DBC 21 Double-diode triode

This directly-heated double diode triode has a filament voltage of 1.4 V, at a current of 50 mA. The gain factor in respect of the triode section is 25 and the mutual conductance 0.85 mA/V at an anode voltage of 90 V or 0.9 m A/V at 120 V. The impedance is relatively low, being 30,000 and 28,000 Ohms at these anode voltages, so that the valve can serve not only as detector and R—C coupled A.F. amplifier, but can also be used with transformer coupling, this being important if a push-pull output stage using the DLL 21 is to follow. In contrast with the DAC 21, the DBC 21 has two diodes, one of which can be used for detection, whilst the other is available for automatic gain control.

As regards the construction of the DBC 21, this valve has virtually two filaments, each taking 25 mA: one serves the triode portion and the other the two diodes. The triode is screened from the diode part by a plate which almost completely separates the two sections electrostatically: the two filaments are wired parallel within the valve, and the screen is connected to the filament pin marked —f,s in Fig. 2. The diode marked d_2 is mounted at that end of the filament which is in contact with pin —f,s and is therefore employed for detection (filament pin —f,s is to be earthed).

In this way the other diode automatically receives a small negative potential which serves for the automatic gain control, although, generally speaking, a slightly higher delay voltage is desirable.

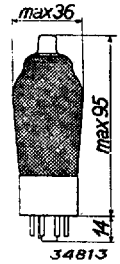
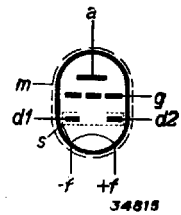


Fig. 1
Dimensions in mm.



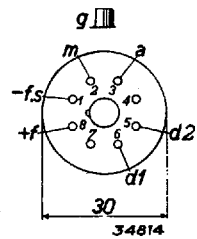


Fig. 2
Arrangement and sequence of contacts.

FILAMENT RATINGS

Filament supply: direct heating by means of a battery, rectified alternating current, or D.C.: series or parallel supply.

Filament voltage	V_f	= 1.4 V
Filament current	I_f	= 0.050 A

CAPACITANCES

Anode-grid	C_{ag}	= 2.6 pF
Grid-filament	C_{gf}	= 1.7 pF
Anode-filament	C_{af}	= 4.0 pF
Between diodes	$C_{d_1d_2}$	< 1.2 pF
Diode 1-filament	C_{d_1f}	= 2.4 pF
Diode 2-filament	C_{d_2f}	= 2.0 pF
Between the 2 diodes and grid	$C_{(d_1+d_2)g}$	< 0.01 pF
Between the 2 diodes and anode	$C_{(d_1+d_2)a}$	< 0.1 pF

RATINGS FOR THE TRIODE SECTION

Anode voltage	V_a	= 90	120 V
Grid bias	V_g	= —0.5	—1.5 V
Anode current	I_a	= 1.4	1.6 mA
Gain factor	μ	= 25	25
Mutual conductance	S	= 850	900 μA/V
Internal resistance	R_i	= 30,000	28,000 Ohms

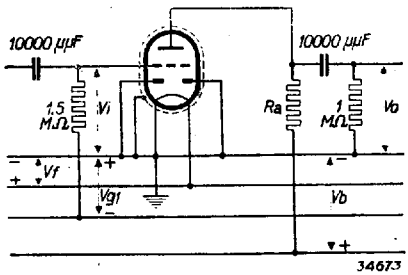


Fig. 3
Circuit diagram showing the triode section of the DBC 21 used as R.C. coupled A.F. amplifier, to illustrate the symbols employed in the Operating Data.

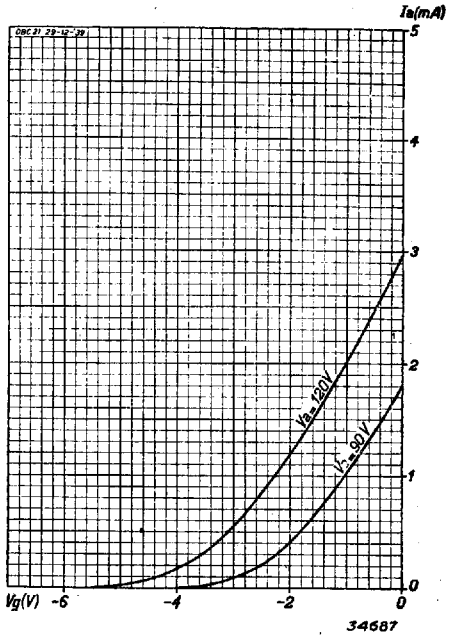


Fig. 4
Anode current as a function of the grid bias at Va = 90 V and 120 V.

OPERATING DATA: triode section employed as resistance-capacitance coupled A.F. amplifier

Battery voltage	V_b	=	90		120 V
Anode resistance	R_a	=	0.2	0.5	0.2	0.5 MOhms
Grid bias	V_g	=	—0.5	—0.5	—1	—1 V
Anode current	I_a	=	0.19	0.09	0.27	0.14 mA
Required alternating grid voltage for an effective output voltage of $V_{o\ \text{eff}}$ = 3 V	$V_{i\ \text{eff}}$	=	0.19	0.16	0.18	0.15 V
Voltage gain	V_o/V_i	=	15.5	19	16.5	19.5
Total distortion at an alternating output voltage $V_{o\ \text{eff}}$ = 3 V	d_{to}	=	0.7	0.5	1.0	0.8 %

MAXIMUM RATINGS FOR THE TRIODE SECTION

Anode voltage	V_a	=	max. 135 V
Anode dissipation	W_a	=	max. 0.3 W
Cathode current	I_k	=	max. 3 mA
Max. external resistance between grid and filament	R_{gf}	=	max. 3 M Ohms
Grid current commences at (I_g = +0.3 µA)	V_g	=	max. —0.2 V
Minimum limit for filament voltage	V_f	=	min. 1.1 V
Maximum limit for filament voltage	V_f	=	max. 1.5 V

MAXIMUM RATINGS FOR THE DIODE SECTION

Peak voltage on diode d_1	V_{d1}	=	max. 125 V
Peak voltage on diode d_2	V_{d2}	=	max. 125 V
Max. D.C. through resistor of diode 1	I_{d1}	=	max. 0.2 mA
Max. D.C. through resistor of diode 2	I_{d2}	=	max. 0.2 mA
Diode current commences at	V_{d1} (I_{d1} = +0.3 μA)	=	max. —0.4 V
Diode current commences at	V_{d2} (I_{d2} = +0.3 μA)	=	max. —0.7 V

APPLICATIONS

The uses of this valve are restricted to diode detection with subsequent R—C coupled, or transformer-coupled A.F.amplification. It is recommended that a grid bias of at least 0.5 V be applied to the grid of the triode, since in some cases grid current commences to flow at —0.2 V. In view of possible microphony, the gain between the diode and triode sections should not exceed a factor of 15.
In the case of series-parallel circuits precautions must be taken as described on p. 82.

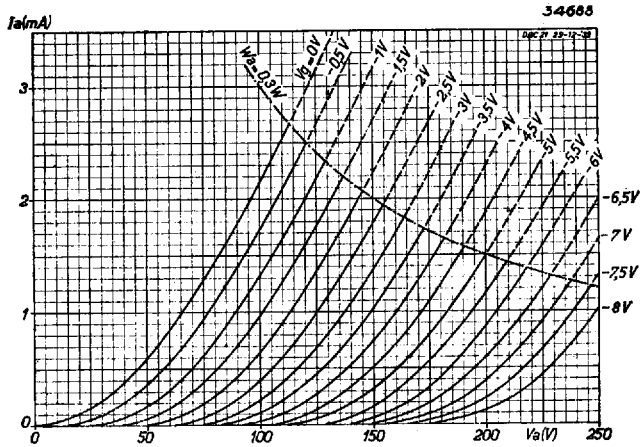


Fig. 5
Anode current as a function of the anode voltage, with Vg as parameter.