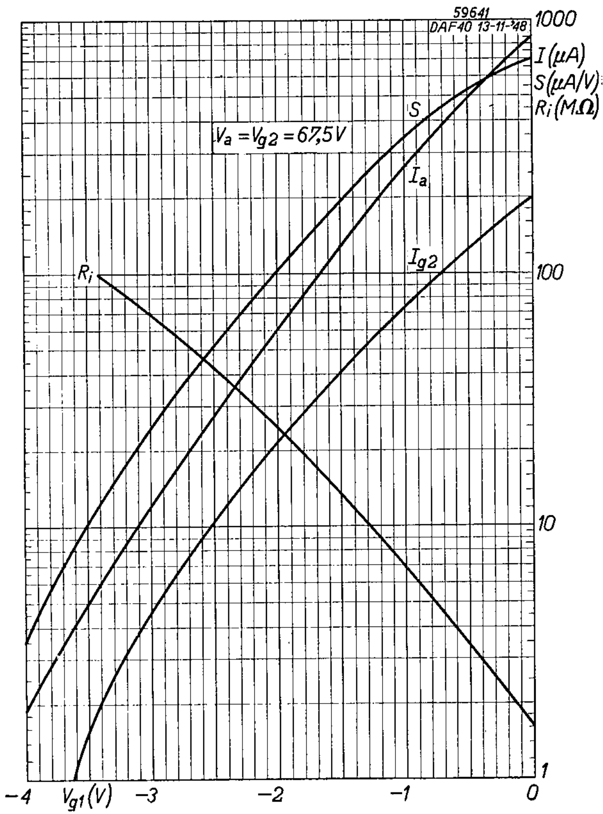

Fig. 5

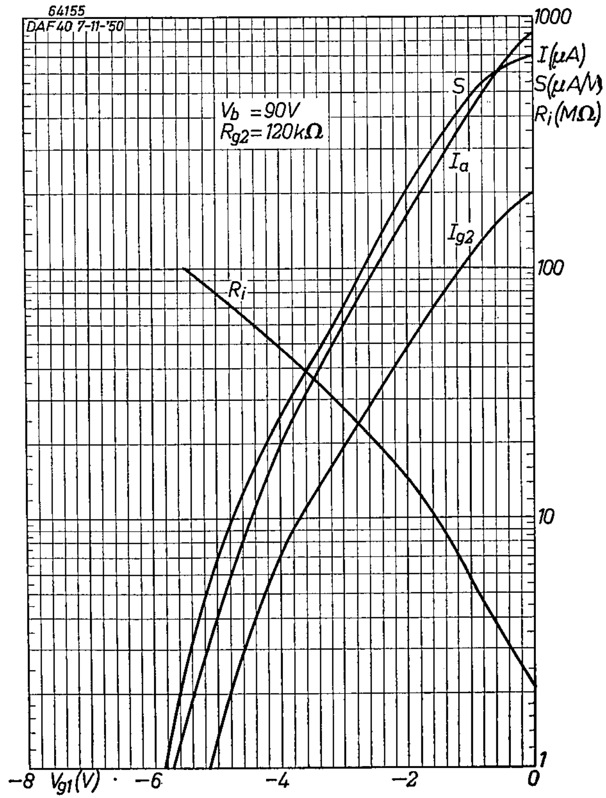

Fig. 6

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}) for an anode and screen grid voltage of 67.5 V (Fig. 5) and for a supply voltage of 90 V (Fig. 6).

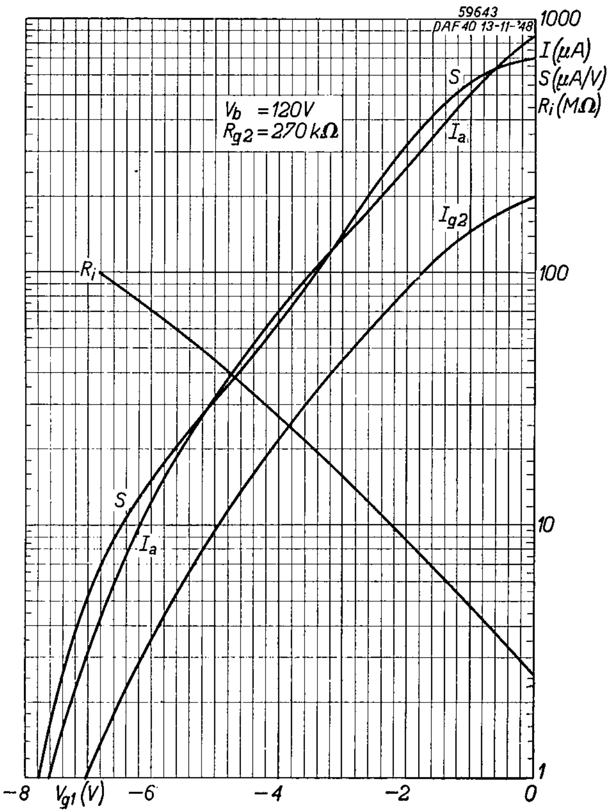

Fig. 7
As Fig. 6, but for a supply voltage of 120 V.

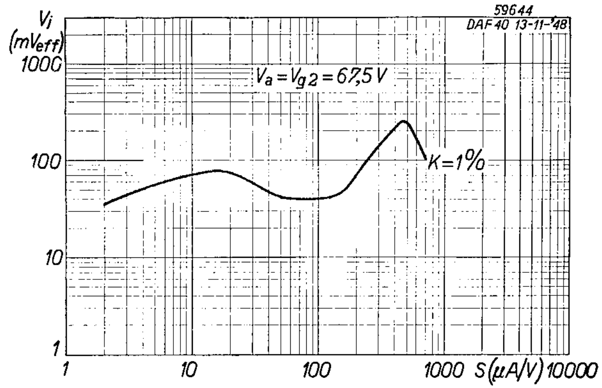

Fig. 8
The voltage (V_i) of an interfering signal at the control grid, producing 1% cross-modulation, as a function of the slope (S). $V_a = V_b = 67.5$ V.

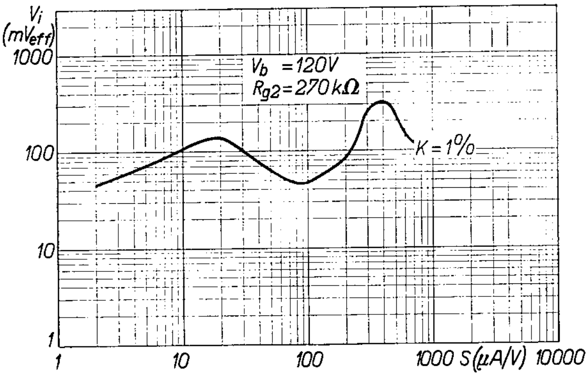

Fig. 9
As Fig. 8, but at $V_b = 120$ V.

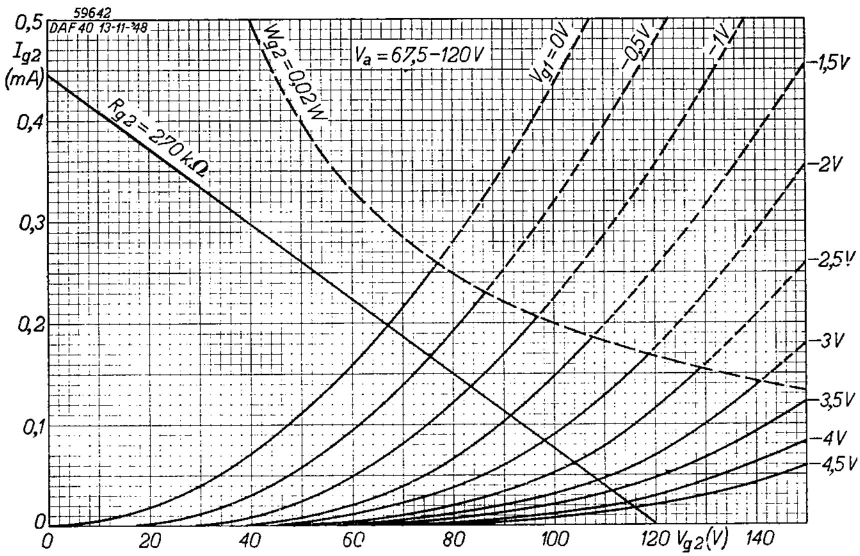

Fig. 10
Screen grid current (I_{g2}) as a function of the screen grid voltage (V_{g2}), with grid bias (V_{g1}) as parameter. The broken curve indicates the maximum screen grid dissipation ($W_{g2} = 0.02$ W). The straight line is the working line with a screen grid resistor $R_{g2} =$ 270 kΩ.